



## Short sleep duration as a risk factor for childhood overweight/obesity: a large multicentric epidemiologic study in China☆

Jinwen Zhang, MD<sup>a,b,d</sup>, Xingming Jin, MD<sup>c</sup>, Chonghuai Yan, MD, PhD<sup>d</sup>, Fang Jiang, MD, PhD<sup>c</sup>, Xiaoming Shen, MD, PhD<sup>d,\*</sup>, Shenghui Li, MD, PhD<sup>a,d,\*\*</sup>

<sup>a</sup> School of Public Health, Shanghai Jiao Tong University, Shanghai, China

<sup>b</sup> Xin Hua Hospital, School of Medicine, Shanghai Jiao Tong University, Shanghai, China

<sup>c</sup> Children's Medical Center, School of Medicine, Shanghai Jiao Tong University, Shanghai, China

<sup>d</sup> MOE-Shanghai Key Laboratory of Children's Environmental Health, Shanghai, China

### ARTICLE INFO

#### Article history:

Received 15 March 2015

Received in revised form 5 June 2015

Accepted 7 June 2015

#### Keywords:

Children

BMI

Obesity/overweight

Sleep duration

Sleep-schedule variability

China

### ABSTRACT

**Objectives and setting:** The present study was designed to examine the association of sleep duration with obesity/overweight in a multicentric urban sample of Chinese children.

**Participants and design:** A random sample of 17,696 children aged 7.00–11.99 years participated in a cross-sectional multicentric survey.

**Measurements:** The Chinese version of the Children's Sleep Habits Questionnaire was used to collect information on children's sleep behaviors. Body mass index (BMI) was calculated as weight (kilograms)/height squared (square meters). Sex, age, and BMI were used to define overweight and obesity based on the definition recommended by the Working Group on Obesity in China.

**Results:** The prevalence of obesity and overweight in Chinese school-aged children was 10.7% and 10.3%, respectively. Hierarchical multiple linear regression models revealed a significant association between shorter sleep duration (hours/day) and increased BMI ( $\beta = -0.120$ ;  $P = .019$ ). Multivariate logistic regression models demonstrated that, compared with sleep duration  $\geq 10$  hours/d, mean sleep duration  $< 9$  hours/d experienced increased likelihood of overweight/obesity (odds ratio = 1.21;  $P = .005$ ). Moreover, sleep-schedule variability, independent of sleep duration, was found to be associated with overweight/obesity (odds ratio = 1.11;  $P = .016$ ).

**Conclusions:** Sleep duration and sleep-schedule variability, along with television viewing, homework schedule, and snack eating, were linked to overweight/obesity among elementary school children in this population-based sample.

© 2015 National Sleep Foundation. Published by Elsevier Inc. All rights reserved.

### Introduction

Given a significant increase in the prevalence worldwide during the past few decades, overweight/obesity has been recognized as a global epidemic.<sup>1</sup> Childhood overweight/obesity has been associated with psychosocial problems, such as low self-esteem and depression.<sup>2,3</sup> Moreover, most childhood obesity can continue into adulthood<sup>4</sup> and

significantly be linked to numerous comorbidities, including type 2 diabetes, hypertension, coronary heart disease, dyslipidemia, endothelial dysfunction, and metabolic syndrome.<sup>5–7</sup> Increasing attention is being focused on potential risk factors of overweight/obesity in children and that may therefore be important targets for intervention.

The decrease in sleep duration has occurred over the same time period as the increase in the prevalence of obesity. Over the past century, sleep duration in children and adolescents has decreased by 0.75 minutes per year.<sup>8</sup> It has been reported that 40% of school-aged children are not getting sufficient sleep.<sup>9</sup> Evidence has accumulated to indicate that sleep duration may be an important influential factor for obesity.<sup>10,11</sup> Most cross-sectional and prospective studies have indicated that there was an association between short sleep duration and overweight/obesity in children.<sup>12–14</sup> In addition, it was reported that longer weekend/holiday sleep duration may partly ameliorate the association.<sup>15</sup>

It should be noted that nearly all studies evaluating the association between sleep duration and obesity focused on children in

☆ Competing interests: There are not any financial competing interests or nonfinancial competing interests to declare.

\* Corresponding author: X Shen, MOE-Shanghai Key Laboratory of Children's Environmental Health, Xinhua Hospital, Shanghai Jiao Tong University School of Medicine, 1665 Kong Jiang Road, Shanghai, 200092, P R China. Tel.: +86 21 65028710.

\*\* Corresponding author: S Li, School of Public Health affiliated with Shanghai Jiao Tong University School of Medicine, 227 South Chongqing Road, 200127, P R China. Tel.: +86 21 63846590x776139.

E-mail addresses: [fanjiang@shsmu.edu.cn](mailto:fanjiang@shsmu.edu.cn) (F. Jiang), [Shenxm9907@126.com](mailto:Shenxm9907@126.com) (X. Shen), [Lsh9907@163.com](mailto:Lsh9907@163.com) (S. Li).

developed countries, with much less work being directed at children in developing countries. China, a developing country, is facing a critical challenge of rapidly increasing prevalence rate of childhood overweight/obesity. According to data from the Chinese National Survey on Students Constitution and Health showed that, among Chinese children aged 7–12 years, the prevalence of overweight (10.8%) and obesity (6.8%) in 2005 had increased approximately 10- and 20-fold since 1985, respectively.<sup>16</sup> Previous studies have found an association between short sleep duration and obesity among Chinese preschool children and adolescents.<sup>17,15,18</sup> However, to our knowledge, no study has explored this association among Chinese school-aged children. Therefore, the present study was designed to investigate the association between sleep duration and overweight/obesity among Chinese school-aged children based on a large representative sample, controlling for a number of potential confounding factors.

## Participants and methods

### Study participants and protocol

This study is part of a cross-sectional study on sleep and health among Chinese school-aged children. Detailed information on subject enrollment was described previously.<sup>19,20</sup> Briefly, a large national cross-sectional survey was undertaken in 8 Chinese cities (Fig. 1). Twenty-three thousand seven hundred ninety-one school-aged children were recruited from 6 grades of 55 eligible primary schools in 39 districts. Of 23,791 children, 22,018 (92.5%) returned completed questionnaires. Given the possible influences of pubertal development on sleep, body composition, and energy metabolism,<sup>21–23</sup> 1313 children aged  $\geq 12.00$  years were excluded from the sample; in China, "adolescents" usually refer to children aged 12–19 years.<sup>24,25</sup> In addition, due to the fact that there was no standard BMI-based criteria for defining overweight and obesity for children <7 years old in China, 3009 children <7 years old were also excluded. The final sample consisted of 17,696 children (49.5% boys vs 50.5% girls). The mean age of the sample was 9.35 years old (SD = 1.40 years, ranged from 7.00–11.99 years).

This study was conducted from November to December of 2005. The purposes of this research project were explained to the principals and teachers of the target schools. After the permissions were obtained from these schools, students who were eligible to participate in this study were invited to do anthropometric measurements. Meanwhile, a questionnaire was given to their parents, with a letter explaining the objectives of the project and processes to complete the questionnaire. Children and parents were told that participation

in the survey was voluntary, and the survey was anonymous. Only those children whose parents (caregivers) returned signed consent participated in the study.

The ethical application and consent procedure of this study were approved by the Ministry of Education of the People's Republic of China and Ethics Committee of Shanghai Jiao Tong University School of Medicine.

### Measure

#### Anthropometric measurements

Height and weight were measured following the standard protocols. Subjects were required to wear light clothes and stand straight, barefoot, and at ease when being measured. All measurements were conducted by trained health workers. The stadiometer and weight scale were both checked for accuracy by health worker before measurement. The same model and brand of stadiometer and weight scale were used for all children. Height was measured to the nearest 0.1 cm, and weight was measured to the nearest 0.1 kg. Body mass index (BMI) was calculated as weight (kilograms)/height squared (square meters). Body mass index cut offs for children overweight/obesity status are not as standardized as for adults. Here, we implemented a definition recommended by the Working Group on Obesity in China.<sup>24</sup> The Working Group on Obesity in China was supported by the International Life Sciences Institute Focal Point in China to establish a set of nationwide reference for screening overweight and obesity among Chinese school-aged children in 2004. This reference uses sex, age, and BMI to define overweight and obesity, and the Chinese Center for Disease Control and Prevention has adopted the reference.<sup>26</sup>

#### Sleep duration

Sleep duration was assessed by a parent-administered questionnaire—the Children's Sleep Habits Questionnaire (CSHQ). The CSHQ is a 36-item instrument, which was designed and developed to assess sleep behaviors of preschool and school-aged children.<sup>27</sup> A Chinese version of the CSHQ was developed by translation, back translation, and pilot study. The Chinese version has been used previously with proven sensitivity and reliability.<sup>28</sup> Psychometric properties of the Chinese version of the CSHQ were examined. The internal consistency of the overall questionnaire and the 8 subscales were good (Cronbach  $\alpha$  coefficients were 0.73 and ranged from 0.42–0.69). The test-retest reliability was excellent (intraclass correlation coefficients were 0.85 for the overall questionnaire and ranged from 0.60–0.88 for subscales).<sup>28</sup>

Sleep duration measure included total sleep duration during weekdays (Monday–Friday) and at weekends (Saturday and Sunday), respectively. For example, the parents were asked how many hours and minutes their children usually slept on average during weekdays and weekends. For the statistical analysis, the number of minutes was divided by 60 and added to the number of hours to obtain a metric variable.

Based on sleep duration during weekdays and weekends, the total sleep duration was calculated by averaging weekday and weekend sleep (weighted 5:2 for weekday vs weekend to account for the distribution of days in a week). Based on the distribution of sleep duration at approximately the 25th and 7th percentiles, 9.00 and 10.00 hours, were used as cut offs to create the following 3 categories: <9.00, 9.00–9.99, and >10.00 hours. *Sleep-schedule variability* was defined as the difference between mean sleep duration of weekend and weekday (mean sleep duration of weekend minus mean sleep duration of weekday).

#### Control variables

Sociodemographic covariates included children's sex, age, parents' educational levels (illiteracy, elementary or middle school, high school,



Fig. 1. Map showing the location of the study sites in China.

Download English Version:

<https://daneshyari.com/en/article/916268>

Download Persian Version:

<https://daneshyari.com/article/916268>

[Daneshyari.com](https://daneshyari.com)