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SCIENTIFIC INVESTIGATIONS

Relationship of Sleep Duration with Sociodemographic Characteristics, Lifestyle, Mental Health, and Chronic Diseases in a Large Chinese Adult Population

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Study Objectives: Pattern of sleep duration and its correlates have rarely been reported in China. This study examined the sleep duration and its relationship with sociodemographic variables, lifestyle, mental health, and chronic diseases in a large Chinese adult population.

Methods: This cross-sectional study used multistage stratified cluster sampling. A total of 17,320 participants from Jilin province were selected and interviewed using standardized assessment tools. Basic socio-demographic and clinical data were collected. Sleep duration was classified as short (< 7 h per day), long (> 9 h per day) and medium sleep (7–9 h per day).

Results: The mean age of the sample was 42.60 ± 10.60 y, with 51.4% being female. The mean sleep duration was 7.31 ± 1.44 h. Short and long sleepers accounted for 30.9% and 6.9% of the sample, respectively. Multinomial logistic regression analysis revealed that older age, current smoking, irregular meal pattern, lack of physical exercise, poor mental health, and chronic diseases or multimorbidity were positively associated with short sleep. Being married and living in rural areas were, however, negatively associated with short sleep. In addition, living in rural area, current smoking, current alcohol use and lack of physical exercise were positively associated with long sleep, while older age and lower education were negatively associated with long sleep.

Conclusion: Given the high frequency of short sleep and its negative effect on health, health professionals should pay more attention to sleep patterns in general health care. Nationwide epidemiologic surveys in China are needed to further explore the relationship between sleep duration and health.

Keywords: China, chronic disease, mental health, sleep duration

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INTRODUCTION

To maintain optimal health, sleep duration of 7–9 h is generally needed for adults.[1] There is compelling evidence that both habitual short and long sleep durations are associated with poor health outcomes.[2–4] A U-shaped relationship between sleep duration and mortality was found in some but not all studies,[5,6] although the explanation for this association is unknown.[7] It is assumed that short sleep could be due to voluntary sleep restriction or certain chronic diseases, whereas long sleep is commonly associated with sleep disturbances, chronic diseases, and psychiatric disorders.[8] Identifying the relationship between sleep duration and other clinical variables may help understand the pathomechanism of increased mortality associated with short and long sleep duration.[9]

Most studies on sleep duration and its correlates have been conducted in the West. Evidence is accumulating that socioeconomic and cultural factors play an important role in sleep-related disturbances including short and long sleep duration.[10–14] Therefore, findings from Western countries may not be applicable in other sociocultural contexts, particularly in developing countries.[15] To date there have been very few studies examining sleep duration in China. Xiang et al. examined 5,926 randomly selected subjects in Beijing in 2002 and found that the reported actual total sleep time was 7.76 h, with several factors associated with short and long sleep including age, residential area (rural versus urban), and presence of psychiatric and comorbid medical conditions.[11]

Over the past two decades, China has experienced rapid socioeconomic changes leading to a number of social problems including increased divorce rates, smoking and alcohol use,

BRIEF SUMMARY

Current Knowledge/Study Rationale: Habitual short and long sleep durations are usually associated with poor health outcomes. The patterns of sleep duration and its correlates have been rarely examined in China.

Study Impact: Short and long sleep durations are significantly associated with a number of demographic and clinical characteristics in Chinese adults. Given the high prevalence of short sleep, professionals should pay more attention to sleep patterns in general health care.

weakening of family ties, and an increasing social and economic gap between the rich and poor.[16,17] All of these changes and problems may have a significant effect on health, including sleep duration. Regular surveys of health status using standardized assessment tools, trained interviewers, and strict field quality-control procedures are needed.

This study set out to examine the sleep duration, the proportions of short, medium, and long sleepers, and the relationship of sleep duration with basic sociodemographic and clinical characteristics in the general population in Jilin Province, China.

METHODS

Participants and Study Setting

This study was part of the Jilin Provincial Chronic Disease Survey conducted from June 2012 to August 2012. Jilin Province is an intermediate economically developed province located in northeastern China, with a total population of 27.5 million of which 50.3% live in rural areas (in 2012).[18] The details of the methodology has been described elsewhere.[19] A multistage stratified cluster sampling method was employed in the following way. In the first stage, all the nine administrative regions of Jilin Province were selected as the first stratification. In the second stage, probability proportional to size sampling was used to select four counties or districts from each administrative region with a computer-generated random number table. In the third stage, each selected county or district was divided into urban and rural areas as defined by the National Bureau of Statistics of China. Subsequently, either four or five communities were randomly selected from each of the selected rural and urban areas using probability proportional to size. Finally, one adult resident aged 18 to 79 y was randomly selected from each household in the selected community. The interview was conducted at local community clinics or health service centers.

The sample size was calculated based on the complex sampling using the formula[20]:

$$n = deff \frac{z_a^2 \times p(1-p)}{d^2}$$

The design effect (*deff*) was assigned as 3.0, z_α as 1.96 (α as 95% for both sides), p as 5.0%, and d as 0.1p according to the study design. The nonresponse rate was assumed to be 15% according to the result of a pilot study. Thus, a sample size of 25,240 was estimated, being approximately 1‰ of the total adult population of Jilin Province. Eventually, 21,435 respondents completed the interview, yielding a response rate of 84.9%. Sleep duration cutoffs vary greatly across different age groups; in order to make the study sample more homogeneous, only the adult population aged 18 to 59 y was included in this study.

Ethical Issues

The study protocol was approved by the Ethics Committee of the School of Public Health, Jilin University (reference number: 2012-R-011) and the Health Bureau of Jilin Province (reference number: 2012-10). All participants provided written informed consent prior to participating in the survey.

Procedures and Measures

Participants were interviewed face-to-face using a structured questionnaire at local community clinics or health service centers. Trained investigators collected data on basic sociodemographics, mental health, sleep duration, chronic disease history, and chronic disease-related lifestyle factors. A comprehensive physical examination was conducted by primary care physicians. Height, weight, blood pressure, fasting plasma glucose, and fasting blood lipids including total cholesterol, triglycerides, high-density lipoprotein, and low-density lipoprotein were measured.

The primary outcome was sleep duration. In order to measure sleep duration in the past month, participants were asked the following question: "How many hours do you sleep each night on average?" Because there is no consensus in China on the criteria of short and long sleep, the criteria for adults aged 18 to 59 y were based on the National Sleep Foundation's recommendations[1]: short sleep: < 7 h/day; medium sleep: 7–9 h/day; and long sleep: > 9 h/day.

The household's monthly income per person was divided into three classes: low (< 1,000 yuan/mo), middle (1,000–2,999 yuan/mo) and high income (> 3,000 yuan/mo) according to the Jilin Provincial Bureau of Statistics. Lifestyle factors included smoking, alcohol use, regularity of meal pattern, and regular physical exercise. A current smoker was defined as an adult who smoked cigarettes either every day (daily) or some days (nondaily), and at least 100 cigarettes in their entire life.[21] Current moderate or heavy drinker was defined as a person who consumed on average more than three times of standard alcoholic drinks per week.[21] A regular meal pattern was defined as three meals per day (breakfast, lunch, and dinner), and an irregular meal pattern was defined as skipping any of the three meals.[22] Participants who did not or seldom (less than once per month) exercised were categorized as lacking in exercise. Body mass index (BMI) was measured as weight/height^2 (kg/m^2). Adults were categorized as "normal or underweight" (BMI < 25 kg/m^2), "overweight" (25 ≤ BMI < 30 kg/m^2) and "obese" (BMI ≥ 30 kg/m^2). General mental health was assessed with the 12-item General Health Questionnaire (GHQ-12), which has been used extensively in China. All respondents on the GHQ-12 were classified into two groups with a cut-point of 4 on a scale of 0 to 12 points, with those scoring 4 or more being deemed to have poor mental health.[23]

Current chronic diseases were classified according to the International Classification of Disease, 10th Revision (ICD-10). The top 16 most common chronic diseases with rates higher than 0.5% were included in this study: anemia, diabetes, hyperlipidemia, cataract/glaucoma, hypertension, ischemic heart disease, cerebrovascular disease, nasopharyngitis, chronic obstructive pulmonary disease, chronic gastroenteritis/peptic ulcer, liver diseases, chronic cholecystitis/gallstones, arthritis, chronic low back pain, chronic nephritis, and urolithiasis. Multimorbidity was defined as the co-occurrence of two or more of the aforementioned chronic diseases in one person in the past 12 mo. Hypertension was defined as a mean systolic blood pressure above 140 mmHg or a mean diastolic blood pressure above 90 mmHg, or a previous diagnosis of hypertension established by a primary care physician. Diabetes mellitus was defined as

Table 1—Sociodemographic and lifestyle factors, body mass index, and mental health in the three sleep duration groups.

	Total (n = 17,320)		Short Sleepers (n = 5,887)		Medium Sleepers (n = 10,338)		Long Sleepers (n = 1,095)		Statistics	
Variable	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**χ^2**	**p**
Age (y)									92.33	< 0.001
18–29	2,515	26.4	516	17.3*	1,766	29.7	233	38.2*		
30–39	3,614	24.3	866	18.6*	2,501	27.1	247	24.5*		
40–49	6,092	29.3	2,259	35.1*	3,509	27.2	324	21.8*		
50–59	5,099	20.0	2,246	29.0*	2,562	16.0	291	15.5*		
Female	8,900	48.0	2,929	44.9*	5,400	49.1	571	51.2	9.90	< 0.001
Married/cohabitation	14,952	79.7	5,133	82.6*	8,882	78.5	937	77.8	9.14	< 0.001
Rural	8,082	44.6	2,593	41.4*	4,814	44.3	675	61.2*	50.48	< 0.001
Education ≤ 9 y	8,923	48.3	3,100	49.7*	5,099	45.7	724	65.8*	58.95	< 0.001
Income									16.98	< 0.001
High	1,982	12.6	607	11.7*	1,262	13.1	113	12.2*		
Middle	9,231	57.3	3,064	55.5*	5,658	59.3	509	47.8*		
Low	6,107	30.1	2,216	32.8*	3,418	27.6	473	40.0*		
Physical laborer	10,368	58.1	3,529	58.8	6,086	56.9	753	65.7*	10.74	< 0.001
Current smoker	5,597	32.6	2,148	37.7*	3,062	29.9	387	33.6	33.58	< 0.001
Current moderate or heavy drinker	2,794	15.9	1,112	18.9*	1,492	14.3	190	16.8	20.91	< 0.001
Irregular meal pattern	3,804	24.9	1,514	29.1*	2,022	22.4	268	27.6*	26.99	< 0.001
Lack of physical exercise	8,382	46.5	2,929	48.6*	4,827	44.2	626	57.7*	29.29	< 0.001
BMI (kg/m^2)*									11.99	< 0.001
< 25	13,278	64.7	4,624	60.8*	7,786	66.5	868	67.0		
25 to < 30	6,822	29.1	2,612	32.3*	3,789	27.7	421	26.6		
≥ 30	1,335	6.2	503	6.9*	735	5.8	97	6.4		
Poor mental health (GHQ-12)	4,050	23.8	1,660	28.4*	2,118	21.5	272	25.0	29.32	< 0.001

Numbers are unweighted, but percentages are weighted. * = multiple Rao-Scott χ^2 tests were used with the medium sleepers as the reference. Bonferroni correction was used to adjust the significance level. BMI = body mass index, GHQ = General Health Questionnaire.

fasting plasma glucose ≥ 7.0 mmol/L (126 mg/dL) according to World Health Organization criteria and/or a self-reported previous diagnosis established by health professionals. Hyperlipidemia was defined as high total cholesterol (≥ 6.22 mmol/L), and/or high triglycerides (≥ 2.26 mmol/L), and/or low high-density lipoprotein (< 1.04 mmol/L), and/or high low-density lipoprotein (≥ 4.14 mmol/L), and/or having a history of dyslipidemia in the past year. The presence of chronic diseases was recorded during the interview and was then confirmed by a review of medical records, whenever possible.

Statistical Analyses

In order to ensure the sample's representativeness of the adult population, the data were weighted by sex, age groups, administrative regions and place of residence (urban/rural area) according to the census data from Jilin Provincial Bureau of Statistics in 2012. The analyses were conducted with the SPSS Complex Samples, version 21.0 package (IBM SPSS, IBM Corp, Armonk, NY, USA). Complex weighted computation was used in the statistical analysis. Comparisons between short, medium, and long sleepers with regard to sociodemographic and clinical characteristics were performed using Rao-Scott χ^2 test based on the complex sampling. All the variables that significantly differed between the three groups in the univariate analyses were entered into a multinomial logistic regression model as independent variables to examine their independent associations with sleep duration. Similarly, multinomial logistic regression models were used to examine the independent associations of sleep duration with the 16 chronic diseases individually. The dependent variable was sleep duration with medium sleep as the reference category. Significance level was set at 0.05 (two-sided).

RESULTS

Altogether 17,320 participants fulfilled the study criteria and were included in the analyses. The mean age of the sample was 42.60 ± 10.60 y, with 51.4% being female. **Figure 1** shows the distribution of sleep duration by age and sex. The mean sleep duration was 7.31 ± 1.44 h (7.37 ± 1.45 h in men and 7.24 ± 1.43 h in women), and the proportion of short and long sleepers accounted for 30.9% and 6.9%, respectively.

Table 1 presents the sociodemographics characteristics, lifestyle factors, BMI, and mental health by sleep duration. **Table 2** displays the chronic diseases and multimorbidity by sleep duration. There were significant differences between the three sleep duration groups in all chronic disease categories and multimorbidity, with the exception of anemia, nasopharyngitis, and chronic nephritis.

Figure 1—Distribution of sleep duration by age and sex.

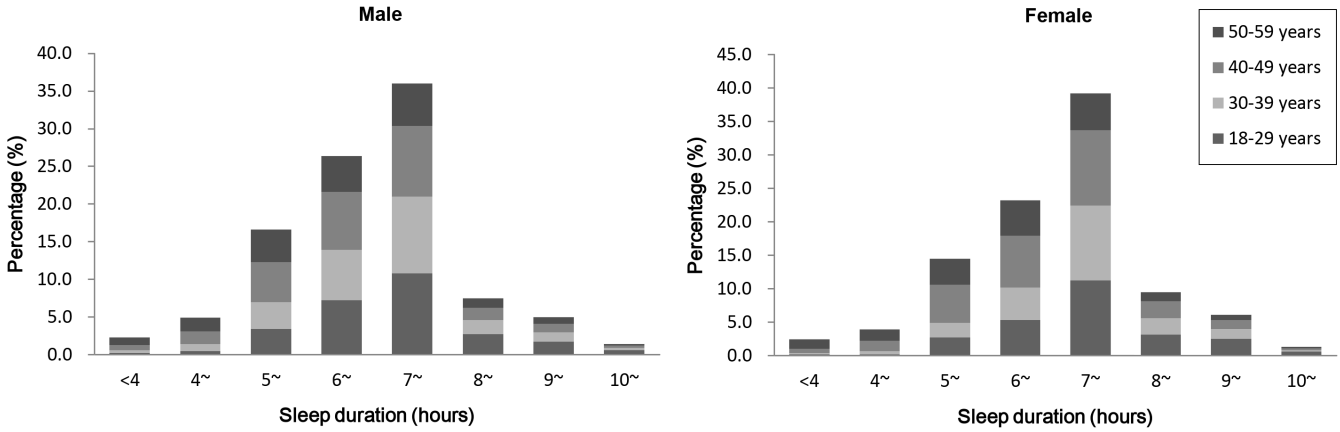

Table 2—Chronic diseases and multimorbidity in different sleep duration groups.

	Total (n = 17,320)		Short Sleepers (n = 5,887)		Medium Sleepers (n = 10,338)		Long Sleepers (n = 1,095)		Statistics	
Variable	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**χ^2**	**p**
Anemia	516	3.1	181	3.2	305	2.9	30	4.5	1.99	0.143
Diabetes	1,226	5.6	532	8.0*	623	4.6	71	4.0	40.71	< 0.001
Hyperlipidemia	5,472	27.9	2,025	31.6*	3,088	26.1	359	27.3	19.20	< 0.001
Cataract/glaucoma	148	0.6	72	0.9*	68	0.4	8	0.4	9.64	< 0.001
Hypertension	5,047	24.1	2,012	30.2*	2,732	21.4	303	21.4	62.40	< 0.001
Ischemic heart disease	1,167	4.7	533	7.0*	556	3.7	78	4.3	50.10	< 0.001
Cerebrovascular disease	797	3.3	298	3.8*	433	3.0	66	3.9	5.64	0.004
Nasopharyngitis	363	2.2	126	2.1	233	2.3	14	1.5	0.99	0.370
COPD	508	2.3	219	3.2*	261	1.9	28	1.7	13.98	< 0.001
CGPU	2,048	11.2	805	13.1*	1,133	10.4	110	10.3	8.98	< 0.001
Liver disease	547	2.9	227	3.7*	285	2.5	35	2.4	8.40	< 0.001
Cholecystitis/gallstone	1,367	6.1	566	7.9*	720	5.3	81	5.3	18.98	< 0.001
Arthritis	1,329	5.8	562	7.7*	698	5.0	69	4.4	26.51	< 0.001
Chronic low back pain	2,196	10.3	908	13.5*	1,176	9.1	112	6.9*	43.46	< 0.001
Chronic nephritis	182	0.8	78	1.0	91	0.7	13	0.8	2.45	0.086
Urolithiasis	380	1.9	163	2.6*	192	1.6	25	1.9	8.14	< 0.001
Number of chronic diseases									50.68	< 0.001
0	5,883	40.8	1,579	31.8*	3,898	44.8	406	44.9		
1	4,944	28.6	1,704	30.0*	2,945	28.0	295	27.9		
≥ 2 (multimorbidity)	6,493	30.6	2,604	38.2*	3,495	27.2	394	27.2		

Numbers are unweighted, but percentages are weighted. * = multiple Rao-Scott χ^2 tests were used with the medium sleepers as the reference. Bonferroni correction was used to adjust the significance level. CGPU = chronic gastroenteritis/peptic ulcer, COPD = chronic obstructive pulmonary disease.

Multivariable logistic regression analysis revealed that older age, current smoking, irregular meal pattern, lack of physical exercise, poor mental health, and a chronic disease or multimorbidity were positively associated with short sleep. Being married/cohabitation and living in rural areas were negatively associated with short sleep. In addition, living in a rural area, current smoking status, current alcohol use, and lack of physical exercise were positively associated, whereas older age and lower education were negatively associated with long sleep (**Table 3**). **Table 4** shows the independent associations between chronic diseases and sleep duration.

DISCUSSION

In this study the mean sleep duration (7.31 h) was somewhat longer than the figures obtained from Hong Kong (7.06 h) and the United States (6.99 h),[9,24] but shorter than that in Beijing (7.7 to 7.8 h).[11,25] The proportion of short and long sleepers were 30.9% and 6.9%, respectively, in this study, which is inconsistent with the figures of 13.9% and 21.4%, respectively, in Beijing.[11] The inconsistency may be partly due to the differences in sampling and assessment methods, the study period, sample characteristics, and the lack of consistency in definitions of short and long sleep. Some studies found sleeping 7

Table 3—Adjusted odds ratios and 95% confidence intervals of sociodemographic and lifestyle factors, and multimorbidity in relation to sleep duration.

Variable	Short Versus Medium Sleepers	Long Versus Medium Sleepers
Age (y)		
18–29	1.00	1.00
30–39	1.22 (1.03–1.45)*	0.64 (0.50–0.82)*
40–49	2.38 (2.01–2.81)*	0.50 (0.39–0.64)*
50–59	3.29 (2.77–3.90)*	0.59 (0.45–0.78)*
Female	0.93 (0.85–1.03)	1.22 (0.99–1.51)
Married/cohabitation	0.86 (0.74–0.99)*	0.95 (0.73–1.24)
Rural	0.80 (0.73–0.87)*	1.37 (1.15–1.64)*
Education ≤ 9 y	0.97 (0.88–1.06)	0.57 (0.46–0.70)*
Income		
High	1.00	1.00
Middle	0.99 (0.87–1.13)	0.78 (0.58–1.03)
Low	1.05 (0.90–1.21)	1.09 (0.79–1.50)
Physical laborer	0.99 (0.91–1.09)	1.02 (0.84–1.25)
Current smoker	1.27 (1.15–1.40)*	1.22 (1.00–1.50)*
Current moderate/heavier drinker	1.08 (0.97–1.21)	1.33 (1.05–1.68)*
Irregular meal pattern	1.58 (1.43–1.75)*	1.11 (0.91–1.35)
Lack of physical exercise	1.12 (1.02–1.22)*	1.30 (1.10–1.55)*
BMI (kg/m^2)		
< 25	1.00	1.00
25 to < 30	1.08 (0.99–1.18)	1.04 (0.87–1.23)
≥ 30	1.17 (0.99–1.38)	1.03 (0.73–1.44)
Poor mental health (GHQ-12)	1.45 (1.32–1.60)*	1.05 (0.86–1.27)
Number of morbidity domains		
0	1.00	1.00
1	1.22 (1.10–1.37)*	0.98 (0.79–1.21)
≥ 2 (multimorbidity)	1.27 (1.14–1.40)*	1.03 (0.83–1.28)

Complex weighted computation and multinomial logistic regression model were used in the statistical analysis. Sociodemographics, lifestyle factors, mental health, and multimorbidity were adjusted for in the model. * = $p < 0.05$.

Table 4—Adjusted odds ratios and 95% confidence intervals of specific chronic diseases in relation to sleep durations.

Chronic Disease	Short Versus Medium Sleepers	Long Versus Medium Sleepers
Anemia	1.20 (0.95–1.51)	1.39 (0.83–2.31)
Diabetes	1.24 (1.07–1.44)*	0.97 (0.73–1.31)
Hyperlipidemia	1.03 (0.94–1.13)	1.16 (0.96–1.39)
Cataract/glaucoma	1.29 (0.09–1.86)	0.89 (0.39–2.03)
Hypertension	1.11 (1.01–1.21)*	1.09 (0.91–1.31)
Ischemic heart disease	1.31 (1.13–1.51)*	1.11 (0.84–1.48)
Cerebrovascular disease	0.76 (0.64–0.91)*	1.31 (0.97–1.76)
Nasopharyngitis	0.85 (0.65–1.10)	0.70 (0.36–1.36)
COPD	1.27 (1.02–1.59)*	0.77 (0.49–1.21)
CGPU	1.17 (1.04–1.32)*	0.91 (0.70–1.18)
Liver disease	1.14 (0.92–1.41)	1.15 (0.72–1.81)
Cholecystitis/gallstone	1.24 (1.08–1.43)*	0.93 (0.70–1.25)
Arthritis	1.20 (1.04–1.38)*	0.88 (0.66–1.17)
Chronic low back pain	1.14 (1.01–1.27)*	0.73 (0.58–0.91)*
Chronic nephritis	1.19 (0.85–1.66)	1.04 (0.53–2.03)
Urolithiasis	1.29 (0.99–1.67)	1.08 (0.67–1.74)

Complex weighted computation and multinomial logistic regression models were used in the statistical analysis. Sociodemographics, lifestyle factors, and mental health were adjusted for in the models. * = $p < 0.05$. CGPU = chronic gastroenteritis/peptic ulcer, COPD = chronic obstructive pulmonary disease.

to 8 h per day was significantly associated with low risk for all-cause death, thus leading to sleep duration less than 7 h/day being defined as short sleep, and sleep duration greater than 8 h/day as long sleep.[6,11] Recently, however, the American Heart Association and the United States National Sleep Foundation has recommended that sleep duration between 7 to 9 h/day is adequate for adults,[1,26] and therefore this definition of short and long sleep was applied in this study.

Similar to earlier findings,[11] the adjusted odds ratios of short sleep increased with age, whereas longer sleep decreased with age, which is in accordance with the age-specific sleep duration recommendations.[1] The negative relationship between sleep duration and age may be biologically determined: polysomnographic tests showed that slow wave sleep and sleep efficiency decrease with age.[27] Being married and cohabitation were negatively associated with short sleep in this study, replicating earlier findings.[28–30] In the current fast-changing Chinese society, social stress, complex personal relationships, and the gradual dissolution of the traditional family structure often increase the risk of insomnia and also shorten the total sleep duration in the unmarried group.[31,32] Conversely, being married and living together seems to be a protective factor for sleep.

The socioeconomic environment could also have an important effect on sleep duration.[4] In China, low education level is usually associated with greater work-related stress, more physical work, and longer working time, which may explain the negative relationship between low education and long sleep. The traditional view is that industrialization shortens sleep duration.[33] Some studies found that short sleep is more common in those with lower income and education level,[34] which is consistent with the results of the univariate analysis, but not with that of the multivariable analysis in this study. This could be due to the moderating effects of other factors, such as age and residential area. Compared to their urban counterparts, Chinese rural residents tend to have more outdoor work and physical activity, more favorable sleep environment and exposure to daylight, but fewer evening leisure activities and less late night or shift work, all of which can contribute to longer sleep.[35] This could explain the finding that rural residents had less short and more long sleep duration than urban residents. Similar findings have also been reported previously.[11,36]

The mechanisms mediating the associations between sleep duration and unhealthy lifestyle are complex and multifactorial, which could not be explored in this cross-sectional study. As expected, unhealthy lifestyle, characterized by smoking, moderate or heavy drinking, irregular meal pattern, and lack of physical exercise were associated with sleep duration. This result is consistent with the findings from the 2004–2006 United States National Health Interview Survey.[37] A longitudinal cohort study found that unhealthy lifestyle choices were closely correlated with social inequality.[38] Social inequality leads to unhealthy choices in poorer population which, in turn, could affect sleep duration.[39] Some studies found that shorter sleep was associated with higher BMI,[24,25,40] but this was not replicated in the multivariable analysis of this study. Perhaps an unhealthy lifestyle might have a moderating effect on the association between sleep duration and BMI.

As was also expected, short sleep was positively and significantly associated with poor mental health. A number of studies have found depression as the most frequent psychiatric condition co-occurring with sleep disturbances,[32,41,42] This aspect of sleep duration was not examined in this survey as the GHQ-12 is not a diagnostic instrument for depression. The association between sleep duration and chronic medical diseases and multi-morbidity was found in this study, which is broadly consistent with results in the literature.[10,28,30,36,43]

The adjusted odds ratio of short sleep increased in patients with multimorbidity compared to those with a single chronic disease. The high rate of serious medical conditions, such as hypertension, diabetes, ischemic heart disease and chronic obstructive pulmonary disease, found in short sleepers could partly account for the commonly reported association between mortality and short sleep.[2,3,5,6] Nevertheless, the relationship between short sleep and chronic diseases is bidirectional as chronic diseases can also shorten sleep duration.[11] Chronic pain from cholecystitis/gallstone, arthritis, and chronic low back pain could disrupt sleep. However, cerebrovascular disease was found to be negatively associated with short sleep in this study, which is inconsistent with previous findings.[44] There was no significant correlation between long sleep and chronic diseases, which is different from the results obtained in the United States.[43] The reason for the link between chronic diseases and long sleep is far from clear,[9,45] although there is some evidence from Western studies pointing to the association between long sleep and increased risk of diabetes mellitus and coronary heart disease.[46,47] Very few studies have examined the relationship between long sleep and health status in China. A cross-sectional study in Beijing found no association between long sleep duration and obesity,[25] which is a risk factor for many chronic diseases.

The strengths of this study include its representative sample and the large sample size. However, the results need to be interpreted with caution because of several methodological limitations. First, the study covered only Jilin Province, thus the results are unlikely to be applicable to other areas of China. Second, sleep duration was self-reported in a subjective manner that may only be correlated modestly with objectively recorded sleep. Similarly, for logistic reasons, the presence of chronic diseases was mostly self-reported and not confirmed via a review of the medical records. Third, the study was cross-sectional; therefore, the causality of the relationships between sleep duration and sociodemographic and clinical variables could not be examined. Fourth, the American National Sleep Foundation's recommendations[1,3] were used to define short and long sleep in this study. The appropriateness of Western-based definition of sleep duration in Chinese population needs to be examined further. Finally, because this was a spinoff of a large-scale epidemiologic survey, some variables that may be closely associated with sleep duration, such as sleep disturbances and sleep quality, were not measured.

CONCLUSIONS

In conclusion, considering the significant association of short sleep with mental health and chronic diseases, health professionals should pay more attention to sleep patterns in general

health care. National surveys and cohort studies to examine the effect of short and long sleep on health are warranted.

ABBREVIATIONS

BMI, body mass index
CGPU, chronic gastroenteritis/peptic ulcer
COPD, chronic obstructive pulmonary disease
GHQ-12, General Health Questionnaire 12-item version
ICD, International Classification of Diseases

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