

## COMMENTARY

## Duration Isn't Everything. Healthy Sleep in Children and Teens: Duration, Individual Need and Timing

Commentary on Paruthi et al. Consensus statement of the American Academy of Sleep Medicine on the recommended amount of sleep for healthy children: methodology and discussion. *J Clin Sleep Med* 2016;12(11):1549–1561.

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A recent publication in the *Journal of Clinical Sleep Medicine* provided general guidelines for child and adolescent sleep duration by age group.<sup>1</sup> This was followed by a publication in this issue the *Journal of Clinical Sleep Medicine* that provides an in-depth description of the methods used to arrive at the sleep duration recommendations.<sup>2</sup> These publications are long awaited, and the consensus statement carries particular weight due to the endorsements of American Academy of Pediatrics, the Sleep Research Society, and the American Academy of Sleep Medicine.<sup>3</sup> The authors performed an exhaustive evaluation of peer reviewed publications selected based on the Oxford Criteria, and then used a Rand Appropriateness modeling approach to arrive at consensus on best estimates of healthy sleep duration for children ages 4 months to 17 years. Developing consensus about this important health behavior certainly demands great care and consideration because deficient sleep duration is a contributor to decrements in physical health, mental health, and development.

Publication of these recent AASM recommendations follows comparable recommendations from the National Sleep Foundation, which differ in part by including a category “May be Appropriate” that extends the range of sleep durations for each age grouping by  $\pm 2$  hours.<sup>3</sup> We raise a few key challenges to the consensus recommendations and have equally significant concerns about the NSF recommendations which used similar methodology. Most important, the ranges of sleep times and ages are too broad for the recommendations to be understood and applied by providers and caregivers, and policy makers. Additionally, neither set of recommendations addresses several sleep variables that are necessary to provide context for sleep duration recommendations. Such additional variables include the timing of sleep episodes during the night and day, individual variability in daily sleep need, and signs of insufficient sleep. While only alluded to in the methodology paper, introducing such concepts in the consensus recommendations is necessary, as these variables are as important as sleep duration due to their demonstrated direct impact on child health.<sup>4</sup>

If sleep duration were a simple phenomenon, such as the dosing of a medication to treat an underlying illness and decrease

symptom expression, the current recommendations might be sufficient. Evidence is more than ample, however, showing that sleep is a complex psychophysiological phenomenon in which sleep duration, sleep episode timing (i.e., circadian rhythms), and napping are equally important components of optimal sleep health.<sup>5,6</sup> Furthermore, although variability in individual sleep need is addressed in the methodology papers, the authors provided no guidance on identification of signs of inadequate sleep. Nutrition is a perfect analogy: It is not sufficient to make broad recommendations regarding caloric intake without consideration of the source of the calories (e.g., raw vegetables, cooked vegetables, sources of protein and carbohydrate) and when the body can best use these resources. Granted, any sweeping recommendations to improve public health must be clear and almost self-evident so that they can be understood and used consistently by the general public and health care providers. As with nutrition, the message about sleep health is not as simple as “back to sleep,” “click-it or ticket,” or “an aspirin a day...” Therefore, the way the message is crafted and delivered is as important as the quality and accuracy of the data.

While long overdue, the release of the recommendations is complicated by deficiencies in the evidence base that links sleep duration to long-term health outcomes. Moreover, there is to date no consensus on the outcome variables and tools to determine the short- and long-term signs and effects of deficient sleep.<sup>7</sup> This remains an unfortunate gap in the science, but we applaud the leadership and effort of the American Academy of Sleep Medicine and agree that development of consensus recommendations is both appropriate and necessary at this time. While we agree that the science is evolving, guidelines for pediatric sleep duration are absolutely necessary and they are anticipated to promote health and pose minimal risk. We hope the scientific gaps exposed by the current recommendations will help to drive commitments on the part of funding agencies and increase enthusiasm in among scientific review panels.

To use the nutrition analogy again, it was deemed important for the federal government to release initial nutrition recommendations (e.g., the food pyramid),<sup>8</sup> and to make revisions

to reflect advances in health and nutrition science. The nutrition recommendations address the broad average health needs and have benefited the public as a whole and guided numerous policies, such as the use of product labeling and school lunch nutrition. The recommendations, however, do not account for individual differences and could theoretically be harmful when individuals have a chronic illness or a metatype that requires modifications. Likewise, the *Back to Sleep* campaign resulted in a drop in SIDS rates of almost 50%, but some children will suffer from GERD and plagiocephaly as a result of such recommendations.<sup>9,10</sup> In this context, the release and development of the “Back to Sleep” campaign were carefully calculated risks.<sup>11</sup> With regard to the current sleep duration recommendations, discussion of risks and benefits as well as signs of insufficient sleep is lacking.

Our most significant concerns about the current recommendations are that the age and sleep duration ranges are too broad for easy interpretation, and no implementation guidance is given for caregivers, schools, and providers. For example, how will the caregiver of a 6-year old interpret a range of 9–11 hours for their child? Was the bottom end of the range intended for the top of the age range? Could a caregiver assume and implement a plan of 9 hours of sleep for a 6-year old when in reality it is not sufficient for the majority of children between 6 and 9 years? Such concerns also apply to the older age group, as 8 hours of sleep is typically not sufficient for the majority of 13 or 14-year olds and perhaps may not even be sufficient for many 17-year olds. Based on publications selected for the recommendations there are several instances when the authors provide evidence that these shorter sleep durations are associated with negative health outcomes for different age groups, yet their final recommendations conflict with the literature. The following are just a few of the conflicts:

“Limited data also suggested that sleeping less than 10 hours was associated with a greater risk of accidental injury and reduced quality of life several years later”<sup>2</sup>;  
 “Most informative was a large meta-analysis of children from 20 countries that indicated children between 9 and 12 years of age slept approximately 10 hours per night. In addition, data were available suggesting children sleeping 10 hours or more per night reported better health”<sup>2</sup>;  
 “Similarly, in a cohort study of 1,930 children ages 0–13 years, in younger children, ages 0–4 years, sleep duration of less than 11 hours was subsequently associated with increased risk of being overweight or obese.”<sup>2</sup>

Furthermore, the rationale for the age groupings are based on those selected by other groups; yet it is noteworthy that the NIH recommendations use general developmental categories without ages and narrower sleep duration recommendations (i.e., preschool age: 11–12 hours; school age: at least 10 hours; teens: 9–10 hours). While very general, the NIH recommendation addresses important changes in sleep and circadian regulation and environmental demands that occur at the transition to elementary school and for older children at the onset of puberty. Clearer justification of age groupings based on the

scientific literature and consideration of how the public would interpret the groups would have been optimal.

The choice to use specific and overlapping categories of health outcomes is quite reasonable and emphasizes the importance of sufficient sleep and the need for future research. It is important to note that virtually all of the outcomes are quite distal to episodic or chronic deficient sleep duration. It is not clear why the authors did not include outcome variables that are sensitive to the daily effects of insufficient sleep such as daytime tiredness, increased daytime sleep propensity, impaired attention, and mood dysregulation. These variables are important as they provide immediate feedback on day to day deficiencies in sleep that can guide caregivers and providers understanding individual’s children’s sleep need.

In summary, sleep health has been identified as a national health priority and there must be rational and implementable recommendations as well as a commitment to a research plan that addresses large gaps in the scientific literature on optimal sleep. Until science catches up with the public health recommendations, it is safer to recommend the higher rather than the lower estimates of sleep. Such sleep health recommendations should also reflect some of the complexities of the sleep and circadian system, while at the same time they must be communicated in a way that the public can understand and implement them. A statement about sleep duration, even with narrow implementable parameters, cannot capture the complexity of the sleep wake system between 4 months and 17 years. To improve the public health message we recommend a few modifications and additions that will clarify the message and support implementation. The following modifications and clarifying statements are derived from standard clinical practice and scientifically established principles:

1. Provide recommended sleep ranges for each year or at most 3 year age groupings with a narrow range of sleep durations that are optimal for every age grouping and consistent with the child development literature.
2. Provide indicators for determining sleep need and identifying the signs of insufficient sleep (e.g., difficulty waking in the morning; unplanned or long daytime naps; irritability, depressed mood, low frustration tolerance, difficulties in school, and inattention).
3. Provide general guidelines on the timing of day and night sleep periods (e.g., a. day-to-day sleep duration varying more than 1.5 hours on weekdays and more than 2 hours on weekends is a sign of insufficient sleep and possibly a circadian rhythm misalignment or disorder; and for children older than 6 years, afternoon naps longer than 20 minutes may indicate insufficient nocturnal sleep, can delay bedtime, and can contribute to circadian rhythm dysregulation).

## CITATION

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## SUBMISSION & CORRESPONDENCE INFORMATION

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