

Supplementary Table 1. Odds ratios of sleep disorder and corresponding 95% CIs according to CSF NOS (including tNOS, iNOS, cNOS) level and smoke.

Model	Variable	Adjusted OR (95% CI)	P value	
Model1	tNOS	Low Level	Reference	
		High Level	0.46 (0.16, 1.30)	0.137
	Smoke	No	Reference	
		Yes	0.92 (0.32, 2.66)	0.871
	Marriage	Unmarried	Reference	
		Married	1.16 (0.47, 2.94)	0.745
	Living state	Living alone	Reference	
		Living with others	0.46 (0.13, 1.64)	0.221
	BMI		1.04 (0.96, 1.13)	0.354
	Age		1.03 (0.99, 1.08)	0.107
Model2	iNOS	Low Level	Reference	
		High Level	0.40 (0.17, 0.92)	0.032*
	Smoke	No	Reference	
		Yes	0.98 (0.42, 2.26)	0.969
	Marriage	Unmarried	Reference	
		Married	1.02 (0.40, 2.61)	0.970
	Living state	Living alone	Reference	
		Living with others	0.48 (0.14, 1.72)	0.249
	BMI		1.03 (0.95, 1.12)	0.479
	Age		1.04 (1.00, 1.08)	0.790
Model3	cNOS	Low Level	Reference	
		High Level	0.28 (0.12, 0.63)	<0.01**
	Smoke	No	Reference	
		Yes	0.84 (0.37, 1.87)	0.667
	Marriage	Unmarried	Reference	
		Married	1.17 (0.46, 3.00)	0.740
	Living state	Living alone	Reference	
		Living with others	0.39 (0.11, 1.43)	0.145
	BMI		1.03 (0.95, 1.13)	
	Age		1.03 (0.99, 1.07)	0.145

Note: Model 1 was a logistic regression analysis with tNOS and smoke as the independent variable and sleep disorder as the dependent variable. Model 2 was a logistic regression analysis with iNOS and smoke as the independent variable and sleep disorder as the dependent variable. Model 3 was a logistic regression analysis with cNOS and smoke as the independent variable and sleep disorder as the dependent variable. The model was adjusted for age, BMI, marriage, and living state. *p<0.05, **p<0.01.

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); tNOS, total nitric oxide synthase; iNOS, inducible nitric oxide synthase; cNOS, constitutive nitric oxide synthase; OR, odds ratio; 95% CI, 95% confidence interval.

Supplementary Table 2. Odds ratios of CSF tNOS levels and corresponding 95% CIs according to CSF iNOS and CSF cNOS levels.

Variable	OR (95% CI)	P value
iNOS	1.59 (1.39, 1.87)	<0.001***
cNOS	1.07 (1.01, 1.14)	0.030*
Marriage	0.81 (0.22, 3.14)	0.754
Living state	1.25 (0.20, 8.32)	0.811
BMI	1.03 (0.90, 1.18)	0.680
Age	1.02 (0.96, 1.08)	0.534

Note: The model was a logistic regression analysis with iNOS and cNOS as the independent variable and tNOS as the dependent variable. The model was adjusted for age, BMI, marriage, and living state. * $p < 0.05$, *** $p < 0.001$.

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); tNOS, total nitric oxide synthase; iNOS, inducible nitric oxide synthase; cNOS, constitutive nitric oxide synthase; OR, odds ratio; 95% CI, 95% confidence interval.

Supplementary Table 3. Odds ratios of sleep disorder and corresponding 95% CIs according to CSF iNOS levels, CSF cNOS levels and smoke.

		OR (95% CI)	P value
iNOS	cNOS		
Low Level	Low Level		Reference
Low Level	High Level	0.37 (0.108, 1.10)	0.086
High Level	Low Level	0.55 (0.18, 1.55)	0.264
High Level	High Level	0.15 (0.05, 0.45)	<0.001***
Smoke	No		Reference
	Yes	0.579 (0.22, 1.45)	0.250
Marriage	Unmarried		Reference
	Married	1.03 (0.39, 2.72)	0.951
Living state	Living alone		Reference
	Living with others	0.39 (0.11, 1.43)	0.145
BMI		1.03 (0.94, 1.13)	0.493
Age		1.04 (0.99, 1.08)	0.093

Note: The model was a logistic regression analysis with iNOS, cNOS and smoke as the independent variable and sleep disorder as the dependent variable. The model was adjusted for age, BMI, marriage, and living state. ***p<0.001.

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); iNOS, inducible nitric oxide synthase; cNOS, constitutive nitric oxide synthase; OR, odds ratio; 95% CI, 95% confidence interval.

Supplementary Table 4. Analysis of smoking and PSQI Global scores association with CSF Inducible NOS as a mediator.

	Model1 (PSQI)		Model2 (iNOS)		Model3 (PSQI)	
	β	t	β	t	β	t
Age, y	0.126	1.250	0.041	0.484	0.138	1.411
BMI	0.155	1.685	-0.101	-1.306	0.125	1.393
Marrige	0.003	0.069	-0.049	-1.191	-0.011	-0.234
Living status	0.039	0.596	-0.062	-1.130	0.020	0.321
Smoke	0.109***	3.206	-0.245***	-8.533	0.037	0.935
CSF Inducible NOS	(--)	(--)	(--)	(--)	-0.297***	-3.504
R ²	0.1112		0.3231		0.1400	
F (df)	4.65*** (5,185)		19.14*** (5, 185)		6.16*** (5, 185)	

Note: Model 1 was a linear regression model with smoke as the independent variable and PSQI as the dependent variable. Model 2 was a linear regression model with smoke as the independent variable and CSF inducible NOS as the dependent variable. Based on Model 1, Model 3 uses CSF inducible NOS and smoke as independent variables. All data were reported as mediation analysis. ***p<0.001.

Abbreviations: PSQI, Pittsburgh Sleep Quality Index; BMI, body mass index; CSF, cerebral spinal fluid; iNOS, inducible nitric oxide synthase.

Supplementary Table 5. Significance test for mediating effects of smoke, iNOS, and PSQI global scores.

Effect decomposition	Estimated	95% CI		<i>P</i>
		Lower	Upper	
Indirect effect	0.073	0.031	0.120	<0.001***
Direct effect	0.037	-0.040	0.110	0.341
Total effect	0.109	0.042	0.180	<0.01**

Note: All data were reported as mediation analysis. Effect decomposition of the mediation model for the relationship between smoking and PSQI global score association with CSF Inducible NOS as mediator. ***p* < 0.01, ****p* < 0.001.

Abbreviations: 95% CI, 95% confidence interval.

Supplementary Table 6. Analysis of smoking and PSQI Global scores association with CSF Constitutive NOS as a mediator.

	Model1 (PSQI)		Model2 (cNOS)		Model3 (PSQI)	
	β	t	β	t	β	t
Age, y	0.126	1.250	-0.030	-0.439	0.113	1.170
BMI	0.155	1.685	0.009	0.149	0.159	1.807
Marrige	0.003	0.069	-0.012	-0.345	-0.002	-0.035
Living status	0.039	0.596	0.011	0.253	0.044	0.701
Smoke	0.109***	3.206	-0.204***	-8.763	0.020	0.523
CSF Constitutive NOS	(--)	(--)	(--)	(--)	-0.437***	-4.234
R ²	0.1112		0.3035		0.1640	
F (df)	4.65*** (5,185)		17.56*** (5, 185)		7.22*** (5, 185)	

Note: Note: Model 1 was a linear regression model with smoke as the independent variable and PSQI as the dependent variable. Model 2 was a linear regression model with smoke as the independent variable and CSF constitutive NOS as the dependent variable. Based on Model 1, Model 3 uses CSF constitutive NOS and smoke as independent variables. All data were reported as mediation analysis. ***p < 0.001.

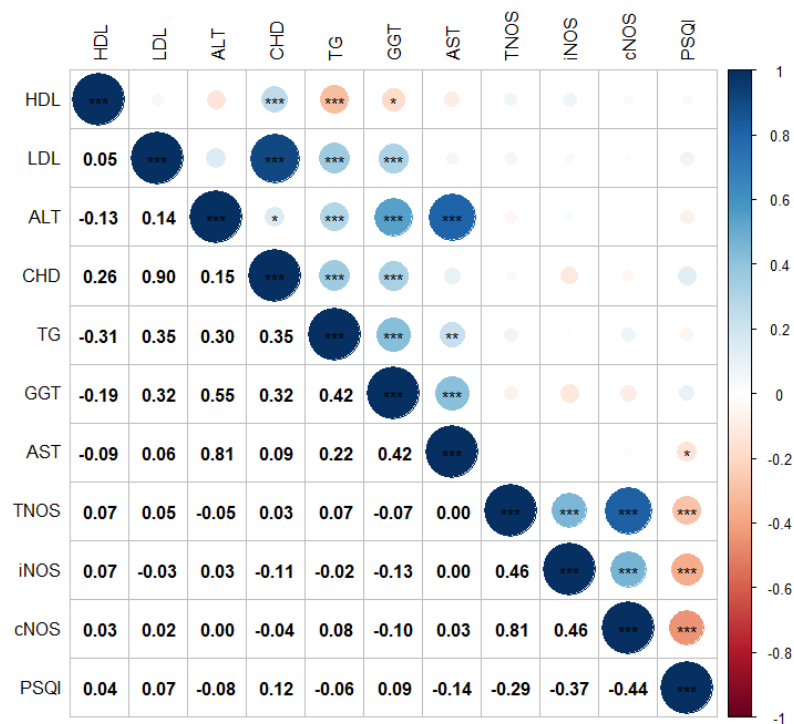
Abbreviations: PSQI, Pittsburgh Sleep Quality Index; BMI, body mass index; CSF, cerebral spinal fluid; cNOS, constitutive nitric oxide synthase.

Supplementary Table 7. Significance test for mediating effects of smoke, cNOS, and PSQI global scores.

Effect decomposition	Estimated	95% CI		<i>P</i>
		Lower	Upper	
Indirect effect	0.089	0.046	0.140	<0.001***
Direct effect	0.019	-0.055	0.090	0.608
Total effect	0.109	0.042	0.180	<0.01**

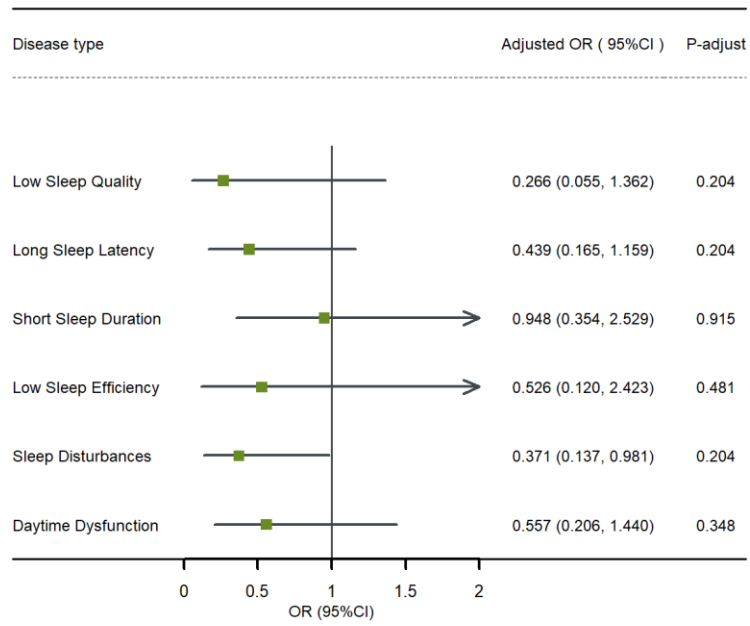
Note: All data were reported as mediation analyses. Effect decomposition of the mediation model for the relationship between smoking and PSQI global score association with CSF Constitutive NOS as mediator. ***p* < 0.01, ****p* < 0.001.

Abbreviations: 95% CI, 95% confidence interval.



Supplementary Figure 1. Correlation of physiological indices with PSQI Global scores in the general group.

Note: All data were reported as Spearman correlation analysis. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Abbreviations: PSQI, Pittsburgh Sleep Quality Index; HDL, high-density lipoprotein; LDL, low-density lipoprotein; TG, triglyceride; CHO, cholesterol; ALT, alanine transaminase; AST, aspartate aminotransferase; GGT, γ -glutamyltransferase; TNOS, total nitric oxide synthase; iNOS, inducible nitric oxide synthase; cNOS, constitutive nitric oxide synthase.



Supplementary Figure 2. Odds ratios of PSQI components and corresponding 95% CIs according to median CSF Total NOS.

Note: OR, odds ratio; 95% CI, 95% confidence interval; P-adjust, FDR-corrected P.