



Original Article

Associations between sleep duration and physical activity and dietary behaviors in Chinese adolescents: results from the Youth Behavioral Risk Factor Surveys of 2015



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ABSTRACT

Objective: To assess the association between sleep duration and physical activity and dietary behaviors among adolescents in a representative sample.

Methods: The analysis was performed using data from the 2015 Ningbo Youth Risk Behavior Survey. Associations between physical activity and dietary behaviors and sleep duration were examined on weighted data using logistic regression.

Results: Of the 10726 students, roughly 40% reported sleep duration <8 h. Longer sleep duration was associated with higher likelihood of milk intake, fruit consumption, vegetable consumption, water consumption, moderate physical activity, and muscle-strengthening physical activity, and with a lower likelihood of cigarette use, alcohol use, sweets intake, Western fast food intake, and breakfast skipping.

Conclusion: Insufficient sleep may be common among Chinese adolescents. Sleep duration was associated with dietary behaviors, physical activity, and other health-related behaviors. These findings suggest that sleep duration could be a potential target for many health-risk behaviors in young adolescents.

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1. Introduction

Sleep is recognized as an important indicator of health in children and adolescents [1,2]. Short sleep duration or insufficient sleep in adolescents may increase the risk of developing obesity [3–5] and other unhealthy conditions and behaviors [2,6], including physical inactivity [7], poor eating behaviors [6,8], and substance use [9,10]. Nowadays, Chinese adolescent students are always under a high burden of schoolwork, for reason of which they are more vulnerable to short sleep [11,12]. In addition, more and more students use computers and modern electronic equipment (eg, iPhones and iPads) which may also be associated with insufficient sleep in adolescents [6,13,14]. Adolescence is a critical period for the development of behaviors and lifestyle patterns from childhood to adulthood. Most previous studies on relationships between sleep and unhealthy behaviors among adolescents have come from developed countries [6,7,9,14,15], and the results have

been inconsistent. However, to the best of our knowledge, no larger representative sample studies have examined insufficient or short sleep duration and its related health behaviors among Chinese adolescents. To fill these knowledge gaps, the purposes of this study were (1) to estimate the prevalence of inefficient sleep among school-aged adolescents in Ningbo, China, and (2) to investigate the relationship among sleep duration and dietary, physical activity, cigarette smoking, and alcohol drinking behaviors.

2. Methods

2.1. Study subjects

This cross-sectional study is an epidemiologic survey that was established by Ningbo Centers for Disease Control and Prevention to monitor the prevalence of youth behaviors mostly influencing health. This study was carried out during a two-month period from October to November 2015, and the questionnaire was established with reference to the Youth Risk Behavior Surveillance (YRBS) survey conducted in the United States [16]. The questionnaire was reviewed, checked, and approved by experts, and was revised after a pilot survey. A two-stage cluster sample design produced a

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Table 1
Questionnaire regarding dietary behaviors, physical activity, sedentary activity, and other behaviors.

Health-related behavior	Question
Dietary behavior	
Milk (≥ 1 day/wk)	During the past 7 days, how many days did you drink milk? (0 days, <1 day, 1–2 days, 3–4 days, 5–7 days)
Fruits (≥ 1 time/d)	During the past 7 days, how many times did you eat fruits every day (not counting fruit juice)? (0 times, 1 time, 2 times, 3 times, 4 times, ≥ 5 times)
Vegetables (≥ 1 time/d)	During the past 7 days, how many times did you eat vegetables every day? (0 times, 1 time, 2 times, 3 times, 4 times, ≥ 5 times)
Western fast food (≥ 1 day/wk)	During the past 7 days, how many days did you eat Western fast food, such as hamburgers, hotdogs, or potato chips, etc.? (0 days, 1 day, 2 days, 3 days, 4 days, 5 days, 6 days, 7 days)
Water (≥ 4 cups/d)	During the past 7 days, how many cups (about 200 mL per cup) or glass of plain water did you drink each day? (<2 cups, 2–3 cups, 4–5 cups, 6–7 cups, ≥ 8 cups)
Sweets (≥ 1 day/wk)	During the past 7 days, how many days did you eat sweets, such as chocolate, ice cream, candy, cakes, etc.? (0 days, 1 day, 2 days, 3 days, 4 days, 5 days, 6 days, 7 days)
Breakfast skipping (breakfast consumption frequency ≤ 6 days/wk)	During the past 7 days, on how many days did you eat breakfast? (0 days, 1 day, 2 days, 3 days, 4 days, 5 days, 6 days, 7 days)
Physical activity	
Moderate physical activity (≥ 1 day/wk)	During the past 7 days, on how many days did you participate in at least 60 min per day of any kind of physical activity that increased your heart rate and made you breath hard, such as kicking shuttlecock, fast bicycling, or aerobic activities, etc.? (0 days, 1 day, 2 days, 3 days, 4 days, 5 days, 6 days, 7 days)
Muscle strengthening activity (≥ 1 day/wk)	During the past 7 days, on how many days did you do exercises to strengthen or tone your muscles, such as push-ups, sit-ups, weight lifting, etc.? (0 days, 1 day, 2 days, 3 days, 4 days, 5 days, 6 days, 7 days)
Sedentary activity	
Watch television (≥ 2 h/d)	During the past 7 days, in an average school day, how many hours did you watch TV? (0 h, <1 h, 1–2 h, 2–3 h, 3–4 h, 4–5 h, ≥ 5 h)
Use computer (≥ 2 h/d)	During the past 7 days, in an average school day, how many hours did you spend using a computer for playing games, surfing, e-mailing, watching movies, etc.? (open question)
Other behavior	
Cigarette use (yes)	During the past 30 days, how many days did you smoke cigarettes? (0 days, 1–2 days, 3–5 days, 6–9 days, 10–19 days, 20–29 days, 30 days) (participants who answered they had smoked at least 1 day during the past 30 days were considered to have cigarette-smoking behavior)
Alcohol use (yes)	During the past 30 days, how many days did you drink alcohol? (0 days, 1–2 days, 3–5 days, 6–9 days, 10–19 days, 20–29 days, 30 days) (participants who answered they had consumed alcohol at least 1 day during the past 30 days were considered to have alcohol-drinking behavior)
Perceived sadness/hopelessness (yes)	During the past 12 months, did you ever feel so sad or hopeless almost every day for 2 weeks or more in a row that you stopped doing some usual activities? (yes, no)
Physical fighting (yes)	During the past 12 months, how many times were you in a physical fight? (0 times, 1 time, 2–3 times, 4–5 times, 6–7 times, 8–9 times, 10–11 times, ≥ 12 times) (participants who answered that they had had fights at least 1 time during the past 12 months were considered to have fight behavior)

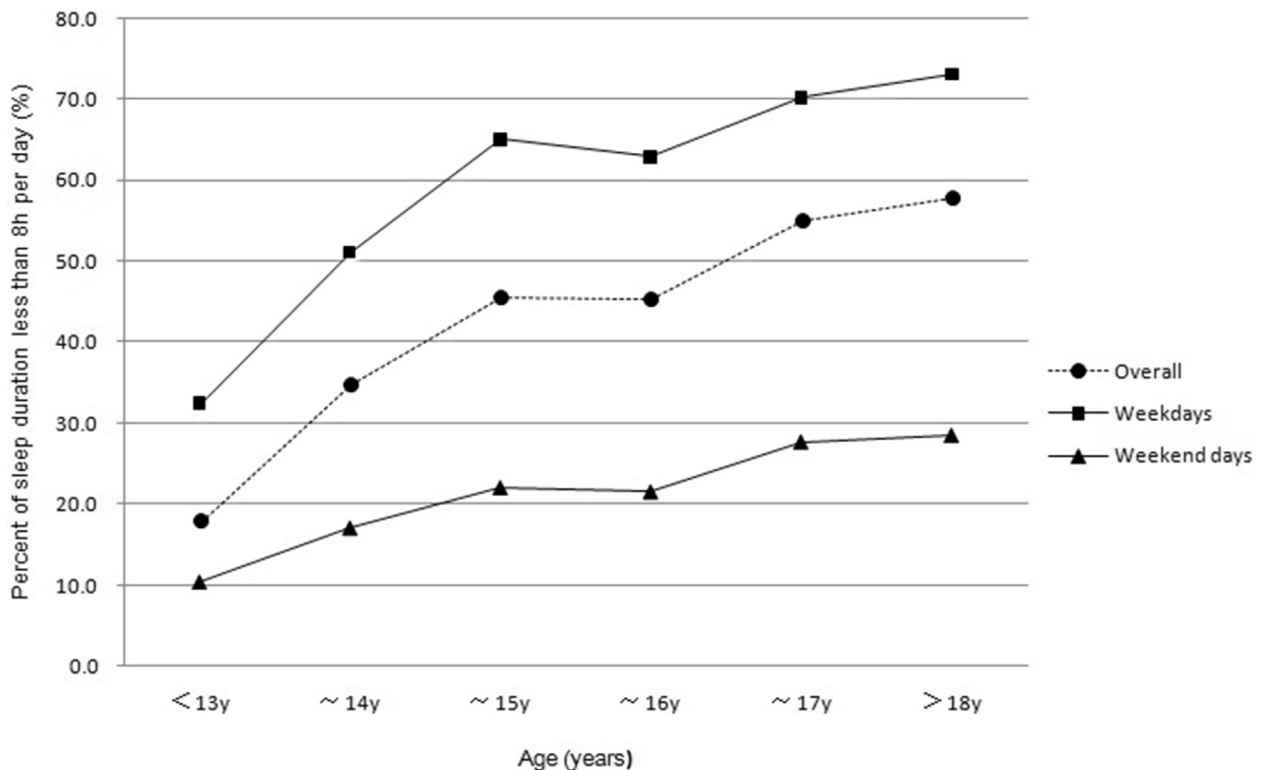


Fig. 1. Prevalence of sleep duration <8 h on overall, weekdays and week end days by age.

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