Table S1 The results of Spearman's correlations

			Age	Sex	WC	BMI	MAP	Current smokers	Current drinkers	AHI_{REM}	AHI_{NREM}	Insulin	HOMA-IR	FIRI	Bennett's ISI
Spearman's Rho	Age	Correlation Coefficient	1.000	.178**	.053**	-.013	-.024	.079**	-.024	.079**	.107**	-.097**	-.048**	-.048**	.032
		Sig. (2-tailed)	.	.000	.005	.499	.202	.000	.202	.000	.000	.000	.010	.010	.081
		N	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899
	Sex	Correlation coefficient	.178**	1.000	-.269**	-.168**	-.192**	-.191**	-.192**	-.191**	-.261**	-.085**	-.088**	-.088**	.087**
		Sig. (2-tailed)	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
		N	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899
	WC	Correlation coefficient	.053**	-.269**	1.000	.809**	.026	.489**	.026	.489**	.516**	.562**	.582**	.582**	-.580**
		Sig. (2-tailed)	.005	.000	.	.000	.158	.000	.158	.000	.000	.000	.000	.000	.000
		N	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899
	BMI	Correlation coefficient	-.013	-.168**	.809**	1.000	.021	.486**	.021	.486**	.480**	.570**	.581**	.581**	-.577**
		Sig. (2-tailed)	.499	.000	.000	.	.257	.000	.257	.000	.000	.000	.000	.000	.000
		N	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899
	MAP	Correlation coefficient	.108**	-.109**	.289**	.264**	-.048*	.239**	-.048*	.239**	.258**	.201**	.222**	.222**	-.225**
		Sig. (2-tailed)	.000	.000	.000	.000	.011	.000	.011	.000	.000	.000	.000	.000	.000
		N	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899
	Current smokers	Correlation coefficient	-.005	-.263**	.087**	.076**	.459**	.052**	.459**	.052**	.081**	-.018	-.025	-.025	.026
		Sig. (2-tailed)	.794	.000	.000	.000	.000	.005	.000	.005	.000	.338	.170	.170	.157
		N	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899

	Current drinkers	Correlation coefficient	-.024	-.192**	.026	.021	1.000	.008	1.000	.008	.022	-.052**	-.059**	-.059**	.059**
		Sig. (2-tailed)	.202	.000	.158	.257	.	.675	.	.675	.240	.005	.001	.001	.001
		N	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899
	AHIREM	Correlation coefficient	.079**	-.191**	.489**	.486**	.008	1.000	.008	1.000	.848**	.380**	.400**	.400**	-.402**
		Sig. (2-tailed)	.000	.000	.000	.000	.675	.	.675	.	.000	.000	.000	.000	.000
		N	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899
	AHINREM	Correlation coefficient	.107**	-.261**	.516**	.480**	.022	.848**	.022	.848**	1.000	.374**	.394**	.394**	-.396**
		Sig. (2-tailed)	.000	.000	.000	.000	.240	.000	.240	.000	.	.000	.000	.000	.000
		N	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899
	Insulin	Correlation coefficient	-.097**	-.085**	.562**	.570**	-.052**	.380**	-.052**	.380**	.374**	1.000	.978**	.978**	-.961**
		Sig. (2-tailed)	.000	.000	.000	.000	.005	.000	.005	.000	.000	.	.000	.000	.000
		N	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899
	HOMAIR	Correlation coefficient	-.048**	-.088**	.582**	.581**	-.059**	.400**	-.059**	.400**	.394**	.978**	1.000	1.000**	-.995**
		Sig. (2-tailed)	.010	.000	.000	.000	.001	.000	.001	.000	.000	.000	.	.	.000
		N	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899
	FIRI	Correlation coefficient	-.048**	-.088**	.582**	.581**	-.059**	.400**	-.059**	.400**	.394**	.978**	1.000**	1.000	-.995**
		Sig. (2-tailed)	.010	.000	.000	.000	.001	.000	.001	.000	.000	.000	.	.	.000
		N	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899
	Bennett ISI	Correlation coefficient	.032	.087**	-.580**	-.577**	.059**	-.402**	.059**	-.402**	-.396**	-.961**	-.995**	-.995**	1.000
		Sig. (2-tailed)	.081	.000	.000	.000	.001	.000	.001	.000	.000	.000	.000	.000	.

		N	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899	2899

*, correlation is significant at the 0.05 level (2-tailed); **, correlation is significant at the 0.01 level (2-tailed).

Table S2 The tolerance and VIF in terms of insulin level

Model		Unstandardized coefficients		Standardized coefficients			Collinearity statistics	
		B	Std. error	Beta	*t*	Sig.	Tolerance	VIF
1	(Constant)	-18.265	1.719		-10.627	.000		
	Age	-.083	.013	-.108	-6.501	.000	.917	1.091
	Sex	1.376	.404	.061	3.410	.001	.781	1.281
	WC	.201	.024	.246	8.351	.000	.292	3.420
	BMI	.521	.066	.226	7.922	.000	.310	3.225
	Current smokers	-1.099	.401	-.050	-2.740	.006	.755	1.325
	Current drinkers	-.745	.412	-.033	-1.809	.071	.779	1.283
	MAP	.002	.013	.003	.161	.872	.892	1.121
	AHIREM	.026	.010	.075	2.544	.011	.294	3.406
	AHINREM	.016	.010	.048	1.627	.104	.290	3.451

Dependent variable: insulin level.

Table S3 The eigenvalue and condition index in terms of insulin level

Model	Dimension	Eigenvalue	Condition index	Variance proportions									
				(Constant)	Age	Sex	WC	BMI	Current smokers	Current drinkers	MAP	AHI_{REM}	AHI_{NREM}
1	1	7.001	1.000	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
	2	1.249	2.368	.00	.00	.15	.00	.00	.16	.16	.00	.00	.00
	3	.799	2.960	.00	.00	.32	.00	.00	.04	.13	.00	.02	.03
	4	.424	4.064	.00	.00	.00	.00	.00	.63	.70	.00	.01	.01
	5	.381	4.289	.00	.01	.41	.00	.00	.16	.00	.00	.05	.06
	6	.066	10.305	.00	.16	.00	.00	.00	.00	.00	.00	.68	.72
	7	.058	10.961	.00	.73	.05	.00	.01	.00	.00	.01	.21	.16
	8	.014	21.985	.02	.04	.00	.03	.14	.00	.00	.50	.01	.00

	9	.006	33.763	.73	.05	.00	.00	.16	.00	.01	.47	.01	.01
	10	.003	51.613	.25	.02	.07	.96	.69	.00	.00	.01	.00	.01

Dependent variable: Insulin level.

Table S4 The tolerance and VIF in terms of HOMA-IR

Model		Unstandardized coefficients		Standardized coefficients			Collinearity statistics	
		B	Std. Error	Beta	*t*	Sig.	Tolerance	VIF
1	(Constant)	-6.951	.512		-13.564	.000		
	Age	-.017	.004	-.072	-4.362	.000	.917	1.091
	Sex	.447	.120	.067	3.717	.000	.781	1.281
	WC	.071	.007	.291	9.912	.000	.292	3.420
	BMI	.133	.020	.193	6.759	.000	.310	3.225
	Current smokers	-.413	.120	-.063	-3.450	.001	.755	1.325
	Current drinkers	-.259	.123	-.038	-2.107	.035	.779	1.283
	MAP	.002	.004	.010	.619	.536	.892	1.121
	AHIREM	.007	.003	.071	2.434	.015	.294	3.406
	AHINREM	.004	.003	.039	1.306	.192	.290	3.451

Dependent variable: HOMA-IR.

Table S5 The eigenvalue and condition index in terms of HOMA-IR

Model	Dimension	Eigenvalue	Condition index	Variance proportions									
				(Constant)	Age	Sex	WC	BMI	Current smokers	Current drinkers	MAP	AHI_{REM}	AHI_{NREM}
1	1	7.001	1.000	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
	2	1.249	2.368	.00	.00	.15	.00	.00	.16	.16	.00	.00	.00
	3	.799	2.960	.00	.00	.32	.00	.00	.04	.13	.00	.02	.03
	4	.424	4.064	.00	.00	.00	.00	.00	.63	.70	.00	.01	.01
	5	.381	4.289	.00	.01	.41	.00	.00	.16	.00	.00	.05	.06
	6	.066	10.305	.00	.16	.00	.00	.00	.00	.00	.00	.68	.72
	7	.058	10.961	.00	.73	.05	.00	.01	.00	.00	.01	.21	.16
	8	.014	21.985	.02	.04	.00	.03	.14	.00	.00	.50	.01	.00
	9	.006	33.763	.73	.05	.00	.00	.16	.00	.01	.47	.01	.01

	10	.003	51.613	.25	.02	.07	.96	.69	.00	.00	.01	.00	.01

Dependent variable: HOMA-IR.

Table S6 The tolerance and VIF in terms of FIRI

Model		Unstandardized coefficients		Standardized coefficients			Collinearity statistics	
		B	Std. error	Beta	*t*	Sig.	Tolerance	VIF
1	(Constant)	-6.256	.461		-13.564	.000		
	Age	-.015	.003	-.072	-4.362	.000	.917	1.091
	Sex	.403	.108	.067	3.717	.000	.781	1.281
	WC	.064	.006	.291	9.912	.000	.292	3.420
	BMI	.119	.018	.193	6.759	.000	.310	3.225
	Current smokers	-.371	.108	-.063	-3.450	.001	.755	1.325
	Current drinkers	-.233	.111	-.038	-2.107	.035	.779	1.283
	MAP	.002	.004	.010	.619	.536	.892	1.121
	AHIREM	.007	.003	.071	2.434	.015	.294	3.406
	AHINREM	.003	.003	.039	1.306	.192	.290	3.451

Dependent variable: FIRI.

Table S7 The eigenvalue and condition index in terms of FIRI

Model	Dimension	Eigenvalue	Condition index	Variance proportions									
				(Constant)	Age	Sex	WC	BMI	Current smokers	Current drinkers	MAP	AHI_{REM}	AHI_{NREM}
1	1	7.001	1.000	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
	2	1.249	2.368	.00	.00	.15	.00	.00	.16	.16	.00	.00	.00
	3	.799	2.960	.00	.00	.32	.00	.00	.04	.13	.00	.02	.03
	4	.424	4.064	.00	.00	.00	.00	.00	.63	.70	.00	.01	.01
	5	.381	4.289	.00	.01	.41	.00	.00	.16	.00	.00	.05	.06
	6	.066	10.305	.00	.16	.00	.00	.00	.00	.00	.00	.68	.72
	7	.058	10.961	.00	.73	.05	.00	.01	.00	.00	.01	.21	.16
	8	.014	21.985	.02	.04	.00	.03	.14	.00	.00	.50	.01	.00
	9	.006	33.763	.73	.05	.00	.00	.16	.00	.01	.47	.01	.01

	10	.003	51.613	.25	.02	.07	.96	.69	.00	.00	.01	.00	.01

Dependent variable: FIRI.

Table S8 The tolerance and VIF in terms of Bennet's ISI

Model		Unstandardized coefficients		Standardized coefficients			Collinearity statistics	
		B	Std. error	Beta	*t*	Sig.	Tolerance	VIF
1	(Constant)	3.997	.270		14.786	.000		
	Age	.006	.002	.055	2.910	.004	.917	1.091
	Sex	-.104	.063	-.033	-1.642	.101	.781	1.281
	WC	-.019	.004	-.163	-4.920	.000	.292	3.420
	BMI	-.023	.010	-.072	-2.232	.026	.310	3.225
	Current smokers	.030	.063	.010	.478	.633	.755	1.325
	Current drinkers	.037	.065	.012	.567	.570	.779	1.283
	MAP	-.003	.002	-.024	-1.271	.204	.892	1.121
	AHIREM	.000	.002	.003	.083	.934	.294	3.406
	AHINREM	-.003	.002	-.058	-1.754	.080	.290	3.451

Dependent variable: Bennett's ISI.

Table S9 The eigenvalue and condition index in terms of Bennet's ISI

Model	Dimension	Eigenvalue	Condition index	Variance Proportions									
				(Constant)	age	sex	WC	BMI	Current smokers	Current drinkers	MAP	AHI_{REM}	AHI_{NREM}
1	1	7.001	1.000	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
	2	1.249	2.368	.00	.00	.15	.00	.00	.16	.16	.00	.00	.00
	3	.799	2.960	.00	.00	.32	.00	.00	.04	.13	.00	.02	.03
	4	.424	4.064	.00	.00	.00	.00	.00	.63	.70	.00	.01	.01
	5	.381	4.289	.00	.01	.41	.00	.00	.16	.00	.00	.05	.06
	6	.066	10.305	.00	.16	.00	.00	.00	.00	.00	.00	.68	.72
	7	.058	10.961	.00	.73	.05	.00	.01	.00	.00	.01	.21	.16
	8	.014	21.985	.02	.04	.00	.03	.14	.00	.00	.50	.01	.00
	9	.006	33.763	.73	.05	.00	.00	.16	.00	.01	.47	.01	.01

	10	.003	51.613	.25	.02	.07	.96	.69	.00	.00	.01	.00	.01

a. Dependent Variable: Bennett's ISI

Table S10 Adjusted odds ratios for characteristics of insulin resistance by AHI_{REM} severities in Models 1 and 2

Model	Hyperinsulinemia	HOMA-IR ≥2.5	FIRI ≥2.7	Bennet's ISI ≤1.34
Model 1 adjusted OR (95% CI)				
AHI_{REM} <5	1	1	1	1
5≤ AHI_{REM} <15	1.457 (1.038, 2.043)	1.388 (1.014, 1.899)	1.506 (1.057, 2.143)	1.288 (0.936, 1.773)
15≤ AHI_{REM} <30	1.610 (1.145, 2.265)	1.529 (1.111, 2.104)	1.647 (1.156, 2.347)	1.533 (1.111, 2.116)
AHI_{REM} ≥30	2.244 (1.703, 2.957)	2.121 (1.639, 2.744)	2.457 (1.845, 3.271)	2.183 (1.683, 2.831)
P for trend	<0.001	<0.001	<0.001	<0.001
Model 2 adjusted OR (95% CI)				
AHI_{REM} <5	1	1	1	1
5≤ AHI_{REM} <15	1.396 (0.990, 1.967)	1.348 (0.980, 1.854)	1.458 (1.019, 2.086)	1.265 (0.915, 1.749)
15≤ AHI_{REM} <30	1.472 (1.026, 2.111)	1.439 (1.025, 2.019)	1.540 (1.060, 2.238)	1.476 (1.048, 2.077)
AHI_{REM} ≥30	1.879 (1.312, 2.691)	1.883 (1.340, 2.647)	2.152 (1.487, 3.114)	2.024 (1.436, 2.853)
P for trend	0.001	<0.001	<0.001	<0.001

Model 1: to observe the risks of insulin resistance across AHI_{REM} severities, the age, gender, BMI, WC, MAP, smoking status, and alcohol consumption were adjusted. Model 2: to consider the influence of AHI_{NREM}, we adjusted the factors in model 1 as well as AHI_{NREM}.

Table S11 Adjusted odds ratios for characteristics of insulin resistance

Characteristics	Hyperinsulinemia		HOMA-IR ≥2.5		FIRI ≥2.7		Bennet's ISI ≤1.34	
	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P
Sex, %	1.522 (1.178, 1.967)	0.001	1.408 (1.096, 1.808)	0.007	1.324 (1.020, 1.720)	0.035	1.430 (1.111, 1.841)	0.005
Age, years	0.977 (0.969, 0.985)	<0.001	0.988 (0.980, 0.996)	0.003	0.986 (0.978, 0.994)	0.001	0.989 (0.981, 0.997)	0.005
BMI, kg/m^2	1.184 (1.135, 1.236)	<0.001	1.181 (1.131, 1.233)	<0.001	1.175 (1.126, 1.226)	<0.001	1.182 (1.132, 1.234)	<0.001
WC, cm	1.055 (1.039,1.072)	<0.001	1.066 (1.049, 1.083)	<0.001	1.059 (1.042, 1.076)	<0.001	1.065 (1.048,1.082)	<0.001
MAP, mmHg	1.008 (1.000, 1.016)	0.055	1.006 (0.998,1.013)	0.162	1.009 (1.001, 1.017)	0.031	1.008 (1.000, 1.016)	0.046

Current-smoker, %	0.735 (0.577, 0.935)	0.012	0.729 (0.575,0.924)	0.009	0.694 (0.543, 0.887)	0.004	0.697 (0.549, 0.885)	0.003
Current-drinker, %	0.776 (0.605, 0.997)	0.047	0.770 (0.604,0.982)	0.035	0.785 (0.609, 1.013)	0.052	0.799 (0.626, 1.020)	0.072
AHI_{REM}, events/h	1.007 (1.001, 1.013)	0.030	1.008 (1.002,1.014)	0.013	1.010 (1.004, 1.016)	0.001	1.010 (1.004, 1.016)	0.002
AHI_{NREM}, events/h	1.008 (1.002, 1.013)	0.008	1.006 (1.001,1.012)	0.030	1.006 (1.000, 1.012)	0.036	1.005 (1.000, 1.011)	0.061
NREM sleep duration, h (every 1 hour)	0.906 (0.854, 0.960)	0.001	0.910 (0.858,0.965)	0.002	0.884 (.833, 0.938)	<0.001	0.893 (0.842, 0.947)	<0.001
REM sleep duration, h (every 1 hour)	0.764 (0.604, 0.966)	0.024	0.808 (0.641,1.019)	0.072	0.786 (0.619, 0.997)	0.047	0.816 (0.646, 1.030)	0.087

The data were adjusted for age, gender, BMI, WC, MAP, AHI, smoking status, alcohol consumption and NREM sleep duration. BMI, body mass index; WC, waist circumference; MAP, mean arterial pressure; AHI, apnea hypopnea index; NREM, non-rapid eye movement; REM, rapid eye movement.