

Perceptions and behaviours towards high body weight among adults in Northeast China

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Abstract

Objective: To determine the prevalence of high weight at different characteristics, understand the perceptions and behaviours towards high body weight, and determine potential influencing factors of body weight misperception among high-weight adults in Jilin Province.

Design: A cross-sectional survey with complex sampling design was conducted. We described the prevalence and perception of high body weight.

Setting: Northeast China in 2012.

Subjects: Adults ($n = 20\,552$) aged 18–79 years.

Results: Of overweight individuals, 37.4% considered themselves as 'normal weight', 4.8% reported themselves as being 'very thin' and only 53.1% were aware of their own weight being 'overweight'. About 1.8% of both male and female obese individuals perceived themselves as 'very thin'. Only 29.1% of obese people thought of themselves as 'too fat'. Nearly 30.0% of centrally obese men and women perceived that their waist circumference was about right and they were of 'normal weight'; 5.7% of the centrally obese even perceived themselves as being 'very thin'. Only 51.8 and 12.5% of centrally obese individuals reported themselves to be 'overweight' or 'too fat'. Body weight misperception was more common in rural residents (OR; 95% CI: 1.340; 1.191, 1.509). The prevalence of body weight misperception increased with age (middle age: 1.826; 1.605, 2.078; old people: 3.101; 2.648, 3.632) and declined with increased education level (junior middle school: 0.628; 0.545, 0.723; senior middle school: 0.498; 0.426, 0.583; undergraduate and above: 0.395; 0.320, 0.487).

Conclusions: Body weight misperception was common among adults from Jilin Province.

Key words
Overweight
Obesity
Abdominal obesity
Prevalence
Body weight perception

The rising prevalence rates of overweight and obesity have been regarded as a global pandemic^(1–5). A study in the USA showed that the high obesity prevalence could lead to a fall in life expectancy in the future⁽⁶⁾. Considering the increased risk of obesity-related diseases, a voluntary target with the purpose of stopping the rise of obesity by 2025 was introduced in WHO member states⁽⁷⁾. The WHO provides advocacy to help lower the prevalence of overweight in all populations^(8,9). According to the nutrition and chronic disease status reports of Chinese residents in 2015, the prevalences of overweight and obesity among adults were 7.1 and 4.5% in 2002, respectively. However, in a short span of 10 years, the prevalence rates had almost doubled in 2012 (overweight: 11.9%; obesity: 9.6%). The overweight and obesity prevalences in Chinese children increased rapidly from 22.8% in 2002 to 30.1%

in 2012 and from 2.1% in 2002 to 6.4% in 2012, respectively⁽¹⁰⁾. It was reported that the overall obesity prevalence was 3.3% in China in 1992. A rapid growth in the prevalences of overweight and obesity was perceived. The prevalence rates of overweight and obesity will continue to increase if no attention is paid to them and no effective intervention measures is taken⁽¹¹⁾.

The increased overweight and obesity prevalences and the marked shift in lifestyle-related non-communicable disease patterns in China over the past few decades may be due to rapid economic growth and urbanization as well as overnutrition characterized by increased intakes of high-fat/high-energy foods^(4,12–15).

Evidence indicates that the prevalences of overweight and obesity in children and adolescents worldwide have reached worrying levels^(16,17). Obese children are more

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likely to have psychological health issues due to low self-esteem compared with non-obese peers⁽¹⁸⁾. Similarly, the lifestyle-related transformation has largely contributed to the increased prevalence rates of overweight and obesity among children and youths⁽¹⁹⁾. A meta-analysis conducted on the prevalence of overweight/obesity in Portuguese children showed that during the last decade, 30.3% of Portuguese children were overweight or obese⁽²⁰⁾.

Besides the high prevalences of overweight, obesity and abdominal obesity as well as the threat of obesity-related diseases, body weight misperception is also common among adults. Many studies conducted in different countries and populations have demonstrated that a considerable number of adults do not perceive their body weight correctly^(21–26). A study in Sri Lanka showed that 44.7% of overweight females and almost two-thirds of overweight males reported themselves to be 'right weight', and 7.6% of overweight females and 4.1% of overweight males considered themselves to be 'underweight'. Over one-third of obese individuals (both males and females) even thought themselves to be 'underweight' or 'right weight'. Nearly 32% of abdominally obese individuals perceived that their waist circumference was within the normal range. Only 63.6% thought of themselves as 'overweight' or 'obese' and tried to lose weight or take advice from professionals⁽²⁷⁾.

Our study aimed to determine the prevalence of high weight at different characteristics, understand the perceptions and behaviours towards high body weight, and determine potential influencing factors of body weight misperception among adults in Jilin Province.

Methods

Participants

The present study was part of a large cross-sectional survey of chronic diseases in Jilin Province in 2012. Using the method of multistage stratified cluster sampling (the stratifying process has been reported previously⁽²⁸⁾), the study was conducted among residents aged 18–79 years in nine regions per administrative division (Changchun, Jilin, Siping, Liaoyuan, Tonghua, Baishan, Songyuan, Baicheng and Yanbian). A total of 23 050 individuals were recruited and 21 435 of them completed the survey (response rate 84.9%). A total of 20 552 individuals (5645 in Changchun, 3160 in Jilin, 2779 in Siping, 1302 in Liaoyuan, 1263 in Tonghua, 957 in Baishan, 2217 in Songyuan, 1483 in Baicheng and 1746 in Yanbian) who had detailed information from the physical examination were chosen for the present study. The percentages of males and females were 47.0% (n 9651) and 53.0% (n 10 901), respectively. To make the sample more representative, the data analyses were weighted by post-stratification adjustment according to the factors of age, area and gender, using the 2010 China (Jilin Province) Population Census.

Data collection

We used the method of questionnaire investigation (sociodemographic characteristics and health-related information) and body measurements (such as height, weight and waist circumference). Sociodemographic characteristics included gender, residence (rural/urban), age, area, ethnicity, education level, marital status, occupation and income class, and health-related information included perceptions and behaviours towards high weight. All investigators had received uniform training. We calibrated the measurement instruments with a common standard before use⁽²⁹⁾.

Measurements

The physical examination included the measurement of height, weight, waist and hip circumferences. The participants were asked to take off their shoes and wear light clothes, and the indices were recorded to the nearest 0.1 cm or 0.1 kg.

Definitions

We calculated BMI as weight/height² (kg/m²). All participants were categorized as normal weight (BMI = 18.5 to 25 kg/m²), underweight (BMI < 18.5 kg/m²), overweight (BMI = 25.0 to 30.0 kg/m²) or obese (BMI > 30.0 kg/m²)⁽³⁰⁾. Waist circumference > 94 cm in males and > 80 cm in females was defined as abdominal obesity⁽³¹⁾.

Data analysis

In addition to the complex sampling design, post-stratification adjustment according to the distribution of gender and age groups was also used for our study⁽³²⁾. EpiData 3.1 software was used for establishment of the database and the statistical analyses were carried out using the IBM SPSS Complex Samples add-on module with IBM SPSS Statistics Version 21.0. We used χ^2 tests to compare the distribution of high weight at different characteristics and multiple logistic regression analyses were used to explore the association between sociodemographic factors and body weight misperception. $P < 0.05$ was considered to be statistically significant.

Results

The prevalence of high weight at different characteristics by gender is shown in Table 1.

Among males, the prevalence of overweight, obesity and abdominal obesity in urban residents was higher than that in rural residents; however, it is interesting to note that the results in females were precisely the opposite. Among females, those of Han ethnicity were more likely to develop high body weight compared with other ethnicities. Males with a higher level of education (undergraduate and above) had a higher prevalence of high weight than those with a lower level of education,

Table 1 The prevalence of high weight at different characteristics* by gender among adults (*n* 20 552) aged 18–79 years from Jilin Province, Northeast China, 2012

Characteristic	Overweight participants						Obese participants						Abdominally obese participants					
	Male		Female		Total		Male		Female		Total		Male		Female		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Residence																		
Rural	1567	31.1	1927	32.0	3494	31.5	672	15.3	851	13.8	1523	14.6	2034	41.6	2788	44.1	4822	42.8
Urban	1901	36.8	1802	28.8	3703	33.0	818	17.0	716	11.9	1534	14.6	2581	50.4	2481	39.2	5062	45.0
χ^2	36.95		14.86		5.75		4.88		9.81		0.00		77.89		31.24		11.04	
<i>P</i>	<0.001		<0.001		0.017		0.027		0.002		0.999		<0.001		<0.001		0.001	
Age																		
Youth	1363	30.9	1126	22.7	2489	27.0	729	17.7	435	9.1	1164	13.6	1811	42.3	1267	26.1	3078	34.7
Middle age	1454	41.2	1736	39.6	3190	40.4	535	15.2	753	17.1	1288	16.1	1889	53.6	2506	56.4	4395	55.0
Old people	651	34.9	867	40.2	1518	37.6	226	12.2	379	18.0	605	15.1	915	50.1	1496	69.0	2411	59.7
χ^2	91.23		376.42		368.73		30.21		159.36		20.64		103.24		1429.30		1003.73	
<i>P</i>	<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001	
Area																		
Central	2124	34.2	2275	29.0	4399	31.7	870	15.5	968	12.3	1838	14.0	2713	44.6	3177	39.2	5890	42.0
Eastern	732	35.3	709	32.6	1441	34.0	315	16.5	285	13.8	600	15.1	949	47.3	960	44.4	1909	45.9
Western	612	33.3	745	31.6	1357	32.5	305	18.6	314	13.1	619	15.9	953	52.6	1132	45.5	2085	49.1
χ^2	1.75		13.46		7.98		9.04		3.74		9.86		36.34		41.45		73.72	
<i>P</i>	0.416		0.001		0.019		0.011		0.154		0.007		<0.001		<0.001		<0.001	
Ethnicity																		
Han	3202	34.2	3448	30.3	6650	32.3	1384	16.2	1646	13.1	2848	14.7	4279	46.5	4912	42.0	9191	44.3
Others	266	35.8	281	29.4	547	32.5	106	16.3	103	9.4	209	12.8	336	47.0	357	34.8	693	40.8
χ^2	0.78		0.34		0.03		0.01		12.38		4.38		0.06		20.18		7.86	
<i>P</i>	0.376		0.558		0.865		0.943		<0.001		0.036		0.799		<0.001		0.005	
Education																		
Primary school and below	710	31.4	1482	36.8	2192	34.6	247	12.1	701	17.5	948	15.3	839	37.7	2362	57.8	3201	49.6
Junior middle school	1026	31.9	1012	30.3	2038	31.1	457	16.5	446	13.7	903	15.2	1410	45.5	1398	40.2	2808	43.0
Senior middle school	1052	36.5	837	29.3	1889	33.4	446	16.3	313	11.5	759	14.2	1424	49.3	1062	37.0	2486	44.0
Undergraduate and above	680	37.2	398	21.4	1078	30.1	340	19.5	107	5.5	447	13.2	942	52.0	447	23.7	1389	39.1
χ^2	29.46		148.45		30.04		39.54		173.48		10.08		100.75		705.45		116.22	
<i>P</i>	<0.001		<0.001		<0.001		<0.001		<0.001		0.018		<0.001		<0.001		<0.001	
Marital status																		
Married	3090	36.7	3307	32.8	6397	34.8	1295	16.9	1389	13.8	2684	15.4	4126	50.2	4620	44.3	8746	47.3
Unmarried	235	22.3	61	8.2	296	16.7	153	14.7	25	3.3	178	10.2	314	30.2	73	11.0	387	22.6
Separated/divorced	74	43.4	59	31.1	133	38.0	24	12.4	27	13.0	51	12.7	92	48.8	80	41.1	172	45.4
Widowed	69	30.5	302	39.3	371	37.0	18	7.9	126	17.2	144	14.8	83	36.9	496	63.9	579	56.9
χ^2	92.34		216.27		247.12		17.95		77.48		35.42		159.00		419.75		438.21	
<i>P</i>	<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001	
Occupation																		
Unemployed	228	32.1	687	32.0	915	32.0	125	19.7	341	16.3	466	17.4	349	49.7	1090	49.4	1439	49.5
Mental	812	36.4	579	23.3	1391	30.0	379	18.2	173	6.5	552	12.5	1146	52.2	656	26.4	1802	39.5
Manual	2076	33.1	1855	30.4	3931	32.0	837	15.1	790	13.1	1627	14.3	2581	42.3	2572	40.5	5153	41.6
Retired	352	39.1	608	42.1	960	40.9	149	15.9	263	19.5	412	18.0	539	59.5	951	66.3	1490	63.4
χ^2	19.11		154.40		90.45		16.84		170.89		53.87		136.40		650.78		457.81	
<i>P</i>	<0.001		<0.001		<0.001		0.001		<0.001		<0.001		<0.001		<0.001		<0.001	
Income class																		
Low	557	32.1	943	35.5	1500	33.9	221	15.1	424	15.9	645	15.5	722	43.1	1457	53.5	2179	48.8
Middle	1130	33.7	1214	29.7	2344	31.7	476	15.5	480	12.2	956	13.8	1500	45.3	1650	39.6	3150	42.4
Higher middle	790	36.5	541	26.4	1331	32.2	341	17.4	191	9.2	532	13.9	1046	49.1	692	32.3	1738	42.0
High	440	36.1	235	22.8	675	30.9	237	20.5	91	9.0	328	16.1	626	52.2	317	30.4	943	43.8
Lower middle	551	32.5	796	33.9	1347	33.2	215	13.5	381	16.2	596	15.0	721	43.4	1153	47.7	1874	45.7
χ^2	13.10		90.22		9.66		28.90		84.02		11.96		59.81		37.39		329.94	
<i>P</i>	0.011		<0.001		0.046		<0.001		<0.001		0.018		<0.001		<0.001		<0.001	

*The numbers are unweighted, but the percentages are weighted. Complex weighted computation was used in the statistical analysis.

but the prevalence overall in females showed a downward tendency along with increasing education levels. Retired people had a higher chance of having high body weight than those who were not retired. In addition, the differences according to age, area, marital status and income class were of statistical significance.

Body weight perception, management and changes in the past 12 months, as well as the related lifestyles and behaviours of weight-control practices among adults in Jilin Province, are shown in Table 2.

Body weight misperception was common among adults in Jilin Province. Among those who were overweight, 44.5% of males and 28.9% of females considered themselves of 'normal weight'. Moreover, 4.6% of overweight men and 5.0% of overweight women reported themselves being 'very thin'. Only 48.1% of overweight men and 59.2% of overweight women were aware of their weight being 'overweight, and 4.7% of overweight participants considered themselves 'too fat'.

About 1.8% of both male and female obese participants perceived themselves as 'very thin'. Only 24.7% of obese men and 35.0% of obese women were aware of themselves being 'too fat', and 10.0% obese participants thought that they had 'normal weight'.

Nearly 30.0% of centrally obese men and women perceived that their waist circumference was about right and they were of normal weight, and 5.7% of centrally obese men and women even perceived themselves to be 'very thin'. Only 51.8 and 12.5% of centrally obese participants reported themselves as 'overweight' and 'too fat', respectively.

Only 19.9% of overweight, 30.0% of obese and 21.8% of abdominally obese participants tried to lose weight, and nearly two-thirds of them (79.6, 69.5 and 77.5%, respectively) did not take any measures to manage their weight. Participants were more likely to choose the methods of 'Reduce the total diet' and 'Physical exercise' to lose weight (overweight participants: 66.2% reduced their total diet and 52.6% did physical exercise; obese participants: 65.8% reduced their total diet and 56.0% did physical exercise; abdominally obese participants: 65.8% reduced their total diet and 53.6% did physical exercise). More than half of participants had no body weight changes (± 2.5 kg) in the past 12 months (overweight: 61.0%; obese: 57.1%; abdominally obese: 60.5%). The related lifestyles in these three groups were observed as follows: more than half of participants had a balanced diet (i.e. meat and vegetables in fine match); two-thirds had regular diet; more than 85% of participants were more likely to eat rice as staple food; and less than half of participants had a high salt intake. More than 80% of participants had breakfast every day. About 40% of the participants rarely or never did exercise; more than 70% of them chose to exercise around the house; and nearly 50% of participants chose to drive or go out by bus.

Table 3 shows the associations between sociodemographic factors and body weight misperception by multivariable

logistic regression among individuals with overweight, obesity and abdominal obesity in Jilin Province. Rural residents were more likely to have misperception of their high body weight compared with urban residents (OR = 1.340; 95% CI 1.191, 1.509). Middle-aged participants (OR = 1.826; 95% CI 1.605, 2.078) and old participants (OR = 3.101; 95% CI 2.648, 3.632) were more likely to develop body weight misperception than youth. The prevalence of body weight misperception declined with the increase of education level (junior middle school: OR = 0.628; 95% CI 0.545, 0.723; senior middle school: OR = 0.498; 95% CI 0.426, 0.583; undergraduate and above: OR = 0.395; 95% CI 0.320, 0.487).

Discussion

We come to the conclusion that body weight misperception is common among adults from Jilin Province. Nearly half of overweight individuals did not realize that their weight had already reached the warning level. Only 29.1% of obese participants perceived themselves as being 'too fat'; instead, 10.0% of those who were obese thought that they had 'normal weight' and 1.8% even thought that they were 'very thin'. Nearly 30.0% of centrally obese men and women perceived that their waist circumference was about right and they were of normal weight, and 5.7% of centrally obese men and women even perceived themselves as 'very thin'. A cross-sectional study that recruited 162 Chinese Americans in a community health centre in New York reported that 32% of individuals did not perceive their body weight correctly. Nearly 20% of them underestimated their body weight and there were significant differences by gender⁽²¹⁾. These Chinese Americans had a proper positioning towards their body weight compared with the present study participants. Many studies have shown that body weight misperception is common, but the correct cognition of weight is the premise of weight control^(22,24,26,33).

By analysing weight management among our participants, we found that nearly two-thirds of those with high weight did not take any measures to manage their weight. They were more likely to choose the methods of 'Reduce the total diet' and 'Physical exercise' to lose weight. More than half of high-weight participants had no body weight change (± 2.5 kg) in the past 12 months and most of them had a balanced diet (meat and vegetables in fine match). Two-thirds of them had regular diet, less than half of them had a high intake of salt and more than 80% of the participants had breakfast every day. Studies exploring the association between meal intake habit and abdominal obesity in four Spanish cities reported that having breakfast did not show any association with abdominal obesity, but the individuals who did not eat dinner were more susceptible to abdominal obesity⁽³⁴⁾. This is consistent with our findings. Among our study participants,

Table 2 Perceptions and behaviours towards overweight, obesity and abdominal obesity* among adults (*n* 20 552) aged 18–79 years from Jilin Province, Northeast China, 2012

Perceptions and behaviours	Overweight participants						Obese participants						Abdominally obese participants					
	Male		Female		Total		Male		Female		Total		Male		Female		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Body weight perception																		
Very thin	173	4.6	218	5.0	391	4.8	27	1.4	44	2.3	71	1.8	253	4.8	416	6.8	669	5.7
Normal weight	1643	44.5	1213	28.9	2856	37.4	181	11.1	160	8.5	341	10.0	1655	32.9	1569	26.5	3224	30.0
Overweight	1551	48.1	2061	59.2	3612	53.1	939	62.8	879	54.1	1818	59.1	2263	51.7	2594	52.0	4857	51.8
Too fat	78	2.8	203	7.0	281	4.7	336	24.7	471	35.0	807	29.1	414	10.7	637	14.7	1051	12.5
Weight management																		
On diet	555	17.8	711	22.4	1266	19.9	422	29.6	430	30.7	852	30.0	909	21.4	1013	22.3	1922	21.8
Gain weight	22	0.8	8	0.2	30	0.5	6	0.3	5	0.5	11	0.4	39	1.0	19	0.5	58	0.7
No measures	2891	81.4	3010	77.4	5901	79.6	1062	70.1	1132	68.8	2194	69.5	3667	77.6	4237	77.2	7904	77.5
Weight-loss measures																		
Reduce the total diet	313	56.4	529	75.5	842	66.2	254	60.0	316	73.3	570	65.8	522	57.6	749	75.1	1271	65.8
Low-fat diet	89	15.8	116	15.5	205	15.7	77	17.1	81	17.9	158	17.4	162	17.2	183	16.7	345	16.9
Low-caloric diet	59	10.4	79	11.4	138	10.9	56	13.0	55	15.8	111	14.2	109	11.5	126	13.5	235	12.4
Physical exercise	352	61.8	319	43.8	671	52.6	262	63.3	200	46.4	462	56.0	566	61.3	464	44.7	1030	53.6
Drug	8	1.5	42	6.2	50	3.9	12	4.2	39	12.1	51	7.6	19	2.8	72	9.0	91	5.7
Others	5	0.1	13	0.4	18	0.3	2	0.1	10	0.6	12	0.3	6	0.1	18	0.4	24	0.2
Body weight change																		
Gain weight (≥2.5 kg)	545	17.6	663	18.7	1208	18.1	274	20.1	332	23.7	606	21.6	769	18.2	912	19.0	1681	18.6
Flat (±2.5 kg)	2255	62.7	2268	58.9	4523	61.0	899	57.6	914	56.5	1813	57.1	2936	61.6	3211	59.2	6147	60.5
Lose weight (≥2.5 kg)	605	17.7	706	19.6	1311	18.6	289	19.8	281	17.6	570	18.9	816	17.9	1001	19.0	1817	18.4
Unconcern	63	2.0	92	2.8	155	2.3	28	2.6	40	2.2	68	2.4	94	2.3	145	2.8	239	2.5
Diets																		
Balance	2235	65.4	2031	56.3	4266	61.2	987	67.5	853	57.7	1840	63.3	2959	65.2	2806	55.6	5765	60.8
Meat more	484	15.4	157	4.7	641	10.6	241	17.0	78	5.4	319	12.0	691	16.4	216	4.7	907	11.1
Vegetable more	749	19.3	1541	39.0	2290	28.2	262	15.6	636	36.9	898	24.6	965	18.4	2247	39.6	3212	28.1
Regular diet																		
Yes	2846	80.0	3151	82.7	5997	81.2	1323	83.0	2494	78.7	1171	75.6	3748	78.7	4496	83.7	8244	81.0
No	622	20.0	578	17.3	1200	18.8	319	24.4	244	17.0	563	21.3	867	21.3	773	16.3	1640	19.0
Staple food																		
Rice	2965	87.3	3115	83.8	6080	85.7	1280	87.5	1305	84.6	2585	86.3	3909	86.7	4384	83.6	8293	85.2
Pasta	359	9.2	400	10.8	759	9.9	157	9.3	171	10.0	328	9.6	507	9.7	555	10.4	1062	10.0
Cereal	139	3.4	209	5.3	348	4.2	52	3.2	90	5.4	142	4.1	192	3.5	321	5.8	513	4.6
Others	5	0.1	5	0.1	10	0.1	1	0.1	1	0.0	2	0.0	7	0.1	9	0.2	16	0.2
Sodium																		
Appropriate	1147	34.0	1237	33.7	2384	33.9	505	35.6	489	33.0	994	34.5	1547	34.5	1721	33.3	3268	33.9
Salty	1592	46.1	1222	33.9	2814	40.6	732	48.4	590	36.4	1322	43.3	2159	47.0	1765	34.4	3924	41.3
Light	729	19.8	1270	32.4	1999	25.5	253	15.9	488	30.6	741	22.2	909	18.5	1783	32.3	2692	24.8
Breakfast																		
No	552	18.9	493	15.2	1045	17.2	270	21.5	201	14.5	471	18.5	754	19.7	638	13.9	1392	17.1
Yes	2916	81.1	3236	84.8	6152	82.8	1220	78.5	1366	85.5	2586	81.5	3861	80.3	4631	86.1	8492	82.9
Exercise																		
Often	1163	31.1	1245	30.8	2408	31.0	462	27.1	534	31.0	996	28.8	1577	30.7	1868	32.9	3445	31.7
Sometimes	860	28.1	775	23.6	1635	26.1	439	34.2	300	21.8	739	29.0	1186	29.3	1026	22.3	2212	26.1
Rarely or never	1445	40.8	1709	45.6	3154	43.0	589	38.6	733	47.1	1322	42.2	1852	40.0	2375	44.9	4227	42.2
Places of exercise																		
In the home	173	8.9	220	12.0	393	10.2	80	12.5	76	9.5	156	11.3	214	8.9	292	10.8	506	9.7
Around the house	1561	75.5	1627	79.1	3188	77.0	660	68.5	697	83.0	1357	74.1	2126	75.0	2371	80.9	4497	77.5
Gymnasium	289	15.6	173	8.9	462	12.7	161	19.0	61	7.5	222	14.5	423	16.1	231	8.3	654	12.7
Trip mode																		
By bike	526	13.2	507	13.0	1033	13.1	187	12.5	174	10.3	361	11.6	655	13.0	937	16.3	1292	12.2
Walking	1131	32.1	1849	47.9	2980	39.3	449	28.9	771	47.4	1220	36.8	1552	31.9	1542	29.9	4264	40.2
By bus or driving	1811	54.7	1373	39.0	3184	47.6	854	58.6	622	42.2	1476	51.6	2408	55.1	2557	53.7	4328	47.6

*The numbers are unweighted, but the percentages are weighted. Complex weighted computation was used in the statistical analysis.

Table 3 Multivariate analysis of risk factors associated with body weight misperception among high-weight adults (*n* 11 435) aged 18–79 years from Jilin Province, Northeast China, 2012

Characteristic	<i>P</i>	OR	95% CI
Residence			
Urban		1.000	Ref.
Rural	<0.001	1.340	1.191, 1.509
Age			
Youth		1.000	Ref.
Middle age	<0.001	1.826	1.605, 2.078
Old people	<0.001	3.101	2.648, 3.632
Education			
Primary school and below		1.000	Ref.
Junior middle school	<0.001	0.628	0.545, 0.723
Senior middle school	<0.001	0.498	0.426, 0.583
Undergraduate and above	<0.001	0.395	0.320, 0.487

Ref., reference category.

about 40% of those with high weight rarely or never did exercise, more than 70% of them chose to exercise around the house and nearly 50% chose to drive or go out by bus. Evidence has suggested that regular self-weighing and weight management by nutrition professionals are more effective to lose weight^(35,36).

Multivariate logistic regression analysis suggested that several factors were associated with body weight misperception. Compared with the youth, it was difficult for middle-aged and old participants to get a correct cognition of their high body weight. In our culture, symmetrical and slim features are regarded as symbols of health and beauty, but as people get older they do not pay particular attention to their appearance anymore, so they may not be consciously aware that they are gaining weight. Rural participants were more likely to get body weight misperception; possible explanations for this finding include that the education level of rural populations is lower than that of urban populations; also that rural inhabitants may lack information and knowledge about overweight and obesity.

The high prevalence of body weight misperception presents a severe challenge to public health in Jilin Province. Now we may safely arrive at the conclusion that redoubled efforts are needed to improve the situation of high weight and body weight misperception in Jilin Province. Change begins with attitude. Only when high-weight individuals realize their problem can they take effective measures, like physical exercise and regular diet, to reduce the prevalence of high weight.

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