# Social relationships play a role in sleep status in Chinese undergraduate students

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## ABSTRACT

The purpose of this study was to examine whether social relationships were associated with sleep status in Chinese undergraduate students. A cross-sectional questionnaire survey was conducted in November 2012 at Huzhou Teachers College, China. The questionnaire involved demographic characteristics, personal lifestyle habits, social relationships and Pittsburgh Sleep Quality Index (PSQI). The associations between social relationships and sleep status were analyzed by using regression models after adjustment for potential factors. Poor sleep quality was prevalent among Chinese undergraduate students. Men tended to have better sleep than women. Lower social stress, better management of stress and good social support were correlated with better sleep status, and stress or support from friends, family and classmates were all related with sleep variables. While only weak associations between number of friends and sleep were detected. The results were consistent in men and women. Educators and instructors should be aware of the importance of social relationships as well as healthy sleep in undergraduates.

## 1. Introduction

Complaints about sleep are worldwide in contemporary population, ranging from adolescents to elders, in both men and women. Good sleep is the basics of high quality of life while poor sleep can influence physical and mental health (Leger et al., 2006; Bixler, 2009; Cappuccio et al., 2010). It was reported undergraduate students suffered from sleep problems around the globe (Jensen, 2003; Lund et al., 2010), as well as in China (Suen et al., 2008). Poor sleep may be associated with their physical health, psychological health and academic performance (Medeiros et al., 2001; Oginska and Pokorski, 2006; Wong et al., 2013). Undergraduate students meet with many changes and challenges, such as social relationships. Social relationships, including social support, social integration, and negative interaction, were demonstrated to be associated with health outcomes (Cohen, 2004), as well as sleep status (Yao et al., 2008; Troxel et al., 2010; Chiu et al., 2012). Besides, sleep is not only a health outcome, but also a health related behavior, and it has been proposed to be a mechanism through which social relationships affect health (Hale, 2010). It is necessary to investigate the relationship between social bonds and sleep status, and develop appropriate intervention methods to help undergraduates cope with sleep problems.

In recent years, colleges and universities in China have expanded their enrollments dramatically, while educational resource was not increased correspondingly (Wan, 2006). There are 2409 regular Higher Education Institutions (HEIs) in 2011 in China. Out of 2409 HEIs, 1602 (66.5%) were affiliated with local governments which have middle education level and similar environment (Ministry of Education, 2012). And Huzhou Teachers College belongs to such HEI. A majority of high school students have been enrolled in these HEIs every year, so these students accounted for a main proportion of Chinese undergraduates. It was reported undergraduate students in China faced great sleep problems (Suen et al., 2008; Cheng et al., 2012). However, there were only few studies focused on the role of social relationships on sleep status in university students (Cheng et al., 2012; Galambos et al., 2013), and the number of studies in

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Chinese students were even less (Cheng et al., 2012). Our study was aimed to examine whether social stress, support or integration were associated with sleep status in these undergraduate students in Huzhou Teachers College. Moreover, relationships from family, friends and classmates were analyzed separately to determine which factors might play more important role in sleep status. Besides, medical students had great pressure due to academic demands, and tended to have poor sleep status, with insufficient sleep duration and delayed sleep onset (Abdulghani et al., 2012). So we mainly focused on medical students.

## 2. Methods

### 2.1. Subjects and procedures

Huzhou Teachers College (Zhejiang, China) is a comprehensive full-time college containing 11 major disciplines. All students majored in medicine and life sciences in first, second and third year were invited to participate in this study during 26th to 30th November 2012. Students in fourth year (senior students) were in the internship outside the school so they were not investigated. Questionnaires were distributed by monitors in each class in their specialized classrooms during the night self-studies. Students were asked to complete the questionnaires in 20 min without monitoring, independently and voluntarily. Informed consent was obtained from each participant. The Ethical Committee at Zhejiang University approved the study protocol.

### 2.2. Study survey

#### 2.2.1. Demographic characteristics and personal lifestyle habits
The first part of our well constructed questionnaire included sex, age, ethnic, grade/study year, major, resident location, parent relationship, family economic status, and height and weight. The body mass index (BMI) was defined as the weight in kilograms divided by the square of the height in meters. We set the cutoffs of BMI according to the criterion made by Working Group on Obesity in China (WGOC), which is more suitable for Chinese population, that is, $\geq 24.0$ as overweight, $\geq 28.0$ as obesity, and $< 18.5$ as underweight. The personal lifestyle habits, like cigarette smoking, alcohol drinking, physical exercise, social activity, internet use and courtship, were also involved. No smoking means never smoking, and no alcohol drinking means never drinking. Physical exercise and internet use were defined by frequency. Whether attending social activity frequently were estimated by students themselves.

#### 2.2.2. Assessment of social relationships
We assessed three aspects of social relationships: social support, social integration, and social stress. Standard questionnaire made by Stinson et al. (2008) was used. But in order to make the questionnaire more appropriate to undergraduate students, the following contents were modified: in items of social relationship, "partner" was replaced to "classmates"; in items of social stress, "partner" and "neighbors" were discarded, which was not suitable to undergraduates. And 6-point scale was decreased to 4-point scale in items of ability to handle stress to make items concise. Finally, social stress that participant suffered from family, friends, and classmates was assessed using a 4-point scale (from 0, no stress, to 3, severe stress), and corresponding questions were set to assess the ability to handle these stress (from 0, cannot handle, to 3, handle well). Social support was evaluated by measuring comfort, relational doubts, and relationship satisfaction with family, friends, and classmates in nine items (first three: "I am comfortable being close to my family/friends/classmates"; second three: "I wonder whether my family/friends/classmates really care about me" (reverse scored); third three: "In general, I am satisfied with my family relationships/friendships/classmate relationships"). Each item was scored from 1, strongly disagree, to 7, strongly agree. Social integration was measured by reporting total number of friends live locally and live at a distance. "Friends" means anyone who you choose to classify in this way. "Locally" means living in the same city. If a friend does not live locally, he/she is classified as living "at a distance". Total scores of social stress, management of stress and social support were achieved by adding scores of each item. Categories of social stress, management of stress and social support were created according to the lower quartile (Q1) and upper quartile (Q3) of the score. The reliability and validity of the questionnaire were also analyzed. The cronbach α was 0.83 of our social relationship questionnaires. Factor analysis showed good construct validity, with five factors explaining 66% variation and all items having high factor loadings ( $> 0.6$).

#### 2.2.3. Measurement of sleep status
Pittsburgh Sleep Quality Index (PSQI) (Buysse et al., 1989) is a self-rated questionnaire used to assess sleep quality and disturbances during the last month.

It includes 19 self-rated questions and five other-rated questions, containing seven parts: sleep duration, subjective sleep quality, habitual sleep efficiency, use of sleeping medication, daytime dysfunction, sleep latency, and sleep disturbances. Total score is 0 to 21 points, with 0 to 3 points in each part, and lower scores indicate better sleep status. In this research, Chinese version of the Pittsburgh Sleep Quality Index (PSQI) (Liu et al., 1996) was used to assess participants' sleep status. It has been documented that the Chinese version of the PSQI has good reliability, validity, and internal consistency in Chinese people (Liu et al., 1996; Tsai et al., 2005). We assessed five parts of PSQI, which were subjective sleep quality, sleep duration, habitual sleep efficiency, use of sleeping medication, and daytime dysfunction, to evaluate the sleep status in undergraduate students. The variables of subjective sleep quality, sleep duration, sleep efficiency and sleep latency in the analyses are self-reported items in the PSQI scale.

### 2.3. Statistical analysis

Subjects who completed the items of social relationships and PSQI were included in the analyses. Descriptive statistics were used to characterize all study samples, as well as men and women separately. Difference analyses between included subjects and excluded subjects in this manuscript were performed to test selection bias. Spearman correlation among social support, social stress and social integration was detected. Stepwise regression was used to screen significant covariates for fixed models in whole samples, men and women, respectively. Covariates included sex, study grade, major, resident location, parent relationship, and personal lifestyle habits like cigarette smoking, alcohol drinking, physical exercise, social activity and courtship. Multivariate linear regression models were used to detect the association between PSQI, sleep duration, sleep efficiency and social relationships. Multinomial logistic regression models were utilized to detect the association between subjective sleep quality and social relationships, and binary logistic regression models for the association between sleep duration and social relationships. We also analyzed the relationship of stress and support from family, friends and classmates with sleep status, separately. All statistical analyses were performed by using SAS software (Version 9.2. Institute, Inc., Carey, NC, USA) and $P$ less than 0.05 was considered as statistical significant level.

## 3. Results

Finally, 2987 questionnaires were distributed and 2296 questionnaires were retrieved (response rate$=2296/2987=76.9\%$). After excluding 19 blank questionnaires, 2277 questionnaires were valid (efficient rate$=2277/2296=99.2\%$), but 645 questionnaires were excluded in present study due to lack of essential information (183 for PSQI score and 556 for social relationships). Hence 1632 subjects were involved in the analyses. Of these, 343 (21.0%) were men and 1289 (79.0%) were women. The average age was 19.73 ($\pm 1.03$) years, with a range of 16 to 23. The number of students who reported fairly bad or very bad sleep was 371 (22.7%). Differences between men and women were found in demographic characteristics and personal lifestyle habits. Men had better subjective sleep quality ($\chi^2=7.54$, d.f.$=3$, $P=0.0060$), longer sleep time ($t=3.13$, d.f.$=1630$, $P=0.0018$) and shorter sleep latency ($\chi^2=15.05$, d.f.$=1$, $P=0.0001$) than women, while the PSQI score ($t=-1.20$, d.f.$=1$, $P=0.23$) and sleep efficiency ($t=-0.91$, d.f.$=1630$, $P=0.36$) did not reach statistical significance (Table 1). Men had lower social stress ($t=-2.68$, d.f.$=1630$, $P=0.0075$) and more friends (locally: $t=43.01$, d.f.$=1630$, $P<0.0001$; at a distance: $t=32.40$, d.f.$=1630$, $P<0.0001$) than women (Table 1). Significant correlations were found between social support and social stress ($r=0.4131$, $P<0.0001$) or stress management ($r=0.5074$, $P<0.0001$). While the correlations among number of friends and social support or social stress or stress management were pretty modest ($r=0.1940$, $-0.1379$, $0.2197$, respectively, all $P<0.0001$) (Supplemental Table 1).

### 3.1. Social stress and sleep

Social stress was positively related with PSQI scores (mild stress: $\beta=0.74$, $P<0.0001$; moderate or severe stress: $\beta=1.33$, $P<0.0001$) and poor subjective sleep quality (mild stress: OR$=3.01$, 95%CI, 2.07–4.38; moderate or severe stress: OR$=5.01$,