Letter to the Editor

Does Insufficient Sleep Increase the Body Mass Index in Adolescents?

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Dear Editor,

We read with interest the study by Yang et al. [1] that determines the relationship between the amount of sleep obtained during adolescent youth and their body mass index (BMI). The investigators enrolled a sample of 1,938 first-year students from the Shanghai University, China, aged 18–24 years, including 684 (35.3%) men and 1,254 (64.7%) women. They used a questionnaire-based assessment of sleep duration and employed medical examiners to assess height, weight, and body fat percentage to determine whether insufficient sleep is a risk factor for being overweight (BMI >24) or meeting criteria for obesity (BMI >28). The National Sleep Foundation [2] and the American Academy of Sleep Medicine recommends >8 h per 24-h period as healthy sleep duration for adolescents and defines insufficient sleep duration as a sleep duration of <6 h per 24-h period [3]. For the study, the investigators divided the participants into 3 groups based on their length of sleep: <6, 6–8, and >8 h per 24-h period. They conclude a longer sleep duration is associated with a lower BMI of the participants, even after adjustment for multiple confounders.

There are sparse data on obesity from populations that recently had economic growth and underwent a change in lifestyle. While the study aims to highlight the risk factors applicable to these new cohorts, we want to draw attention to the concerns we have about methods and analyses. We believe the data collected for this study are not adequately equipped to understand the association between sleep and BMI. For instance, the authors classified 200 out of 1,938 participants as overweight; however, they recorded a mean BMI of 20.3 ± 0.6 for this subgroup when the criterion for overweight is BMI >24. Similarly, they categorized 64 of 1,938 participants as obese, but the mean BMI they recorded was 24.1 ± 2.5 for this subgroup when the criterion for obesity is BMI >28. Thus, probably only a tiny fraction of the sample qualified to represent overweight and obese categories truly. On the other hand, only 103 of 1,938 reported <6 h of sleep (5.3%), and 312 of 1,938 (16.1%) reported >8 h of sleep.

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We also do not know what the authors meant by adjustment for multiple confounders with the inclusion of sleeping time as one of the confounders, when an association between sleeping time and obesity was the main research question. The authors included age as a potential confounder, which is confusing; if all participants were freshmen at a university (mean age 20.4 ± 0.8), it is unclear why a minor variation in age would confer significant additional risk. Furthermore, the authors acknowledge diet as an essential risk factor for obesity but do not elaborate in their article what they mean by diet practice, diet control, or a 2-year diet habit recall that undoubtedly is a too long period for recall. Finally, sedentary behavior and physical exertion, which are essential risk factors for obesity, have not been given due consideration in the study.

The relationship between body fat percentage and BMI is not discussed, and the premise for dividing the sample into 3 tertiles based on body fat percentage distribution is not entirely clear. In univariate and multivariate analyses, the investigators combine tertile 1 and 2 for comparison against tertile 3; the rationale again deserves a logical explanation.

The conclusion of the authors that longer sleep duration is associated with a lower BMI is misleading. The analyses tested for an association between the 3 sleep duration categories and the 3 binary outcomes (presence of overweight with BMI >24 , presence of BMI >28 , and presence of body fat percentage in the third tertile). In the multivariate model, with >8 h as the reference category, while both of the insufficient sleep duration categories (<6 and $6\text{--}8$ h) were associated with the presence of overweight outcomes, there was no significant association observed between the lowest sleep duration category (<6 h) and obesity. Moreover, for the body fat percentage outcome, only the <6 -h sleep duration category was associated with the highest body fat percentage. Thus, the authors' conclusion seems to imply a stronger, linear, and less nuanced relationship between variables than is warranted by the data.

Conflict of Interest Statement

The authors have no conflict of interest.

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Author Contributions

A.S. and T.O. wrote the letter. Both authors have approved the final article.

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