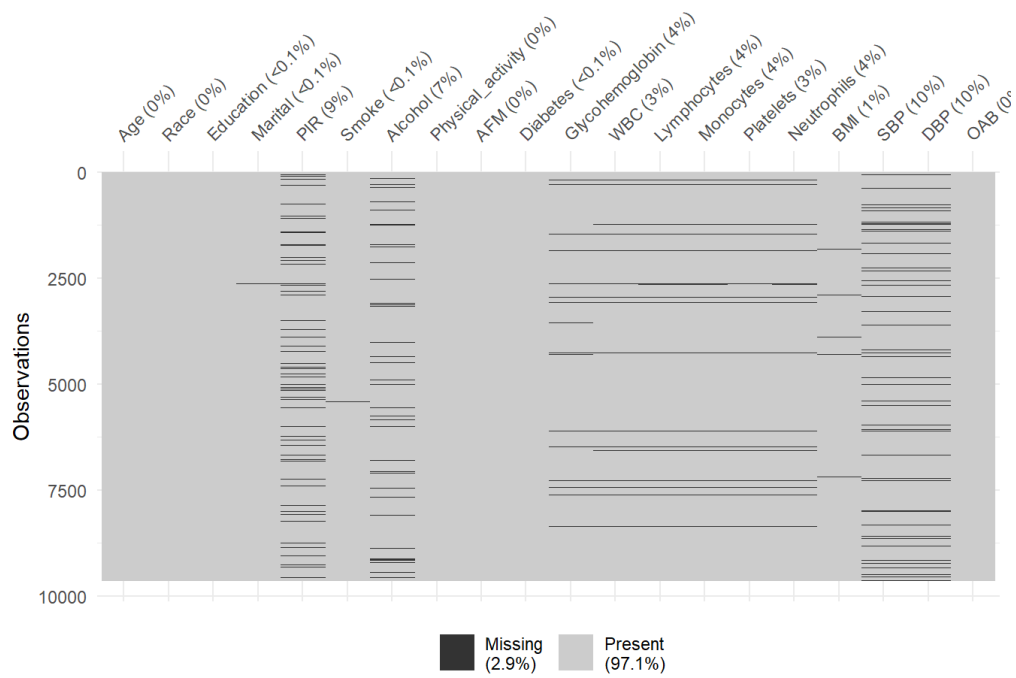


**Table S1** The results of missing data processing

Variable	Before interpolation (N=9647)	After interpolation (N=9647)	P <sub>overall</sub>
Age, years	51.0 [36.0; 64.0]	51.0 [36.0; 64.0]	1.000
Race			1.000
Mexican American	1318 (13.7%)	1318 (13.7%)	
Other Hispanic	1066 (11.1%)	1066 (11.1%)	
Non-Hispanic White	3633 (37.7%)	3633 (37.7%)	
Non-Hispanic Black	2200 (22.8%)	2200 (22.8%)	
Other Race	1430 (14.8%)	1430 (14.8%)	
Education			0.998
Below high school	1945 (20.2%)	1950 (20.2%)	
High school or comparable	2038 (21.1%)	2039 (21.1%)	
College or above	5657 (58.7%)	5658 (58.7%)	
Marital			0.993
Married/Living with partner	5114 (53.0%)	5115 (53.0%)	
Widowed/Divorced/Separated	4528 (47.0%)	4532 (47.0%)	
PIR	2.02 [1.06; 3.92]	2.00 [1.05; 3.91]	0.621
Smoke			1.000
Never	6357 (65.9%)	6363 (66.0%)	
Former	1739 (18.0%)	1739 (18.0%)	
Current	1544 (16.0%)	1545 (16.0%)	
Alcohol			0.369
No	8385 (93.4%)	9042 (93.7%)	
Yes	593 (6.61%)	605 (6.27%)	
Physical activity			1.000
Inactive	6265 (64.9%)	6265 (64.9%)	
Moderate	2151 (22.3%)	2151 (22.3%)	
Vigorous	238 (2.47%)	238 (2.47%)	
Both moderate and vigorous	993 (10.3%)	993 (10.3%)	
AAM	13.0 [12.0; 14.0]	13.0 [12.0; 14.0]	1.000
Diabetes			1.000
No	8055 (83.6%)	8062 (83.6%)	
Borderline	280 (2.90%)	280 (2.90%)	
Yes	1305 (13.5%)	1305 (13.5%)	
Glycohemoglobin	5.50 [5.30; 5.90]	5.50 [5.30; 5.90]	0.939
WBC	7.00 [5.70; 8.50]	7.00 [5.70; 8.50]	0.898
Lymphocytes	2.10 [1.70; 2.60]	2.10 [1.70; 2.60]	0.862
Monocytes	0.50 [0.40; 0.60]	0.50 [0.40; 0.60]	0.817
Platelets	246 [210; 289]	246 [210; 289]	0.913
Neutrophils	4.00 [3.10; 5.20]	4.00 [3.10; 5.10]	0.856
BMI	28.7 [24.2; 34.2]	28.7 [24.3; 34.2]	0.871
SBP	120 [109; 134]	120 [109; 134]	0.427
DBP	70.0 [63.0; 77.0]	70.0 [63.0; 77.0]	0.950
OAB			1.000
No	6676 (69.2%)	6676 (69.2%)	
Yes	2971 (30.8%)	2971 (30.8%)	

OAB, overactive bladder; AAM, age at menarche; WBC, white blood cell; BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; PIR, Ratio of family income to poverty threshold.



**Figure S1** The results of missing data processing.

**Table S2** Weighted baseline characteristics of participants in NHANES 2011–2018

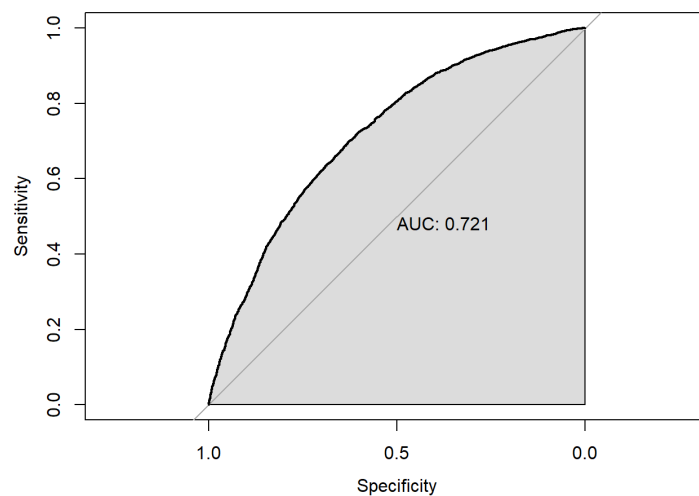
Variable	Overall (N=106,284,371 <sup>1</sup> )	No (N=75,293,567 <sup>1</sup> )	Yes (N=30,990,804 <sup>1</sup> )	P value <sup>2</sup>
Age, years	49.15 (17.27)	45.76 (16.47)	57.37 (16.39)	<0.001
Race				<0.001
Mexican American	8,344,219 (7.9%)	6,108,591 (8.1%)	2,235,628 (7.2%)	
Other Hispanic	6,550,226 (6.2%)	5,030,936 (6.7%)	1,519,290 (4.9%)	
Non-Hispanic White	70,242,791 (66.1%)	48,997,085 (65.1%)	21,245,706 (68.6%)	
Non-Hispanic Black	12,366,847 (11.6%)	8,343,151 (11.1%)	4,023,696 (13.0%)	
Other Race	8,780,289 (8.3%)	6,813,804 (9.0%)	1,966,485 (6.3%)	
Education				<0.001
Below high school	13,563,043 (12.8%)	8,825,149 (11.7%)	4,737,894 (15.3%)	
High school or comparable	22,919,572 (21.6%)	15,391,488 (20.4%)	7,528,084 (24.3%)	
College or above	69,801,756 (65.7%)	51,076,930 (67.8%)	18,724,826 (60.4%)	
Marital				<0.001
Married/Living with partner	62,623,206 (58.9%)	45,827,253 (60.9%)	16,795,953 (54.2%)	
Widowed/Divorced/Separated	43,661,165 (41.1%)	29,466,314 (39.1%)	14,194,851 (45.8%)	
PIR	2.91 (1.66)	2.96 (1.67)	2.77 (1.64)	<0.001
Smoke				<0.001
Never	66,932,352 (63.0%)	48,751,280 (64.7%)	18,181,072 (58.7%)	
Former	21,649,269 (20.4%)	14,269,994 (19.0%)	7,379,276 (23.8%)	
Current	17,702,750 (16.7%)	12,272,293 (16.3%)	5,430,456 (17.5%)	
Alcohol	10,120,726 (9.5%)	7,442,400 (9.9%)	2,678,326 (8.6%)	0.2
Physical activity				0.073
Inactive	64,052,742 (60.3%)	44,967,933 (59.7%)	19,084,809 (61.6%)	
Moderate	27,574,927 (25.9%)	19,924,608 (26.5%)	7,650,319 (24.7%)	
Vigorous	2,618,068 (2.5%)	1,643,733 (2.2%)	974,335 (3.1%)	
Both moderate and vigorous	12,038,634 (11.3%)	8,757,292 (11.6%)	3,281,342 (10.6%)	
AAM	12.69 (1.76)	12.74 (1.75)	12.58 (1.77)	0.017
Diabetes				<0.001
No	92,892,758 (87.4%)	67,944,965 (90.2%)	24,947,794 (80.5%)	
Borderline	2,625,928 (2.5%)	1,635,785 (2.2%)	990,143 (3.2%)	
Yes	10,765,685 (10.1%)	5,712,816 (7.6%)	5,052,868 (16.3%)	
Glycohemoglobin	5.64 (0.92)	5.55 (0.83)	5.87 (1.08)	<0.001
WBC	7.35 (3.03)	7.33 (3.29)	7.38 (2.25)	0.7
Lymphocytes	2.20 (2.05)	2.22 (2.39)	2.17 (0.77)	0.032
Monocytes	0.55 (0.19)	0.54 (0.19)	0.56 (0.19)	0.003
Platelets	251.77 (61.79)	253.30 (60.54)	248.05 (64.58)	0.002
Neutrophils	4.36 (1.71)	4.34 (1.69)	4.40 (1.77)	0.5
BMI	29.60 (7.76)	28.81 (7.40)	31.53 (8.26)	<0.001
SBP	121.41 (18.23)	119.49 (17.50)	126.08 (19.11)	<0.001
DBP	69.54 (11.52)	69.86 (11.17)	68.75 (12.29)	0.025
NPS	3.02 (1.79)	2.88 (1.69)	3.37 (1.98)	<0.001

<sup>1</sup>, mean (SD) or n (%); <sup>2</sup>, design-based Kruskal-Wallis test; Pearson's  $\chi^2$ : Rao & Scott adjustment. OAB, overactive bladder; AAM, age at menarche; WBC, white blood cell; SBP, systolic blood pressure; BMI, body mass index; PIR, Ratio of family income to poverty threshold; DBP, diastolic blood pressure.

**Table S3** Weighted logistic regression analysis of the association between AAM and overactive bladder

Group	Characteristic	OR	95% CI	P value
Model 1	AAM	0.95	0.92, 0.99	0.007
	Q1	–	–	
	Q2	0.88	0.75, 1.03	0.11
	Q3	0.92	0.78, 1.08	0.3
	Q4	0.85	0.70, 1.01	0.071
Model 2	AAM	0.92	0.89, 0.96	<0.001
	Q1	–	–	
	Q2	0.83	0.70, 0.98	0.028
	Q3	0.87	0.74, 1.02	0.094
	Q4	0.77	0.64, 0.92	0.005
Model 3	AAM	0.96	0.92, 0.99	0.019
	Q1	–	–	
	Q2	0.88	0.74, 1.05	0.15
	Q3	0.96	0.81, 1.14	0.7
	Q4	0.86	0.71, 1.05	0.14

Model 1 was the unadjusted baseline model. Model 2 was adjusted for age, race, marital and education. Model 3 included adjustments for alcohol consumption, body mass index (BMI), number of pregnancies (NPS), diabetes, glycohemoglobin, education, race, marital status, physical activity, smoking, poverty income ratio (PIR), white blood cell count (WBC), DBP (diastolic blood pressure), SBP (systolic blood pressure), lymphocytes, neutrophils, monocytes, and platelets. OR, odds ratio; CI, confidence interval; Ref., indicates reference; AAM (Q1: <12 years; Q2: 12 years; Q3: 13–14 years; Q4: >14 years), Age at menarche.

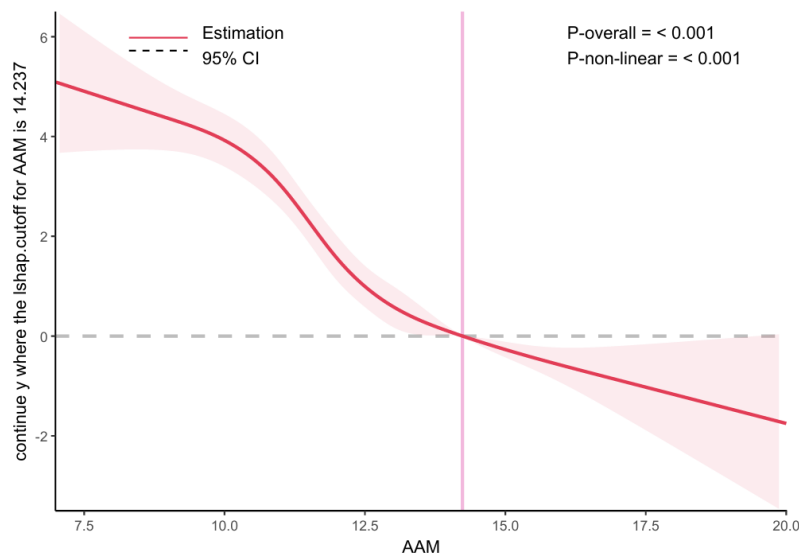


**Figure S2** The ROC curve derived from the AAM and OAB logistic regression analysis based on model 3.

**Table S4** Association between AAM and BMI

Characteristic	Beta	95% CI <sup>1</sup>	P value
AAM	-0.57	-0.65, -0.50	<0.001
Q1	Ref	Ref	
Q2	-1.4	-1.7, -1.0	<0.001
Q3	-1.8	-2.3, -1.4	<0.001
Q4	-2.4	-2.8, -2.0	<0.001

Notes: adjustments for alcohol consumption, diabetes, glycohemoglobin, education, race, marital status, physical activity, smoking, poverty income ratio (PIR), white blood cell count (WBC), DBP (diastolic blood pressure), SBP (systolic blood pressure), lymphocytes, neutrophils, monocytes, and platelets. In this context, OR, refers to the odds ratio; CI, refers to the confidence interval; Ref., indicates reference; BMI, Body mass index; AAM (Q1: <12 years; Q2: 12 years; Q3: 13 years; Q4: >14 years), Age at menarche.

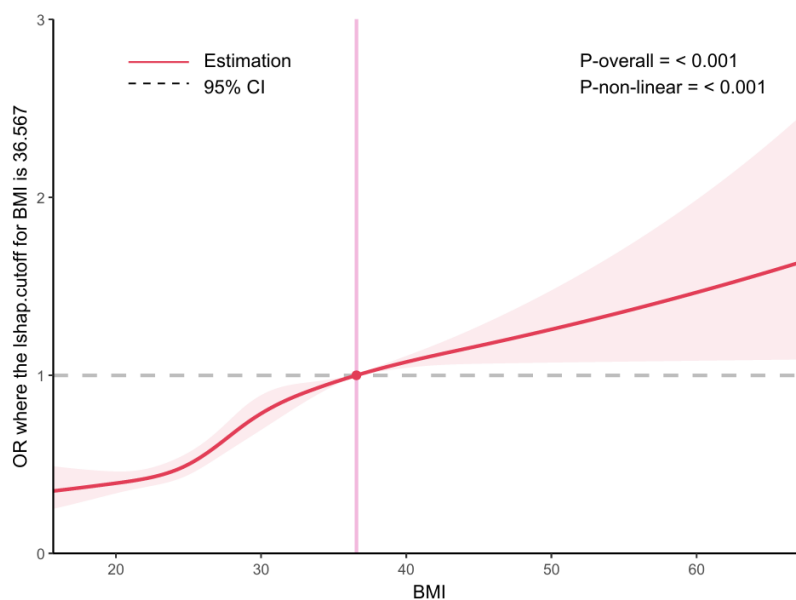


**Figure S3** The RCS curve of the association between AAM and BMI.

**Table S5** Association between BMI and OAB

Characteristic	OR	95% CI	p-value
BMI, kg/m <sup>2</sup>	1.04	1.04, 1.05	<0.001
<18.5	Ref	Ref	
18.5–24.9	0.81	0.55, 1.22	0.3
25–30	0.97	0.66, 1.45	0.9
≥30	1.62	1.11, 2.42	0.014

Notes: adjustments for alcohol consumption, diabetes, glycohemoglobin, education, race, marital status, physical activity, smoking, poverty income ratio (PIR), white blood cell count (WBC), DBP (diastolic blood pressure), SBP (systolic blood pressure), lymphocytes, neutrophils, monocytes, and platelets. In this context, OR, refers to the odds ratio; CI, refers to the confidence interval; Ref., indicates reference; BMI, Body mass index; OAB, Overactive Bladder.



**Figure S4** The RCS curve of the association between BMI and OAB.

**Table S6** The results from five MR methods

Method	Beta	SE	P value	Lower CI	Upper CI	OR	OR Lower CI	OR Upper CI
MR Egger	-0.001470975	0.002042246	0.472463021	-0.005473776	0.002531827	0.998530107	0.994541178	1.002535034
Weighted median	-0.003307366	0.001123617	0.003245249	-0.005509656	-0.001105076	0.996698097	0.994505494	0.998895534
Inverse variance weighted	-0.001798438	0.000686308	0.008781256	-0.003143601	-0.000453275	0.998203178	0.996861335	0.999546828
Simple mode	-0.005355382	0.002764319	0.054547811	-0.010773447	6.27E-05	0.994658933	0.989284378	1.000062686
Weighted mode	-0.003890583	0.001711144	0.024376615	-0.007244425	-0.000536741	0.996116975	0.992781753	0.999463403