Preplanned Studies

The Cohort Study on Association Between Prolonged Sleep Latency and Hypertension — 4 PLADs of the Southern China, 2018–2020

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Summary

What is already known about this topic?

Short sleep duration and poor sleep quality have been epidemiologically associated with cardiometabolic disorders. However, limited research has examined the relationship between prolonged sleep latency, an increasingly prevalent sleep disorder, and hypertension.

What is added by this report?

Approximately 25% of residents in 4 provincial-level administrative divisions (PLADs) in the southern China experienced prolonged sleep latency. Both occasional and habitual prolonged sleep latency were significantly associated with increased odds of hypertension.

What are the implications for public health practice?

Given the increasing prevalence of hypertension, health initiatives should focus on raising awareness about prolonged sleep latency and implementing targeted interventions to mitigate hypertension risk.

The prevalence of hypertension in China has risen dramatically to 23.2% over recent decades, driven by lifestyle changes and an aging population. Sleep disturbances, including short sleep duration, insomnia, and snoring, have emerged as significant risk factors for cardiometabolic disorders, including hypertension (*1*). Among these related disorders, prolonged sleep latency has become more prevalent in modern societies. However, the relationship between sleep latency and hypertension remains incompletely understood. Using baseline survey data from the South China Cohort (SCC) (*2*), this study analyzed 72,476 adults aged 25–89 years, with complete blood pressure and sleep behavior information. Hypertension was defined as either self-reported diagnosis/medication use or blood pressure measurements ≥140/90 mmHg. Sleep latency was assessed using the Pittsburgh Sleep Quality Index (PSQI) questionnaire. This analysis revealed a dose-dependent increase in hypertension prevalence corresponding to increasing frequency of prolonged sleep latency. After adjusting for potential covariates, logistic regression models demonstrated that individuals experiencing habitual prolonged sleep latency had a 21% higher prevalence of hypertension. These findings suggest that public health strategies targeting sleep latency should be implemented to help control the rising prevalence of hypertension.

This study utilized baseline survey data from the SCC, a prospective cohort study employing multistage, stratified cluster sampling across Guangdong, Fujian, Guangxi and Hainan Provinces between 2018 and 2020 (*2*). From 102,932 participants who completed face-to-face interviews, 30,456 participants were excluded due to missing information on sleep behaviors (n=27,738) or hypertension (n=2,718), yielding a final analytical sample of 72,476 participants (Supplementary Figure S1, available at https://weekly.chinacdc.cn/). Comparisons of major socio-economic characteristics between included and excluded participants are presented in Supplementary Table S1 (available at https://weekly.chinacdc.cn/). Sleep latency was assessed using two questions: "During the past month, how long has it taken you to fall asleep each night? (0=falling asleep in ≤15 min, 1=16 to 30 min, 2=31 to 60 min, and 3=over 60 min)", and "During the past month, how often have you had trouble sleeping because you cannot get to sleep within 30 min? (0=none during the past month, 1=less than once a week, 2=once or twice a week, and 3=three or more times a week)". Based on the composite score of these two questions, prolonged sleep latency was categorized as normal (0–2 points), occasional (3–4 points), or habitual (5–6 points) (Supplementary Table S2, available at https://weekly.chinacdc.cn/). Hypertension was defined according to Chinese Guidelines for the Prevention and Treatment of Hypertension as either prior physician diagnosis from tertiary hospitals, current antihypertensive medication use within two

weeks, or blood pressure measurements ≥140/90 mmHg (*3*). The study protocol was approved by the Ethics Committee of School of Public Health, Sun Yat-Sen University (L2017-001).

Normally distributed continuous data were presented as mean±standard deviation (SD), while skewed data were expressed as median with the interquartile range (P_{25}–P_{75}). One-way analysis of variance was employed for continuous variables, and the chi-squared (χ^2) tests were used for categorical variables. Linear trends across sleep latency categories were assessed using linear regression model for continuous variables and the Cochran-Armitage trend test for categorical variables. The association between prolonged sleep latency and hypertension was evaluated using logistic regression models with sleep latency categorized as normal, occasional, or habitual. The relationship between sleep latency and hypertension was further modeled using restricted cubic splines. To ensure result robustness, multiple sensitivity analyses and subgroup analyses were conducted as detailed in the Supplementary Material (available at https://weekly.chinacdc.cn/). All statistical tests were two-tailed, with *P* value <0.05 considered statistically significant. Analyses were performed using R version 4.2.0 (The R Foundation for Statistical Computing, Vienna, Austria).

Among the 72,476 study participants, 17,416 (24.03%) had hypertension, and 18,170 (25.07%) experienced prolonged sleep latency. Compared to participants with normal sleep latency (*n*=54,306), those with prolonged sleep latency (*n*=18,170) were older, more likely to be female, exhibited more unhealthy lifestyle behaviors and adverse metabolic profiles (*P* for trend <0.001). Notably, individuals with prolonged sleep latency also had significantly shorter sleep duration (6.97 and 6.30 hours *vs*. 7.16 hours, *P* for trend <0.001), and reported poorer overall sleep quality (64.53% and 42.09% *vs*. 92.25% of proportion of good sleep quality, *P* for trend <0.001, Table 1). In multivariable-adjusted analyses, sleep latency score demonstrated a linear association with hypertension prevalence (*P* for nonlinearity =0.010, Figure 1). Compared to those with normal sleep latency, the fully adjusted odds ratio (*OR*) and 95% confidence interval (*CI*) for hypertension among those with occasional and habitual prolonged sleep latency were 1.10 (1.03, 1.17), and 1.21 (1.14, 1.29), respectively (Table 2, Model 3). The individual components of prolonged sleep latency — both taking longer to fall asleep (exceeding 30 min) and experiencing multiple instances of sleep initiation difficulty — showed independent associations with increased odds of hypertension (Supplementary Table S3, available at https://weekly.chinacdc.cn/).

The adverse association between habitual prolonged sleep latency and hypertension remained consistent across various subgroups stratified by sex, age, central obesity status and lifestyle factors. However, the impact of occasional prolonged sleep latency on hypertension prevalence was more pronounced among women, individuals with central obesity and those using sleep-aiding medications (Supplementary Table S4, available at https://weekly.chinacdc.cn/). Furthermore, sensitivity analyses yielded consistent results when using alternative hypertension definitions (SBP/DBP ≥ 130/80 mmHg), and when restricting analyses to previously diagnosed hypertension cases (Supplementary Table S3).

DISCUSSION

In contemporary societies, prolonged sleep latency represents a pervasive yet frequently underdiagnosed and undertreated sleep disorder. Analysis of the SCC baseline data revealed that over one quarter of the study participants experienced prolonged sleep latency. The findings demonstrated that occasional and habitual prolonged sleep latency was associated with 10% and 21% higher odds of hypertension prevalence, respectively. These results identify prolonged sleep latency served as a modifiable risk factor for hypertension that warrants increased attention.

While sleep is fundamental for maintaining both physical and mental health, epidemiological investigations of sleep-related cardiometabolic complications have predominantly focused on sleep duration, overlooking the impact of prolonged sleep latency — a more prevalent sleep disorder in modern societies. This finding aligns with a previous cross-sectional study that demonstrated an association between longer night sleep latency and increased odds of hypertension (*4*). The present study extends these observations by confirming this relationship in a substantially larger cohort while controlling for established cardiometabolic risk factors. The robust sample size enabled subgroup analyses across various demographic and lifestyle characteristics, validating the consistency of this association. Similar relationships have been documented in other populations, with prolonged sleep-onset latency with a 60% higher probability of cardiovascular diseases in the US

TABLE 1. Baseline characteristics of study participants stratified by sleep latency status in Four PLADs of South China, 2018–2020.

Characteristic	Overall (*n*=72,476)	Normal latency (*n*=54,306)	Prolonged latency		*P* for trend
			Occasional (*n*=9,341)	Habitual (*n*=8,829)	
Age*, years	56.53 (11.69)	55.85 (11.63)	58.57 (11.64)	58.55 (11.61)	<0.001
Female†, *n* (%)	43,255 (59.68)	31,173 (57.40)	6,132 (65.65)	5,950 (67.39)	<0.001
Married, *n* (%)	56,516 (77.98)	43,511 (80.12)	6,244 (66.85)	6,761 (76.58)	<0.001
Han ethnic group, *n* (%)	51,010 (78.69)	37,928 (79.43)	6,528 (77.87)	6,554 (75.40)	<0.001
Higher education, *n* (%)	27,476 (37.91)	21,654 (39.87)	3,641 (38.98)	2,181 (24.70)	<0.001
Retirement, *n* (%)	27,563 (38.03)	19,854 (36.56)	4,650 (49.78)	3,059 (34.65)	<0.001
Income less than 150,000 Chinese Yuan, *n* (%)	63,836 (88.08)	48,208 (88.77)	7,869 (84.24)	7,759 (87.88)	<0.001
Lifestyle behaviors					
Current smoking, *n* (%)	10,723 (14.80)	8,328 (15.34)	1,151 (12.32)	1,244 (14.09)	<0.001
Current drinking, *n* (%)	22,761 (31.40)	16,916 (31.15)	2,504 (26.81)	3,341 (37.84)	<0.001
Regular exercise, *n* (%)	7,624 (10.52)	5,127 (9.44)	1,621 (17.35)	876 (9.92)	<0.001
Physical and clinical measurements					
Waist circumference, cm	82.25 (9.59)	82.34 (9.62)	81.79 (9.48)	82.20 (9.46)	<0.001
BMI, kg/m^2	23.91 (3.43)	23.97 (3.43)	23.75 (3.44)	23.65 (3.40)	<0.001
SBP, mmHg	128.88 (19.20)	128.61 (19.14)	128.68 (19.24)	130.78 (19.47)	<0.001
DBP, mmHg	77.94 (12.30)	78.10 (12.34)	75.89 (11.96)	79.13 (12.13)	<0.001
Triglycerides§, mmol/L	1.28 (0.90, 1.86)	1.27 (0.90, 1.86)	1.30 (0.91, 1.90)	1.28 (0.91, 1.86)	0.646
Total cholesterol, mmol/L	5.27 (4.59, 6.01)	5.26 (4.59, 6.00)	5.30 (4.61, 6.06)	5.29 (4.60, 6.05)	<0.001
HDL-c, mmol/L	1.43 (1.18, 1.72)	1.43 (1.19, 1.73)	1.43 (1.18, 1.74)	1.41 (1.17, 1.68)	<0.001
LDL-c, mmol/L	3.13 (2.58, 3.75)	3.12 (2.58, 3.74)	3.16 (2.57, 3.82)	3.17 (2.57, 3.78)	<0.001
Comorbidities					
Hypertension, *n* (%)	17,416 (24.03)	12,343 (22.73)	2,530 (27.08)	2,543 (28.80)	<0.001
Diabetes, *n* (%)	4,933 (12.37)	3,489 (12.01)	727 (12.60)	717 (14.16)	<0.001
Cardiovascular disease, *n* (%)	2,724 (3.76)	1,796 (3.31)	441 (4.72)	487 (5.52)	<0.001
Cancer, *n* (%)	732 (1.84)	508 (1.75)	116 (2.01)	108 (2.14)	0.099
Sleep behaviors					
Time to fall asleep, minutes	20.85 (22.00)	13.04 (8.81)	32.85 (20.02)	56.13 (36.04)	<0.001
Difficulty falling asleep, *n* (%)	9,011 (12.43)	0 (0.00)	899 (9.62)	8,112 (91.88)	<0.001
Sleep duration, hours	7.03 (1.27)	7.16 (1.16)	6.97 (1.30)	6.30 (1.59)	<0.001
Good sleep quality, *n* (%)	59,842 (82.57)	50,098 (92.25)	6,028 (64.53)	3,716 (42.09)	<0.001
Medication for sleep, *n* (%)	2,351 (3.24)	1,027 (1.42)	649 (6.95)	675 (7.65)	<0.001
Habit of Napping, *n* (%)	41,968 (57.90)	31,385 (57.80)	5,470 (58.56)	5,113 (57.91)	0.427

Abbreviation: BMI=body mass index, SBP=systolic blood pressure, DBP=diastolic blood pressure, HDL-c=high-density lipoprotein cholesterol, LDL-c=low-density lipoprotein cholesterol; SD=standard deviation.

* Normally distributed continuous data were presented as mean±SD.

† Categorical variables were expressed as cases (Percent).

§ Skewed data were expressed as median with the interquartile range (P_{25}–P_{75}).

population (*5*), and each 10-minute increase in sleep latency corresponding to an 89% increase in hypertension risk among police officers (*6*). While previous research has identified prolonged sleep latency as an indicator of sleep disorders and reduced sleep efficiency (*7*), most studies have focused solely on time to fall asleep, neglecting the frequency and chronicity of the condition. To address this limitation, this study developed a more comprehensive sleep latency score incorporating both the time to fall asleep and

frequency of sleep initiation difficulties. The results revealed that habitual prolonged sleep latency was more prevalent among elderly individuals, women, and subjects with lower educational and economic status. Furthermore, prolonged sleep latency frequently co-occurred with shorter sleep duration and diminished self-reported sleep quality. Notably, after adjusting for these confounding factors, habitual prolonged sleep latency maintained a significant association with a 21% higher likelihood of having hypertension. This detrimental effect persisted across both genders, all age groups, and varying levels of healthy lifestyle adherence. Additionally, we observed that occasional prolonged sleep latency had a more pronounced adverse effect in females and subjects with central obesity, suggesting heightened vulnerability in these populations. While the molecular mechanisms linking prolonged sleep latency to hypertension remain incompletely understood, the observed association may be explained by physiological alterations, including sympathetic nervous system activation, disruption of the hypothalamic-pituitary-adrenal axis affecting cortisol secretion and renin-angiotensin system activity, and elevated systemic inflammation (*8*).

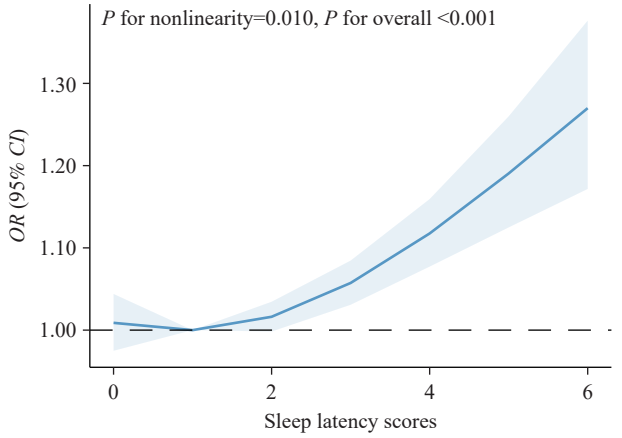

FIGURE 1. Restricted cubic spline for the association between sleep latency and hypertension among adults in South China, 2018–2020.
Note: The *OR* was adjusted for age, gender, education level, income, ethnic group, body mass index, smoking, drinking, regular exercise and self-reported sleep quality.
Abbreviation: *OR*=odds ratio; *CI*=confidence interval.

Several limitations warrant consideration in interpreting these findings. Although the results remained robust across multiple sensitivity analyses, the cross-sectional design precludes definitive causal inference. Future prospective studies across diverse populations are needed to establish causality. Additionally, while self-reported sleep behaviors and lifestyle data are wildly used and validated in large-scale population studies, the potential for misclassification and recall bias cannot be eliminated. Finally, the exclusion of approximately 38% of participants due to missing sleep behavior and hypertension data represents a notable limitation. However, the substantial sample size and consistent findings across sensitivity analyses support the robustness of the conclusions in this study.

In conclusion, the findings underscore the importance of increasing public awareness regarding the adverse effects of prolonged sleep latency on hypertension risk and support the integration of sleep management into current lifestyle intervention strategies for hypertension prevention and control.

Acknowledgments: We are grateful to all participants who contributed to this research. The study protocol was approved by the Ethics Committee of School of Public Health, Sun Yat-Sen University (L2017-001). Informed consent was obtained from all participants.

Conflicts of interest: No conflicts of interest.

Funding: Supported by the Guangzhou Science and Technology Project (2024A04J6477) and the Fundamental Research Funds for the Central

TABLE 2. Association between prolonged sleep latency and hypertension among adults in Four PLADs of South China, 2018-2020, multivariable logistic regression analyses.

Prolonged sleep latency	Hypertension (%)	Crude model		Model 1*		Model 2†		Model 3§	
		OR (95% *CI*)	*P*	*OR* (95% *CI*)	*P*	*OR* (95% *CI*)	*P*	*OR* (95% *CI*)	*P*
Normal	12,343 (22.73)	1		1		1		1	
Occasional	2,530 (27.08)	1.26(1.20,1.33)	<0.001	1.05(0.99,1.11)	0.065	1.09(1.03,1.15)	0.004	1.10(1.03,1.17)	0.003
Habitual	2,543 (28.80)	1.38(1.31,1.45)	<0.001	1.16(1.10,1.23)	<0.001	1.23(1.16,1.30)	<0.001	1.21(1.14,1.29)	<0.001

Abbreviation: *OR*=odds ratio, *CI*=confidence interval; Ref.=reference.
* Model 1: Adjusted for age and sex.
† Model 2: Adjusted for age, sex, education level, income, and ethnicity.
§ Model 3: Adjusted for age, sex, education level, income, ethnicity, body mass index, smoking status, alcohol consumption, regular exercise, and self-reported sleep quality.

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doi: 10.46234/ccdcw2025.030

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Submitted: August 20, 2024
Accepted: January 05, 2025
Issued: January 31, 2025

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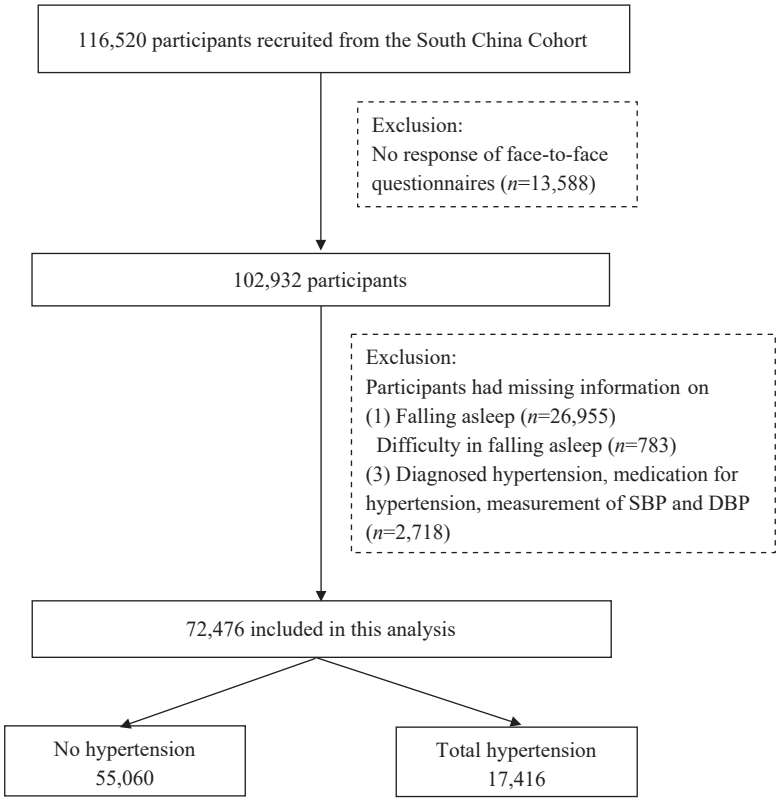
SUPPLEMENTARY MATERIAL

eMethods

Covariates assessment Comprehensive covariate data were collected through structured questionnaires. Marital status was categorized as married or widowed/divorced/separated/unmarried. Educational attainment was dichotomized into high school completion or above. Household was classified as above or below 150,000 Chinese Yuan. Current smoking status was defined as regular consumption of ≥1 cigarette daily or ≥7 cigarettes weekly during the previous 6 months. Current alcohol consumption was defined as regular intake ≥once weekly during the past 12 months. Regular physical activity was defined as ≥150 minutes/week of moderate-intensity activity, ≥75 minutes/week of vigorous-intensity aerobic activity, or an equivalent combination thereof. Central obesity was defined using waist-to-hip ratio thresholds of ≥0.90 for males and ≥0.85 for females, based on established criteria. For blood pressure measurements, participants rested for 5 minutes before two seated measurements were taken using a digital automatic analyzer (Omron HEM-7136) with a 2-minute interval. A third measurement was required if the difference in systolic blood pressure (SBP) or diastolic blood pressure (DBP) between measurements exceeded 10 mmHg (1 mmHg=0.133 kPa). The mean of the final two measurements was used for analysis.

Subgroup analysis and sensitivity analysis To assess the robustness of our findings, we conducted stratified analyses by gender, age (<65, ≥65 years), current smoking status, alcohol consumption, regular exercise, central obesity and use of sleep-aiding medications. Additionally, two sensitivity analyses were performed: first, redefining hypertension using the 2017 American College of Cardiology/American Heart Association guideline threshold of ≥130/80 mmHg; and second, restricting the definition to previously diagnosed hypertension only.



SUPPLEMENTARY FIGURE S1. Flow chart of this study in four PLADs of South China, 2018–2020.

SUPPLEMENTARY TABLE S1. Comparison of basic characteristics between analyses participants and missed participants from four PLADs of South China, 2018–2020.

Characteristics	Analyses participants (*N*=72,476)	Missed participants (*N*=30,456)	*P*
Age, years	56.53 (11.69)	53.49 (12.95)	0.017
Female, *n* (%)	43,255 (59.68)	19,403 (63.71)	<0.001
Married, *n* (%)	56,516 (77.98)	27,008 (89.38)	<0.001
Higher education, *n* (%)	27,476 (37.91)	11,623 (38.29)	0.449
Less than 150,000 Chinese Yuan, *n* (%)	63,836 (88.08)	26,922 (88.40)	0.153
Retirement, *n* (%)	27,563 (38.03)	11,756 (38.60)	0.087
Han ethnic group, *n* (%)	51,010 (70.38)	29,893 (98.15)	<0.001

SUPPLEMENTARY TABLE S2. The definition of sleep latency score among adults in four PLADs of South China, 2018–2020.

Difficulty falling asleep Time to fall asleep	0 time/week (0 point)	<1 time/week (1 point)	1–2 times/week (2 points)	>3 times/week (3 points)
Fall asleep ≤15 minutes (0 point)	0	1	2	3
Fall asleep 16–30 minutes (1 point)	1	2	3	4
Fall asleep 31–60 minutes (2 points)	2	3	4	5
Fall asleep >60 minutes (3 points)	3	4	5	6

SUPPLEMENTARY TABLE S3. The association between sleep latency components and hypertension among adults in four PLADs of South China, 2018–2020.

Sleep latency components	Number of hypertension	Crude model		Model 1*		Model 2†		Model 3§	
		OR (95% *CI*)	*P*	*OR* (95% *CI*)	*P*	*OR* (95% *CI*)	*P*	*OR* (95% *CI*)	*P*
Time to fall asleep									
≤15 minutes	7,940 (22.77%)	1		1		1		1	
16–30 minutes	3,366 (24.46%)	1.10 (1.05,1.15)	<0.001	0.93 (0.88,0.97)	0.002	0.90 (0.85,0.95)	<0.001	0.92 (0.87,0.98)	0.006
31–60 minutes	4,351 (24.28%)	1.09 (1.04,1.13)	<0.001	1.01 (0.97,1.06)	0.586	1.04 (0.99,1.09)	0.123	1.06 (1.01,1.12)	0.021
>60 minutes	1,759 (30.29%)	1.43 (1.35,1.52)	<0.001	1.16 (1.09,1.24)	<0.001	1.25 (1.16,1.33)	<0.001	1.23 (1.14,1.33)	<0.001
Difficulty falling asleep									
None during the past month	10,367 (21.56%)	1		1		1		1	
Less than once a week	2,857 (29.85%)	1.55 (1.47,1.63)	<0.001	1.10 (1.05,1.16)	<0.001	1.09 (1.03,1.15)	0.004	1.12 (1.06,1.19)	<0.001
Once or twice a week	1,626 (27.95%)	1.41 (1.33,1.50)	<0.001	1.05 (0.98,1.12)	0.166	1.09 (1.02,1.17)	0.015	1.09 (1.01,1.17)	0.026
Three or more times a week	2,566 (28.48%)	1.45 (1.38,1.52)	<0.001	1.15 (1.09,1.22)	<0.001	1.22 (1.15,1.29)	<0.001	1.19 (1.12,1.27)	<0.001
Prolonged Sleep latency (sensitivity analysis 1)									
Normal	12,343 (22.73%)	1		1		1		1	
Occasional	2,530 (27.08%)	1.19 (1.14,1.25)	<0.001	0.99 (0.91,1.04)	0.729	1.04 (0.98,1.10)	0.152	1.05 (0.99,1.12)	0.085
Habitual	2,543 (28.80%)	1.29 (1.23,1.35)	<0.001	1.09 (1.03,1.15)	0.002	1.22 (1.16,1.29)	<0.001	1.19 (1.12,1.26)	<0.001
Prolonged Sleep latency (sensitivity analysis 2)									
Normal	10,736 (19.77%)	1		1		1		1	
Occasional	2,305 (24.68%)	1.33 (1.26,1.40)	<0.001	1.11 (1.05,1.17)	<0.001	1.12 (1.05,1.18)	<0.001	1.11 (1.05,1.19)	<0.001
Habitual	2,351 (26.63%)	1.47 (1.40,1.55)	<0.001	1.25 (1.19,1.33)	<0.001	1.23 (1.16,1.30)	<0.001	1.22 (1.14,1.30)	<0.001

Abbreviation: *OR*=odds ratio; *CI*=confidence interval.

* Model 1: Adjusted for age and sex.

† Model 2: Adjusted for age, sex, education level, income, and ethnicity.

§ Model 3: Adjusted for age, sex, education level, income, ethnicity, body mass index, smoking status, alcohol consumption, regular exercise, and self-reported sleep quality.

SUPPLEMENTARY TABLE S4. The association of sleep latency with hypertension in different subgroups among adults in four PLADs of South China, 2018–2020.

Subgroup	Number of hypertension	Normal	Occasional prolonged		Habitual prolonged		*P* for interaction
		*OR** (95% *CI*)	*OR** (95% *CI*)	*P*	*OR** (95% *CI*)	*P*	
Sex							0.002
Male	6,822 (39.17%)	1	1 (0.89,1.09)	0.827	1.15 (1.03,1.28)	0.011	
Female	10,594 (60.83%)	1	1.15 (1.07,1.25)	<0.001	1.25 (1.15,1.35)	<0.001	
Age group							0.241
<65 years	8,462 (48.59%)	1	1.14 (1.05,1.24)	0.002	1.24 (1.13,1.35)	<0.001	
≥65 years	8,954 (51.41%)	1	1.20 (1.10,1.30)	<0.001	1.37 (1.25,1.49)	<0.001	
Smoking							0.041
Yes	1,930 (11.08%)	1	0.92 (0.77,1.11)	0.407	1.24 (1.04,1.48)	0.016	
No	15,486 (88.92%)	1	1.12 (1.05, 1.19)	<0.001	1.21 (1.13,1.29)	<0.001	
Drinking							0.293
Yes	6,139 (35.25%)	1	1.06 (0.95,1.18)	0.320	1.27 (1.14,1.40)	<0.001	
No	11,277 (64.75%)	1	1.11 (1.03,1.20)	0.004	1.18 (1.09,1.28)	<0.001	
Regular exercise							0.084
Yes	2,874 (16.50%)	1	1.22 (1.07,1.39)	0.003	1.29 (1.09,1.53)	0.003	
No	14,542 (83.50%)	1	1.06 (0.99,1.14)	0.078	1.20 (1.12,1.28)	<0.001	
Central obesity							0.856
Yes	10,268 (59.96%)	1	1.10 (1.01,1.19)	<0.001	1.20 (1.10,1.30)	<0.001	
No	7,148 (41.04%)	1	1.06 (0.97,1.63)	0.197	1.18 (1.08,1.30)	<0.001	
Medication for sleep							<0.001
Yes	620 (3.56%)	1	1.13 (1.06,1.21)	<0.001	1.19 (1.10,1.30)	<0.001	
No	16,774 (96.44%)	1	0.87 (0.66,1.15)	0.340	1.51 (1.15,1.99)	<0.001	

Abbreviation: *OR*=odds ratio; *CI*=confidence interval.

*The *OR* was adjusted for age, sex, education level, income, ethnicity, body mass index, smoking status, alcohol consumption, regular exercise, and self-reported sleep quality. Stratification criteria were excluded from its group.