Supplementary Table 1 Full lists of the Inclusion and Exclusion Criteria

Projects	Inclusion criteria	Exclusion criteria
The weight-loss intervention study(ChiCTR1800015923)	(1) Aged 18 to 60 years; (2) Body mass index ≥ 30.0 kg/m^2, or ≥ 28.0 kg/m^2 with one or more comorbidities (hypertension, impaired glucose tolerance, sleep apnea, dyslipidemia); (3) Stable body weight within 3 months; (4) Contraception agreed by women of reproductive age during the whole study; (5) Understand and sign the informed consent.	(1) Existed diabetes or diabetes diagnosed in the screening stage; (2) Secondary obesity (such as Cushing's syndrome, hypothyroidism); (3) Long-term use of drugs that lead to obesity (such as glucocorticoids); (4) Severe infection, severe injuries, severe and acute cardiovascular and cerebrovascular diseases, or in operation period; (5) A history of malignancy; (6) A history of psychiatric illness or neurological diseases; (7) Combined with rheumatic and immune diseases; (8) Serum TG level more than 11.3 mmol/L; (9) Usage of weight-loss drugs (including GLP-1 receptor agonist) or a history of bariatric surgery within three months; (10) A history or a family history of thyroid medullary carcinoma (MTC), or type 2 multiple endocrine adenoma syndrome (MEN); (11) A history of pancreatitis. (12) Female during pregnancy or lactation; (13) Participate in other clinical trials within three

		months; (14) Unable, unwilling or unwilling to comply with the research requirements, including lifestyle modification, return visit, dose description and subject responsibility.
Individualized multidisciplinary weight management in patients with metabolic syndrome (ChiCTR1900022948)	(1) Aged 18 to 65 years; (2) Waist circumference ≥ 90cm in men or ≥85cm in women; (3) two or more comorbidities ; ① high blood pressure: systolic/diastolic blood pressure ≥130/85 mmHg or treatment for hypertension,②low HDL cholesterol: HDL cholesterol＜40mg/dL in men or ＜ 50mg/dL in women, ③ hypertriglyceridemia: serum triglycerides ≥150 mg/dL, or treatment for hypertriglyceridemia, ④hyperglycemia: fasting blood glucose ≥110 mg/dL or 2h postprandial glucose ≥140 mg/dL or treatment for diabetes. (4) Stable body weight within 3 months; (5) Contraception agreed by women of reproductive age during the whole study; (6) Understand and sign the informed consent.	(1) Secondary obesity such as hypothyroidism, Cushing's syndrome, or long-term use of drugs that lead to obesity; (2) Chronic diseases of heart, brain, liver, kidney and other organs that require a special diet or affect exercise; (3) Rheumatic and immune diseases, hematological diseases or a history of malignancy; (4) Female during pregnancy or lactation; (5) Unable, unwilling or unwilling to comply with the research requirements, including lifestyle modification, return visit, and subject responsibility.

Supplementary Table 2 Correlations between values of anthropometric indicators, body composition and AHI

	Body weight	**BMI**	**NC**	**WC**	**WHR**	**SMM**	**FM**	**FFM**	**PBF**	**BMFR**	**AHI**
Body weight	1	0.816*	0.737**	0.869**	0.515**	0.846**	0.731**	0.861**	0.009	-0.006	0.382**
BMI		1	0.500**	0.866**	0.440**	0.487**	0.910**	0.501**	0.441**	0.501**	0.318**
NC			1	0.676**	0.669**	0.827**	0.318**	0.824**	-0.338**	0.344**	0.513**
WC				1	0.727**	0.671**	0.768**	0.663**	0.188**	-0.184*	0.423**
WHR					1	0.577**	0.273*	0.546**	-0.183*	0.190*	0.534**
SMM						1	0.310**	0.989**	-0.460**	0.462**	0.392**
FM							1	0.328**	0.655**	-0.653**	0.181*
FFM								1	-0.445**	0.447**	0.402**
PBF									1	-1.000**	-0.173*
BMFR										1	0.180*
AHI											1

Notes: $^{*}p<0.05$, $^{**}p<0.01$.

Abbreviations: BMI, body mass index; NC, neck circumference; WC, waist circumference; WHR, waist-hip ratio; SMM skeletal muscle mass; FM, fat mass; FFM, fat free mass; PBF, percentage of body fat; BMFR, body muscle-fat ratio.

Supplementary Table 3 Simple liner regression analysis between anthropometric indicators, body composition and log (AHI)

	β(SE)	β'	R^2	*Adjusted* R^2	*P* value
Demographic characteristics					
Age	1.010(0.436)	0.196	0.038	0.031	0.022
Anthropometric measurements					
Body weight	2.900(0.595)	0.388	0.150	0.144	<0.001
BMI	3.246(0.910)	0.295	0.087	0.080	0.001
NC	4.179(0.956)	0.354	0.126	0.119	<0.001
WC	5.186(0.957)	0.424	0.180	0.174	<0.001
WHR	9.430(1.464)	0.501	0.251	0.245	<0.001
Body composition					
SMM	0.873(0.353)	0.209	0.044	0.036	0.015
FM	1.108(0.444)	0.211	0.044	0.037	0.014
FFM	2.744(0.535)	0.405	0.164	0.158	<0.001
PBF	-0.718(0.687)	-0.090	0.008	0.001	0.298
BMFR	0.493(0.430)	0.099	0.010	0.020	0.254

Notes: R^2*, R-square;* β, unstandardized beta coefficients; β', standardized beta coefficients.

Abbreviations: BMI, body mass index; NC, neck circumference; WC, waist circumference; WHR, waist-hip ratio; SMM skeletal muscle mass; FM, fat mass; FFM, fat free mass; PBF, percentage of body fat; BMFR, body muscle-fat ratio.

Supplementary Table 4 Correlations between percent change in body weight and percent changes in anthropometric indicators and body composition among patients with OSA

	Unadjusted		Adjusted[a]	
	Rho	***P* value**	**Rho**	***P* value**
Anthropometric measurements				
BMI	0.998	<0.001	0.998	<0.001
NC	0.557	<0.001	0.507	<0.001
WC	0.857	<0.001	0.847	<0.001
WHR	0.500	<0.001	0.448	<0.001
Body composition				
SMM	0.549	<0.001	0.530	<0.001
FM	0.899	<0.001	0.989	<0.001
FFM	0.534	<0.001	0.485	<0.001
PBF	0.786	<0.001	0.789	<0.001
BMFR	-0.776	<0.001	-0.776	<0.001

Notes: [a]All models corrected for age, gender and percent change in AHI.

Abbreviations: BMI, body mass index; NC, neck circumference; WC, waist circumference; WHR, waist-hip ratio; SMM skeletal muscle mass; FM, fat mass; FFM, fat free mass; PBF, percentage of body fat; BMFR, body muscle-fat ratio.

Supplementary Table 5 Correlations between percent change in AHI and percent changes in anthropometric indicators and body composition among patients with OSA

	Unadjusted		Adjusted[a]	
	Rho	***P* value**	**Rho**	***P* value**
Anthropometric measurements				
BMI	0.332	0.010	0.061	0.650
NC	0.302	0.019	0.157	0.244
WC	0.406	0.001	0.271	0.041
WHR	0.309	0.016	0.188	0.162
Body composition				
SMM	0.341	0.008	0.181	0.178
FM	0.271	0.036	-0.062	0.645
FFM	0.307	0.017	0.162	0.229
PBF	0.216	0.098	-0.076	0.573
BMFR	-0.203	0.121	0.089	0.508

Notes: [a]All models corrected for age, gender and percent change in weight.

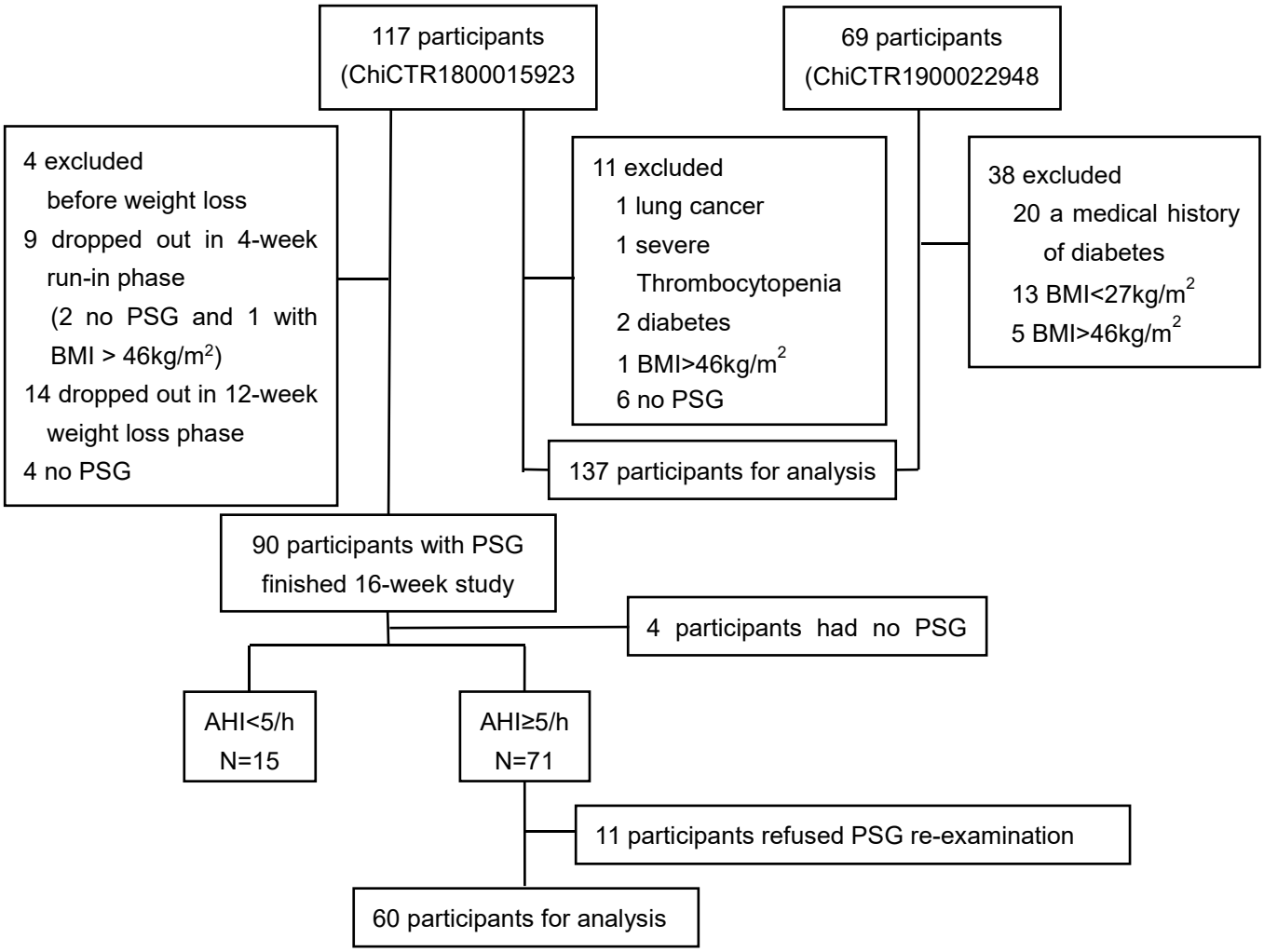
Abbreviations: BMI, body mass index; NC, neck circumference; WC, waist circumference; WHR, waist-hip ratio; SMM skeletal muscle mass; FM, fat mass; FFM, fat free mass; PBF, percentage of body fat; BMFR, body muscle-fat ratio.

Supplementary Table 6 Single mediator model evaluating percent changes in anthropometric indicators and body composition as mediators of the relationship between percent changes in body weight and AHI

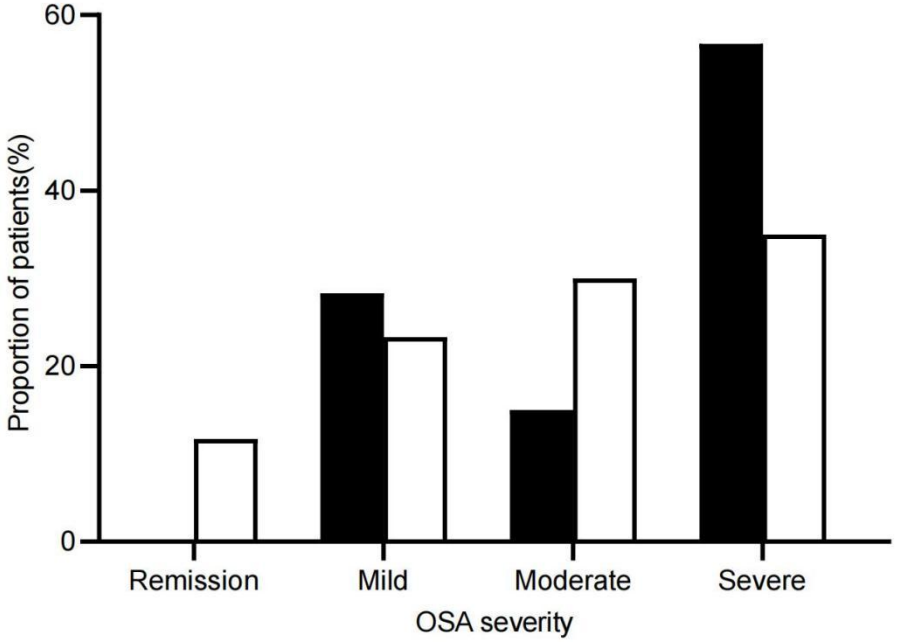
	Indirect Effect (Bias-Corrected 95% CI)	
	Unstandardized	**Standardized[a]**
Anthropometric measurements		
BMI	7.896(-45.184,81.650)	9.406(-51.017,82.492)
NC	0.923(-0.342,2.919)	0.962(-0.378,3.003)
WC	3.840(1.049,6.895)	4.272(0.936,7.999)
WHR	0.924(-0.096,2.080)	1.007(-0.140,2.405)
Body composition		
SMM	1.128(-0.743,4.295)	1.183(-0.758,4.290)
FM	-1.136(-6.849,3.616)	-1.219(-7.269,3.919)
FFM	0.943(-1.068,4.037)	0.942(-1.045,3.674)
PBF	-0.845(-4.580,2.272)	-0.929(-4.830,2.535)
BMFR	-0.992(-5.014,2.046)	-1.040(-5.356,2.204)

Notes: [a]All models corrected for age and gender.

Abbreviations: BMI, body mass index; NC, neck circumference; WC, waist circumference; WHR, waist-hip ratio; SMM skeletal muscle mass; FM, fat mass; FFM, fat free mass; PBF, percentage of body fat; BMFR, body muscle-fat ratio.



Supplementary Figure 1—Flow-chart of Participants' Study Process



Supplementary Figure 2 Proportions of patients with different OSA severity at baseline and after the 12-week weight loss management. Notes: Remission, AHI <5 events/h; Mild, 5 ⩽AHI < 15 events/h; Moderate, 15 ⩽AHI < 30 events/h; Severe, ⩾30 events/h. Baseline, black bar; Follow-up, white bar.
Abbreviations:OSA, obstructive sleep apnea; AHI, apnoea-hypopnoea index.