Public Health Nutrition: 24(9), 2483–2495 doi:10.1017/S1368980020003262

Gender differences in factors associated with body weight misperception

Su Yeon Kye[1] and Keeho Park[2,*]

[1]Division of Cancer Control & Policy, National Cancer Control Institute, National Cancer Center, Goyang 410-769, Republic of Korea: [2]Department of Cancer Control and Population Health, Graduate School of Cancer Science and Policy, National Cancer Center, 323 Ilsan-ro Ilsandong-gu, Goyang 410-769, Republic of Korea

Submitted 16 April 2020: Final revision received 30 July 2020: Accepted 14 August 2020: First published online 28 September 2020

Abstract

Objective: Gender analysis in health research is important to strengthen our health system. The current study aimed to explore factors related to body weight misperception in a national sample of the general Korean population.

Design: Cross-sectional study.

Setting: South Korea, general population.

Participants: 12,900 adults enrolled from the Seventh Korea National Health and Nutrition Examination Survey (2016–2018).

Results: Disadvantageous socio-economic status was considered a predictor of participants' misperceptions of themselves as being of a healthy weight despite being overweight and as underweight despite being of a healthy weight, mainly in men. Favourable socio-economic status was considered a predictor of participants' misperceptions of themselves as being of a healthy weight despite being underweight and as overweight despite being of a healthy weight, mainly in women. Living in an urban area was an independent predictor of men's misperception of themselves as being of a healthy weight despite being overweight and women's misperception of themselves as being underweight despite being of a healthy weight. Physical inactivity was a predictor of most misperceptions in women. Psychological variables, such as stress and depression, were not significant predictors of misperception.

Conclusions: The current study highlighted the gender differences in factors related to body weight misperception. These differences suggested that more sophisticated policies should be formulated to identify solutions to health problems related to body weight.

Keywords
BMI
Body weight misperception
Gender
Factors

People often distort interpretation of information surrounding them[1]. This could waste social resources and reduce quality of life in individuals to offset dissatisfaction with distorted information, and the same is true of the perception of body image[2,3]. Many studies have reported mental distress and poor quality of life in obese or underweight people[4–6]. However, if quality of life is reduced by distorted cognition regarding the body even in those who are not obese or underweight, it could be considered another social harm caused by body image.

Body image refers to how one perceives, feels and thinks about one's body[7,8]. Body image disturbance is defined as the distortion of perception, behaviour or cognition related to physical appearance[9]. Body image disturbance is becoming a social problem, particularly in developed societies, including Western countries, and is related to mental health outcomes[10] including depression, eating disorders such as anorexia nervosa or bulimia nervosa, and body dysmorphia[11–15]. Of course, body image disturbance does not only have a negative effect on weight or health. For example, overweight adolescents were associated with less weight gain in the future if their weight was viewed as normal[16]. Body image and its disturbance have multidimensional components including perceptual, cognitive, affective and behavioural factors[17].

Various authors have demonstrated the role of gender in body image and suggested that sociocultural pressure on women to achieve an unrealistic body image can be related to dissatisfaction[18–20] and undesirable health behaviours such as eating disorders[21–24], cosmetic surgery[25–27] and

*Corresponding author: Email park.keeho@gmail.com

smoking[28–30]. In contrast, the context of body image-related research involving men differs from that of women, with its short history and a lack of admiration for thin body shapes because of men's affinity for muscular bodies[7,31,32]. One study suggested that a gender stereotype of physical attractiveness could be influenced by mental status[33]. While self-esteem is an important predictor of body image, the difference in self-esteem between men and women cannot account for the relationships between gender and body image[34,35]. However, despite the large volume of research conducted to examine body image, few studies have explored body image perception in men and women in detail[36]. While gender differences have been reported in other studies, they did not control for socio-economic status[37,38], and the study populations were limited to young adults[39].

Complex and multidimensional dynamics operate to form body image, and various factors, such as gender, ethnicity, culture, age and the state of the body and mind, are related to body image[7,8,40]. While relatively little is known about the relation between marital status and body image disturbance, it was reported that while men's marital status was unrelated to their perceived weight status, married women were more likely to perceive themselves as overweight than unmarried women[41]. On the other hand, it was reported that while marital status had no significant effect on weight perception for men, women who had never been married were more likely to perceive themselves as heavier weight than those married and living with a partner[42]. Several studies have reported that area of residence is related to body image[43–45]. Women had stronger body image concerns if they were living in coastal areas[43]. For adolescents, the prevalence of body image dissatisfaction was high among adolescents from small-sized municipalities[44]. On the other hand, when comparing body image dissatisfaction between rural and urban, both areas were similar: a high prevalence of body image dissatisfaction was observed among adolescents from rural and urban areas[45].

In the current study, in relation to body image disturbance, we compared body weight misperception between men and women and explored factors related to body weight misperception between genders in the general population. Weight misperception is the over- or underestimation of one's weight. Unlike most previous studies[46–51] that compared body weight perception and obesity and categorised them as over-, under- or correct estimation, to measure body weight misperception, the current study subdivided weight misperception levels into five categories by matching them to actual weight levels, because, for example, in the case of overestimation, there is a difference between people of a healthy weight who perceive themselves as overweight and underweight people who perceive themselves as being of a healthy weight.

Methods

Participants

We used data from the Seventh Korea National Health and Nutrition Examination Survey (KNHANES VII, 2016–2018). As data up to 2017 were refined and available at the time of the study, we analysed 2016/2017 data from the KNHANES VII. These surveys have been conducted periodically by the Korea Centers for Disease Control and Prevention since 1998 to assess health and nutritional status in the general Korean population. The KNHANES consists of four parts: the Health Interview Survey, Health Behavior Survey, Health Examination Survey and Nutrition Survey. The data for each year of the KNHANES VII were collected via a cross-sectional and nationally representative survey using a multistage, stratified sampling design. After providing informed consent, participants completed an extensive interview and underwent assessment in a mobile examination centre. The health interview and health examination are performed by trained medical staff and interviewers. The nutrition survey is conducted at participants' homes 1 week after the health interview. The KNHANES VII was approved by the institutional review board at the Korea Centers for Disease Control and Prevention. Detailed information about the KNHANES is provided elsewhere[52]. The KNHANES VII data for 2016/2017 include information regarding 16 277 individuals (8832 families from 384 sectors based on region and housing). After the exclusion of those aged ≤18 years, 12 900 participants were included in the study.

Assessment

Objective weight status was determined using BMI (underweight: <18·5 kg/m^2, healthy weight: 18·5–24·9 kg/m^2 and overweight: ≥25 kg/m^2). The weight was measured using a digital weight scale (measurement interval: 0·1 kg) according to the Korea Centers for Disease Control and Prevention's examination survey guidelines. Those under 10 years of age should be zeroed in with a 0·5 kg correction weight, and those over 10 years of age should be worn with a disposable examination gown before zeroing in. With personal belongings (glass, mobile phone, accessory, locker key, etc.) are not worn, standing barefoot on the tread plate, keeping the eyes forward and the arms down naturally on both sides, and while breathing in, the measurement is conducted up to one decimal place (0·1 kg).

To measure self-perceived body image in terms of body weight, participants' perceptions of their weight were assessed via the following items: 'How would you describe your weight?' with possible responses of 'very underweight', 'a little underweight', 'healthy weight', 'a little overweight' and 'very overweight'. To compare objective and self-perceived weight status, responses of 'very underweight' and 'a little underweight' were categorised as

https://doi.org/10.1017/S1368980020003262 Published online by Cambridge University Press

'underweight', and 'a little overweight' and 'very overweight' were categorised as 'overweight'. Participants were placed into five groups according to body image perception and objective weight status as follows: perceiving oneself as being of a healthy weight despite being underweight, perceiving oneself as being of a healthy weight despite being overweight, self-perception concordant with objective weight status, perceiving oneself as underweight despite being of a healthy weight and perceiving oneself as overweight despite being of a healthy weight.

Household income and educational level were classified into four categories. Marital status was classified as married, widowed, divorced or unmarried. Subjective health status was assessed using the item, 'How do you usually think about your health status?' Participants chose one of five categories: very unhealthy, unhealthy, medium, healthy and very healthy. In the data analysis, responses of very healthy and healthy were categorised as 'good health', and very unhealthy and unhealthy were categorised as 'poor health'. Therefore, we used three categories: good health, medium and poor health. Stress perception was assessed using the item, 'How much stress do you experience in your daily life?' The presence of depression was assessed using the item, 'Have you ever been diagnosed with depression by a doctor?' Participants were asked questions regarding their physical activity levels during a normal week. To identify moderate physical activity, participants were asked the following: 'Do you usually engage in moderate physical activity for at least 10 minutes (e.g., fast walking, jogging, weight training, golf, dance sports, pilates, or any other activity that causes a slight increase in breathing or heart rate)?'

Statistical methods

Pearson's χ^2 test was performed to identify significant associations between various variables and body weight misperception. Multinomial logistic regression was performed to determine which factors were independently associated with the body weight misperception. Variables with a significance level of $P < 0{\cdot}1$ in the bivariate analysis were entered into the model. The variables put into the final model of multinomial logistic regression for men include age, marital status, household income, education, residence, subjective health perception, stress perception and physical activity. In the case of women, depression, a variable that was not significant in univariate analysis in men, was added to the model in addition to the above variables.

The analysis was performed using SPSS version 16[53].

Results

Table 1 shows the participants' socio-demographic characteristics. In total, 16·4, 40·4 and 43·2 % of participants perceived themselves as underweight, a healthy weight and overweight, respectively. In contrast, based on BMI measurement, 3·9, 61·1, 35·0 % of participants were underweight, a healthy weight, and overweight, respectively. When we grouped the participants according to agreement between body image perception and objective weight status, the proportions of participants in the groups were as follows: perceiving oneself as being of a healthy weight despite being underweight (0·6 %), perceiving oneself as being of a healthy weight despite being overweight (5·9 %), self-perception concordant with objective weight status (66·2 %), perceiving oneself as being underweight despite being of a healthy weight (12·7 %) and perceiving oneself as being overweight despite being of a healthy weight (14·6 %). In addition, 20·2 % of participants perceived their health status as poor, and 27·3 % believed that they experienced high levels of stress. Moreover, 4·5 % of participants had been diagnosed with depression, and 22·7 % engaged in regular physical activity. Comparisons between men and women showed higher rates of bereavement, lower household income and lower levels of education for women than men. Both the proportion of those who thought they were underweight and the proportion of those who were actually overweight were higher in men. The proportions of men who perceived themselves as underweight despite being of a healthy weight were higher relative to those of women. In contrast, the proportions of women who perceived themselves as overweight despite being of a healthy weight were higher relative to those of men. Subjective health status was slightly better in women, but depression and stress perception rates were slightly higher in women. The percentage of people practicing regular physical activity was slightly higher in men.

Table 2 shows the results of the univariate analysis of associations between various factors and body weight misperception according to gender. Regarding the association between age and body image, the proportion of men or women who perceived themselves as being of a healthy weight despite being overweight increased as their age increased. The proportion of women who perceived themselves as overweight despite being of a healthy weight decreased as their age increased.

Concerning the association between marital status and body image, the proportion of men or women who perceived themselves as being of a healthy weight despite being overweight was highest among those who were widowed.

Regarding the association between household income and body image, the proportions of men whose self-perception was concordant with their objective weight status and perceived themselves as overweight despite being of a healthy weight increased as their household income increased.

Concerning the association between education and body image, the proportions of men or women who

https://doi.org/10.1017/S1368980020003262 Published online by Cambridge University Press

Table 1 Characteristics of the sample*

Characteristics	Total		Men		Women		
	Mean	SD	Mean	SD	Mean	SD	*P*†
Demographic characteristics							
Age (years)	51·2	16·9	50·9	16·8	51·4	16·9	0·082‡
Marital status							
Married	9·062	70·3	4·188	73·7	4·874	67·6	<0·001
Widowed	1·165	9·0	132	2·3	1·033	14·3	
Divorced	533	4·1	204	3·6	329	4·6	
Single	2·135	16·6	1·162	20·4	973	13·5	
Household income							
Lower	2·536	19·7	1·006	17·8	1·530	21·3	<0·001
Lower-middle	3·141	24·4	1·363	24·1	1·778	24·8	
Upper-middle	3·489	27·2	1·584	28·0	1·905	26·5	
Upper	3·681	28·7	1·713	30·2	1·968	27·4	
Education							
Elementary school or below	2·499	21·5	757	15·0	1·742	26·5	<0·001
Middle school completed	1·184	10·2	541	10·7	643	9·8	
High school completed	3·626	31·2	1·663	32·9	1·963	29·9	
College graduated or higher	4·313	37·1	2·093	41·4	2220	3·8	
Residence							
Urban	10·431	80·9	4·579	80·5	5·852	81·1	0·359
Rural	2 469	19·1	1 109	19·5	1 360	18·9	
Obesity-related variables							
Body image							
Underweight	1·992	16·4	1·058	19·9	934	13·7	<0·001
Normal weight	4·909	40·4	2·131	40·1	2 778	40·7	
Overweight	5·245	43·2	2·128	40·0	3·117	45·6	
BMI							
Underweight	478	3·9	145	2·7	333	4·9	<0·001
Normal weight	7 466	61·1	3063	56·9	4403	64·3	
Overweight	4285	35·0	2177	40·4	2108	30·8	
Status of body weight misperception							
Perceived as being normal weight despite being underweight	69	0·6	10	0·2	59	0·9	<0·001
Perceived as being normal weight despite being overweight	707	5·9	422	8·0	285	4·2	
Self-perception is concordant with the objective status	7941	66·2	3532	66·8	4409	65·7	
Perceived as being underweight despite being normal weight	1·527	12·7	902	17·1	625	9·3	
Perceived as being overweight despite being normal weight	1·755	14·6	420	7·9	1335	19·9	
Health status and physical activity							
Subjective health perception							
Good	3·240	27·7	855	16·8	1504	22·7	<0·001
Medium	6·106	52·2	2·634	51·7	3·472	52·5	
Poor	2·359	20·2	1·604	31·5	1·636	24·7	
Depression							
Yes	524	4·5	130	2·6	394	6·0	<0·001
No	11·168	95·5	4·958	97·4	6·210	94·0	
Stress perception							
Low	8·811	72·7	3·970	74·8	4·841	71·1	<0·001
High	3·307	27·3	1·338	25·2	1·969	28·6	
Moderate physical activity							
Yes	2·648	22·7	1·362	26·9	1·286	19·5	<0·001
No	8·996	77·3	3·699	73·1	5·297	80·5	

*Data are given as numbers (valid percent), unless otherwise specified.
†*P* values were determined using χ^2 tests.
‡*P* value was determined using Student's *t* test.

https://doi.org/10.1017/S1368980020003262 Published online by Cambridge University Press

Public Health Nutrition

Table 2 Association between various factors and body weight misperception by gender

	Men											Women										
	Status of body weight misperception											Status of body weight misperception										
	HDU		HDO		CON		UDH		ODH			HDU		HDO		CON		UDH		ODH		
Variables	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*P**	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*P*
Age																						
19–29	0	0·0	24	3·7	437	67·5	130	20·1	56	8·7	<0·001	23	3·1	0	0·0	477	63·4	51	6·8	201	26·7	<0·001
30s	0	0·0	41	4·8	612	71·3	129	15·0	76	8·9		18	1·7	4	0·4	710	66·5	68	6·4	268	25·1	
40s	0	0·0	68	6·9	712	71·8	136	13·7	76	7·7		7	0·6	11	0·9	820	65·8	79	6·3	329	26·4	
50s	1	0·1	86	8·7	680	69·0	140	14·2	78	7·9		6	0·5	42	3·2	893	68·6	111	8·5	249	19·1	
60s	1	0·1	94	10·4	575	63·5	151	16·7	84	9·3		1	0·1	77	6·6	795	67·8	104	8·9	195	16·6	
70 or older	8	0·9	109	12·1	516	57·4	216	24·0	50	5·6		4	0·3	151	12·9	714	60·8	212	18·1	93	7·9	
Marital status																						
Married	8	0·2	332	8·5	2608	66·8	636	16·3	319	8·2	<0·001	26	0·6	154	3·4	3011	66·4	380	8·4	964	21·3	<0·001
Widowed	1	0·8	18	14·5	77	62·1	23	18·5	5	4·0		3	0·3	112	11·6	616	63·6	149	15·4	89	9·2	
Divorced	1	0·5	22	11·4	122	63·2	39	20·2	9	4·7		0	0·0	14	4·5	203	64·6	34	10·8	63	20·1	
Single	0	0·0	50	4·7	725	68·0	204	19·1	87	8·2		30	3·4	4	0·4	577	64·7	62	7·0	219	24·6	
Household income																						
Lower	6	0·6	112	12·0	543	58·3	205	22·0	66	7·1	<0·001	6	0·4	136	9·7	893	63·4	214	15·2	160	11·4	<0·001
Lower-middle	2	0·2	108	8·5	828	65·3	239	18·8	91	7·2		8	0·5	80	4·8	1098	66·4	135	8·2	333	20·1	
Upper-middle	1	0·1	105	7·1	1017	68·9	244	16·5	108	7·3		20	1·1	42	2·4	1196	67·0	144	8·1	384	21·5	
Upper	1	0·1	97	6·1	1132	71·0	211	13·2	154	9·7		25	1·4	27	1·5	1208	65·6	130	7·1	452	24·5	
Education																						
Elementary school or below	5	0·7	97	13·0	428	57·2	162	21·7	56	7·5	<0·001	2	0·1	202	11·9	1077	63·4	250	14·7	168	9·9	<0·001
Middle school completed	2	0·4	57	10·7	336	63·2	101	19·0	36	6·8		2	0·3	25	3·9	445	69·6	59	9·2	108	16·9	
High school completed	1	0·1	120	7·3	1108	67·0	303	18·3	121	7·3		17	0·9	28	1·4	1281	66·1	129	6·7	484	25·0	
College graduated or higher	1	0·0	119	5·7	1486	71·3	286	13·7	192	9·2		35	1·6	15	0·7	1447	66·5	151	6·9	528	24·3	
Residence																						
Urban	6	0·1	308	7·2	2882	67·4	729	17·0	353	8·3	<0·001	50	0·9	196	3·6	3607	66·1	459	8·4	1149	21·0	<0·001
Rural	4	0·4	114	11·3	650	64·5	173	17·2	67	6·6		9	0·7	89	7·1	802	64·1	166	13·3	186	14·9	
Subjective health perception																						
Good	1	0·1	145	9·1	1091	68·4	246	15·4	113	7·1	<0·001	10	0·6	42	2·6	1107	69·2	126	7·9	315	19·7	<0·001
Medium	6	0·2	206	7·9	1753	67·0	432	16·5	218	8·3		38	1·1	147	4·3	2233	65·4	275	8·1	719	21·1	
Poor	2	0·2	48	5·7	530	63·2	183	21·8	76	9·1		8	0·5	86	5·8	926	62·7	195	13·2	261	17·7	
Depression																						
No	9	0·2	387	7·9	3290	66·9	839	17·1	392	8·0	0·532	54	0·9	256	4·2	4008	65·8	539	8·9	1233	20·2	0·009
Yes	0	0·0	12	9·4	80	62·5	21	16·4	15	11·7		2	0·5	18	4·6	257	65·7	53	13·6	61	15·6	
Stress perception																						
Low	7	0·2	337	8·5	2606	66·0	679	17·2	319	8·1	0·060	43	0·9	211	4·4	3174	66·8	419	8·8	904	19·0	0·004
High	2	0·2	83	6·2	924	69·5	219	16·5	101	7·6		16	0·8	71	3·7	1225	63·0	202	10·4	429	22·1	
Moderate physical activity																						
Yes	1	0·1	94	6·9	952	70·3	194	14·3	113	8·3	0·006	9	0·7	15	1·2	883	69·1	75	5·9	296	23·2	<0·001
No	8	0·2	302	8·2	2405	65·6	659	18·0	293	8·0		47	0·9	257	5·0	3373	65·0	516	9·9	993	19·1	

HDU, perceiving oneself as being of a healthy weight despite being underweight; HDO, perceiving oneself as being of a healthy weight despite being overweight; CON, self-perception concordant with objective weight status; UDH, perceiving oneself as underweight despite being of a healthy weight; ODH, perceiving oneself as overweight despite being of a healthy weight.

*P values were determined using χ^2 tests.

perceived themselves as being of a healthy weight despite being overweight and as being underweight despite being of a healthy weight decreased as their educational levels increased.

Regarding the association between residence and body image, the proportion of men or women living in rural areas who perceived themselves as being of a healthy weight despite being overweight was higher relative to that of men living in urban areas. The proportion of women living in urban areas who perceived themselves as overweight despite being of a healthy weight was higher relative to that of women living in rural areas.

Regarding the association between subjective health perception and body image, the proportions of men or women whose self-perception was concordant with their objective weight status increased as their subjective health levels increased. In contrast, the proportion of men or women who perceived themselves as underweight despite being of a healthy weight decreased as their subjective health levels increased.

Concerning the association between depression and body image, the proportion of women who perceived themselves as underweight despite being of a healthy weight was higher in those with depression, relative to that of women without depression. The proportion of women who perceived themselves as overweight despite being of a healthy weight was higher in those without depression, relative to that of women with depression.

Regarding the association between physical activity and body image, the proportion of men or women who engaged in regular physical activity and whose self-perception was concordant with their objective weight status was higher relative to that of those who did not engage in regular physical activity.

Table 3 shows the results of the multinomial logistic regression analysis of factors associated with body weight misperception in men. Every 1-year increase in age increased the relative prevalence ratios (RPR) of participants perceiving themselves as being of a healthy weight despite being underweight by 1·13 (95 % CI 1·02, 1·25).

Each 1-year increase in age increased the RPR of participants perceiving themselves as being of a healthy weight despite being overweight by 1·02 (95 % CI 1·01, 1·03). Men whose household income levels were low were 1·45 times more likely to perceive themselves as being of a healthy weight despite being overweight relative to those whose household income levels were high (95 % CI 1·01, 2·07). A lower educational level was a predictive factor for participants perceiving themselves as being of a healthy weight despite being overweight (1·73 times more likely for elementary school or below, 1·55 times more likely for middle school). Men who lived in urban areas (RPR = 0·76, 95 % CI 0·59, 0·97) and had poor (RPR = 0·45, 95 % CI 0·31, 0·65) or medium (RPR = 0·77, 95 % CI 0·61, 0·98) perceived subjective health were less likely to perceive themselves as being of a healthy weight despite being overweight.

Men who were married (RPR = 0·63, 95 % CI 0·49, 0·81) or widowed (RPR = 0·51, 95 % CI 0·29, 0·92) were least likely to perceive themselves as underweight despite being of a healthy weight. Men whose household income levels were low (RPR = 1·33, 95 % CI 1·03, 1·73) or in the lower-middle range (RPR = 1·29, 95 % CI 1·03, 1·61) and whose educational level was low (elementary school or below (RPR = 1·35, 95 % CI 1·02, 1·78), high school (RPR = 1·25, 95 % CI 1·04, 1·51)) were most likely to perceive themselves as underweight despite being of a healthy weight. Men whose perceived subjective health was poor were most likely to perceive themselves as overweight despite being of a healthy weight.

Women whose household income levels were in the lower-middle range were less likely to perceive themselves as being of a healthy weight despite being underweight relative to those whose household income levels were high (RPR = 0·42, 95 % CI 0·18, 0·99; Table 4). Women whose subjective health status was medium were 2·49 times more likely to perceive themselves as being of a healthy weight despite being underweight than those whose subjective health status was good.

As in men, every 1-year increase in age increased the RPR of participants perceiving themselves as being of a healthy weight despite being overweight by 1·05 (95 % CI 1·04, 1·07). A lower educational level was a predictive factor for participants perceiving themselves as being of a healthy weight despite being overweight. However, only the RPR for 'elementary school or below' was statistically significant (RPR = 3·66, 95 % CI 1·90, 7·04). Women who engaged in regular physical activity were 1·80 times more likely to perceive themselves as being of a healthy weight despite being overweight than those who did not engage in regular physical activity.

Every 1-year increase in age increased the RPR of participants perceiving themselves as underweight despite being of a healthy weight by 1·02 (95 % CI 1·01, 1·03). Living in an urban area decreased the RPR of participants perceiving themselves as underweight despite being of a healthy weight by 0·76 (95 % CI 0·62, 0·94). Women who engaged in regular physical activity were 1·42 times more likely to perceive themselves as being of a healthy weight despite being overweight relative to those who did not engage in regular physical activity. Unlike in other body image categories, age operated in opposite direction for perceiving as being overweight despite being of a healthy weight. Every 1-year increase in age decreased the RPR of participants perceiving themselves as overweight despite being of a healthy weight by 0·99 (95 % CI 0·98, 0·99). Married women were 1·28 times more likely than single women to perceive themselves as overweight despite being of a healthy weight. Women whose household income levels were low (RPR = 0·73, 95 % CI 0·58, 0·93) and whose educational level was elementary school or below (RPR = 0·70,

https://doi.org/10.1017/S1368980020003262 Published online by Cambridge University Press

https://doi.org/10.1017/S1368980020003262 Published online by Cambridge University Press

Table 3 Multinomial logistic regression results examining factors associated with body weight misperception in men*

		Perceiving oneself as being of a healthy weight despite being underweight (*n* 10)		Perceiving oneself as being of a healthy weight despite being overweight (*n* 422)		Perceiving oneself as underweight despite being of a healthy weight (*n* 902)		Perceiving oneself as overweight despite being of a healthy weight (*n* 420)	
Variables		Adjusted RPR	95 % CI	Adjusted RPR	95 % CI	Adjusted RPR	95 % CI	Adjusted RPR	95 % CI
Age (years)	(Continuous)	1·13	1·02, 1·25	1·02	1·01, 1·03	1·01	1·00, 1·02	1·00	0·99, 1·01
Marital status	Married	N/A†		1·23	0·81, 1·85	0·63	0·49, 0·81	1·05	0·75, 1·47
	Widowed	N/A†		1·50	0·74, 3·04	0·51	0·29, 0·92	0·56	0·21, 1·52
	Divorced	N/A†		1·55	0·85, 2·84	0·69	0·44, 1·07	0·65	0·31, 1·37
	Single	Reference		Reference		Reference		Reference	
Household income	Lower	0·97	0·08, 12·09	1·45	1·01, 2·07	1·33	1·03, 1·73	0·91	0·63, 1·31
	Lower-middle	0·72	0·05, 9·50	1·16	0·84, 1·59	1·29	1·03, 1·61	0·83	0·62, 1·11
	Upper-middle	0·73	0·04, 12·52	1·14	0·84, 1·54	1·17	0·94, 1·44	0·76	0·58, 1·00
	Upper	Reference		Reference		Reference		Reference	
Education	Elementary school or below	2·54	0·23, 27·59	1·73	1·20, 2·50	1·35	1·02, 1·78	1·13	0·76, 1·69
	Middle school completed	2·77	0·23, 33·89	1·55	1·07, 2·25	1·22	0·92, 1·62	0·89	0·59, 1·33
	High school completed	0·80	0·05, 13·78	1·29	0·98, 1·70	1·25	1·04, 1·51	0·87	0·67, 1·11
	College graduated or higher	Reference		Reference		Reference		Reference	
Residence	Urban	0·84	0·20, 3·58	0·76	0·59, 0·97	1·12	0·92, 1·37	1·18	0·89, 1·58
	Rural	Reference		Reference		Reference		Reference	
Subjective health perception	Poor	1·56	0·13, 18·48	0·45	0·31, 0·65	1·25	0·99, 1·59	1·52	1·09, 2·12
	Medium	2·99	0·35, 25·56	0·77	0·61, 0·98	1·05	0·88, 1·25	1·26	0·99, 1·62
	Good	Reference		Reference		Reference		Reference	
Stress perception	High	1·64	0·32, 8·47	0·97	0·74, 1·27	0·93	0·77, 1·11	0·78	0·61, 1·01
	Low	Reference		Reference		Reference		Reference	
Moderate physical activity	No	1·21	0·14, 10·35	1·05	0·81, 1·36	1·16	0·96, 1·39	1·02	0·80, 1·30
	Yes	Reference		Reference		Reference		Reference	

RPR, relative prevalence ratios; N/A, not available.
*'Self-perception is concordant with the objective status' is the reference category.
†Due to the reason that the number of single men in the category 'Perceived as being normal weight despite being underweight' is zero.

Table 4 Multinomial logistic regression results examining factors associated with body weight misperception in women*

		Perceiving oneself as being of a healthy weight despite being underweight (*n* 59)		Perceiving oneself as being of a healthy weight despite being overweight (*n* 285)		Perceiving oneself as underweight despite being of a healthy weight (*n* 625)		Perceiving oneself as overweight despite being of a healthy weight (*n* 1335)	
Variables		Adjusted RPR	95 % CI	Adjusted RPR	95 % CI	Adjusted RPR	95 % CI	Adjusted RPR	95 % CI
Age (years)	(Continuous)	0·97	0·94, 1·00	1·05	1·04, 1·07	1·02	1·01, 1·03	0·99	0·98, 0·99
Marital status	Married	0·38	0·17, 0·82	0·98	0·33, 2·86	0·71	0·50, 1·02	1·28	1·03, 1·59
	Widowed	0·59	0·09, 3·97	1·01	0·33, 3·13	0·74	0·47, 1·17	1·04	0·72, 1·50
	Divorced	N/A†		1·06	0·32, 3·53	0·84	0·50, 1·39	1·35	0·93, 1·95
	Single	Reference		Reference		Reference		Reference	
Household income	Lower	0·72	0·25, 2·06	1·40	0·85, 2·29	1·19	0·89, 1·60	0·73	0·58, 0·93
	Lower-middle	0·42	0·18, 0·99	1·48	0·91, 2·42	0·90	0·68, 1·19	0·88	0·74, 1·06
	Upper-middle	0·87	0·47, 1·60	1·24	0·74, 2·09	1·09	0·84, 1·42	0·87	0·74, 1·02
	Upper	Reference		Reference		Reference		Reference	
Education	Elementary school or below	0·23	0·04, 1·35	3·66	1·90, 7·04	1·03	0·74, 1·44	0·70	0·53, 0·91
	Middle school completed	0·46	0·10, 2·13	1·77	0·87, 3·60	0·81	0·56, 1·16	0·88	0·68, 1·14
	High school completed	0·62	0·34, 1·13	1·32	0·69, 2·53	0·82	0·64, 1·06	1·13	0·97, 1·32
	College graduated or higher	Reference		Reference		Reference		Reference	
Residence	Urban	0·69	0·33, 1·44	0·93	0·70, 1·24	0·76	0·62, 0·94	1·16	0·97, 1·39
	Rural	Reference		Reference		Reference		Reference	
Subjective health perception	Poor	2·09	0·78, 5·58	0·94	0·62, 1·42	1·15	0·88, 1·51	1·32	1·07, 1·61
	Medium	2·49	1·22, 5·08	1·15	0·79, 1·67	0·93	0·74, 1·16	1·25	1·07, 1·46
	Good	Reference		Reference		Reference		Reference	
Depression	Yes	0·96	0·23, 4·12	0·72	0·43, 1·23	1·18	0·86, 1·63	0·86	0·64, 1·15
	No	Reference		Reference		Reference		Reference	
Stress perception	High	0·70	0·38, 1·29	1·00	0·74, 1·36	1·21	0·99, 1·48	1·14	0·98, 1·31
	Low	Reference		Reference		Reference		Reference	
Moderate physical activity	No	2·11	1·02, 4·38	1·80	1·04, 3·11	1·42	1·09, 1·85	1·04	0·89, 1·21
	Yes	Reference		Reference		Reference		Reference	

RPR, relative prevalence ratios; N/A, not available.
*'Self-perception is concordant with the objective status' is the reference category.
†Due to the reason that the number of divorced women in the category 'Perceived as being normal weight despite being underweight' is zero.

95 % CI 0·53, 0·91) were least likely to perceive themselves as overweight despite being of a healthy weight. In contrast, women whose subjective health status was poor (RPR = 1·32, 95 % CI 1·07, 1·61) or medium (RPR = 1·25, 95 % CI 1·07, 1·46) were less likely to perceive themselves as overweight despite being of a healthy weight than those whose subjective health status was good.

Discussion

The current study aimed to explore factors related to body weight misperception in men and women and demonstrated significant implications for addressing health problems originating from body image. The tendency towards over- or underestimation was the same as that observed in previous studies[54]. Regarding gender differences in factors related to body weight misperception, only a few factors were common in both men and women (age and education for participants perceiving themselves as being of a healthy weight despite being overweight; subjective health perception for participants perceiving themselves as overweight despite being of a healthy weight). In previous studies involving Koreans, men tended to underestimate their weight and women tended to overestimate[55,56]. These results are consistent with the results of univariate analysis in our study.

The results indicated that people's perception of themselves as being of a healthy weight despite being underweight could cause problems such as failure to take action because they believe that they are of a healthy weight despite weakness and decreased muscle, particularly in older men[57]. In women, higher economic status, poorer subjective health status and lack of physical activity were related to this unhealthy perception. In women whose income levels are high, it is possible that the subjective standard for ideal body weight has decreased, prioritising a lower body weight[58]. This could be problematic, in that even though their health status is not good and the fact that they are underweight could be related to poor health status, they could fail to consider their body weight a sign of abnormal health status and take no action[59,60].

Even though relations between social class and body image are unclear because of the inconsistent or conflicting findings[7,61], our study found that, unlike men, the subjective yardstick for healthy weight tends to be biased towards slim body shape in women. In relation to social class and body image, psychology studies have found that body shape ideals are very similar in people of different social classes in affluent Western cultures[7].

As a reason for this result, it can be inferred that women in the higher social class have stronger peer pressure on slim bodies as there are more slim women in their social class than in the lower social class[62]. In the randomised experimental study to investigate the impact of peer pressure to be thin on young women, it was found that exposure to peer pressure to be thin resulted in greater body dissatisfaction[63]. For adolescents, a prospective study identified the impact of peer pressure on body dissatisfaction[64].

Because the perception of body size varies depending on the culture, so the results of the current study may be limited in generalisation. For example, in the Middle East and North Africa or Sub-Saharan African regions, it was found that there were regions in which overweight women were optimistic about being overweight and even thought that overweight women were more beautiful[65–67]. On the other hand, in a study of Tunisian women in North Africa, a region closer to the continental Europe, it was reported that Tunisian women did not prefer larger body sizes in spite of the Arab-Muslim culture in which large body sizes for women are seen as desirable and associated with female beauty[68].

In the scoping review to explore the associations between physical activity, sport and body image, it was found that participation in physical activity and sport was related to less negative and more positive body image[69]. In our study, only women have shown the same results. In the study to explore the theoretical model on the mediation of body image and physical self-concept in adolescents, authors suggested that physical activity can help individuals to achieve a positive self-concept and promote psychological well-being through the improvement of physical perceptions and body satisfaction[70].

Perceiving oneself as being of a healthy weight despite being overweight could lead to failure to attempt to control one's body weight, remaining overweight[71]. Recently, there have been studies that have made health professionals agonise over the health implications of body weight misperception. Contrary to commonly held thoughts, weight misperception among youth who were overweight or obese predicted lower future weight gain[16]. In some studies that analysed longitudinal data, participants who perceived their weight status as being overweight were at an increased risk of subsequent weight gain[72,73]. As a psychological explanation for this phenomenon, identifying oneself as overweight may act independently of BMI to contribute to unhealthy profiles of physiological functioning and impaired health over time[74]. Even in a systematic review of the relationship between weight status perceptions and weight loss attempts, strategies, behaviours and outcomes, it was found that individuals who perceive their weight status as overweight are more likely to report attempting weight loss but over time gain more weight[75]. In a previous study involving Koreans, subjects with overestimated body image had lower OR for physical activity[76]. Therefore, it is conceivable that it cannot be guaranteed that correct body perception will necessarily lead to desirable health behaviours. In particular, it suggests that careful intervention on the psychological state of an individual as well as demographic and sociological aspects may be necessary in health interventions for those who perceive that they are overweight.

https://doi.org/10.1017/S1368980020003262 Published online by Cambridge University Press

In the current study, low socio-demographic status (i.e., household income, educational level and residence) and good subjective health status were related to this unhealthy perception in men. The reason for the finding that good subjective health status was related to misperception in men could have occurred because they were less tolerant of their weight as they were in good subjective health. In women, older age, lower educational level and lack of physical activity were related to this kind of misperception. Previous studies have reported that older age[77,78], male sex[79], low educational level[79] and living below the poverty line[78] were associated with this kind of body image misperception.

Perceiving oneself as underweight despite being of a healthy weight could prompt efforts to increase body weight, resulting in excess weight. In the current study, men who were single, of lower economic status and with lower educational levels were more vulnerable to this unhealthy perception. In women, older age, living in a rural area and lack of physical activity increased the likelihood of this kind of misperception.

Perceiving oneself as overweight despite being of a healthy weight has been associated with some eating disorders[80,81], unnecessary weight loss attempts[82] and higher risk of weight gain[75]. In the current study, men who perceived their health as poor were more vulnerable to this unhealthy perception. In women, younger age, being married, higher socio-economic status, higher educational levels and poor perceived health were predictors of this kind of misperception. The reason for this phenomenon could be that being married, economically stable and highly educated could be a favourable socio-economic condition for the pursuit of a slimmer body despite healthy weight. The result of our study is accordance with the previous study in which married women perceived themselves as overweight than unmarried women[41]. Age[83], poorer subjective health perception[83] and ethnicity (white)[84,85] were previously associated with this kind of misperception. In relation to ethnicity, the comparison between white and black is predominant in most studies, so further research is needed on the relationship between body weight perception and ethnicity.

Overall, disadvantageous socio-economic status was considered a predictor of participants' misperceptions of themselves as being of a healthy weight despite being overweight and as underweight despite being of a healthy weight, mainly in men. In contrast, favourable socio-economic status was considered a predictor of participants' misperception of themselves as being of a healthy weight despite being underweight and as overweight despite being of a healthy weight, mainly in women. Living in an urban area was an independent predictor of men's misperception of themselves as being of a healthy weight despite being overweight and women's misperception of themselves as underweight despite being of a healthy weight. Physical inactivity was a predictor of most misperceptions in women. However, psychological variables, such as stress perception and depression, were not significant predictors of misperception in the current study.

The current study had the following strengths. It was reliable in that interpretation involved representative samples. In addition, the sample size was sufficient to make it possible to analyse by gender. Further, the independent meanings of variables were reviewed in men and women by analysing them using relatively diverse aspects of demographic and sociological variables. However, the study had the following weaknesses. First, because the data were not from a study designed solely for the subject matter in the study, it was inevitable that the types of variable available were limited. In particular, it is regrettable that sociological variables, such as social networks, social support and social pressure, and in-depth psychological variables could not be examined. Second, since the current study is a cross-sectional study, there are limitations in discussing the causal relationship between variables such as subjective health status, stress and physical activity and body weight misperception. Third, in the category of 'Perceiving oneself as being of a healthy weight despite being underweight', the multivariate analysis showed a very wide CI, taking a distant range from 1 (especially in men). This is presumed to be due to the relatively small number of samples in the category of 'Perceiving oneself as being of a healthy weight despite being underweight'. As a result, there is a possibility that the weakened statistical power caused some statistically significant results to be insignificant.

The results of the current study suggest that there are significant differences in factors related to various types of body image misperception between men and women. These differences appeared not only in socio-demographic variables but also in subjective health perception and physical activity. As there have been reports that the effect on the health of body image misperception is not one-sided, tailored approaches may be needed, focusing on the fact that weight-related problems also do not have a uniform pattern between men and women. The problem related to body image should be regarded as a multidimensional issue in which misperception types, related factors and gender are intertwined.

Acknowledgements

Financial support: None. *Conflict of interest*: The authors declare that they have no conflict of interest. *Authorship*: K.P. designed the study and S.Y.K. and K.P. conceived the analysis question and conducted the analysis. S.Y.K. and K.P. critically revised the manuscript content. All authors were involved in the writing of the manuscript at draft and approved the final version. *Ethics of human subject participation*: All procedures performed in studies

involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The survey, KNHANES VII, was approved by the institutional review board at the Korea Centers for Disease Control and Prevention. *Informed consent:* Informed consent was obtained from all individual participants included in the study.

References

1. Coutts LM & Gruman JA (2005) Applying social psychology to organization. In *Applied Social Psychology: Understanding and Addressing Social and Practical Problems*, pp. 229–256 [FW Schneider, JA Gruman, & LM Coutts, editors]. Los Angeles, CA: Sage.
2. Nayir T, Uskun E, Yürekli MV *et al.* (2016) Does body image affect quality of life?: a population based study. *PLOS ONE* **11**, e0163290.
3. Baker A & Blanchard C (2018) Men's body image: The effects of an unhealthy body image on psychological, behavioral, and cognitive health. In *Weight Loss*, pp. 101–119 [IJ Lobera, editor]. London: IntechOpen.
4. Pimenta FBC, Bertrand E, Mograbi DC *et al.* (2015) The relationship between obesity and quality of life in Brazilian adults. *Front Psychol* **6**, 966–966.
5. Taylor VH, Forhan M, Vigod SN *et al.* (2013) The impact of obesity on quality of life. *Best Pract Res Clin Endocrinol Metabol* **27**, 139–146.
6. Hassan MK, Joshi AV, Madhavan SS *et al.* (2003) Obesity and health-related quality of life: a cross-sectional analysis of the US population. *Int J Obes* **27**, 1227–1232.
7. Grogan S (2016) *Body Image: Understanding Body Dissatisfaction in Men, Women and Children*. London: Taylor & Francis Group.
8. Muth JL & Cash TF (1997) Body-image attitudes: what difference does gender make?. *J Appl Soc Psychol* **27**, 1438–1452.
9. Posavac SS & Posavac HD (2002) Predictors of women's concern with body weight: the roles of perceived self-media ideal discrepancies and self-esteem. *Eating Disord* **10**, 153–160.
10. Pimenta AM, Sánchez-Villegas A, Bes-Rastrollo M *et al.* (2009) Relationship between body image disturbance and incidence of depression: the SUN prospective cohort. *BMC Public Health* **9**, 1.
11. Dunkley DM & Grilo CM (2007) Self-criticism, low self-esteem, depressive symptoms, and over-evaluation of shape and weight in binge eating disorder patients. *Behav Res Therap* **45**, 139–149.
12. Hrabosky JI & Grilo CM (2007) Body image and eating disordered behavior in a community sample of Black and Hispanic women. *Eating Behav* **8**, 106–114.
13. Jansen A, Smeets T, Martijn C *et al.* (2006) I see what you see: the lack of a self-serving body-image bias in eating disorders. *Brit J Clin Psychol* **45**, 123–135.
14. Rotenberg KJ, Taylor D & Davis R (2004) Selective mood-induced body image disparagement and enhancement effects: are they due to cognitive priming or subjective mood? *Int J Eating Disord* **35**, 317–332.
15. Veale D, Kinderman P, Riley S *et al.* (2003) Self-discrepancy in body dysmorphic disorder. *Brit J Clin Psychol* **42**, 157–169.
16. Sonneville KR, Thurston IB, Milliren CE *et al.* (2016) Helpful or harmful? Prospective association between weight misperception and weight gain among overweight and obese adolescents and young adults. *Int J Obes* **40**, 328–332.
17. Vocks S, Legenbauer T, Rüddel H *et al.* (2007) Static and dynamic body image in bulimia nervosa: mental representation of body dimensions and biological motion patterns. *Int J Eat Disord* **40**, 59–66.
18. Bordo S (1993) *Unbearable Weight: Feminism, Western Culture, and the Body*. Berkeley, CA: University of California Press.
19. Groesz LM, Levine MP & Murnen SK (2002) The effect of experimental presentation of thin media images on body satisfaction: a meta-analytic review. *Int J Eat Disord* **31**, 1–16.
20. Thompson JK, Heinberg LJ, Altabe M *et al.* (1999) *Exacting Beauty: Theory, Assessment, and Treatment of Body Image Disturbance*. Washington, DC: American Psychological Association.
21. Benveniste J, Lecouteur A & Hepworth J (1999) Lay theories of anorexia nervosa: a discourse analytic study. *J Health Psychol* **4**, 59–69.
22. Levine MP & Piran N (2004) The role of body image in the prevention of eating disorders. *Body Image* **1**, 57–70.
23. Thompson J (2001) *Body Image, Eating Disorders, and Obesity: An Integrative Guide for Assessment and Treatment*. Washington, DC: American Psychological Association.
24. Shroff H & Thompson JK (2006) The tripartite influence model of body image and eating disturbance: a replication with adolescent girls. *Body Image* **3**, 17–23.
25. Davis K (2013) *Reshaping the Female Body: The Dilemma of Cosmetic Surgery*. New York: Routledge.
26. Sarwer DB, Cash TF, Magee L *et al.* (2005) Female college students and cosmetic surgery: an investigation of experiences, attitudes, and body image. *Plast Reconstr Surg* **115**, 931–938.
27. Slevec J & Tiggemann M (2010) Attitudes toward cosmetic surgery in middle-aged women: body image, aging anxiety, and the media. *Psychol Women Quart* **34**, 65–74.
28. King TK, Matacin M, White KS *et al.* (2005) A prospective examination of body image and smoking cessation in women. *Body Image* **2**, 19–28.
29. Wiseman CV, Turco RM, Sunday SR *et al.* (1998) Smoking and body image concerns in adolescent girls. *Int J Eat Disord* **24**, 429–433.
30. Croghan IT, Bronars C, Patten CA *et al.* (2006) Is smoking related to body image satisfaction, stress, and self-esteem in young adults? *Am J Health Behav* **30**, 322–333.
31. Pope H, Pope HG, Phillips KA *et al.* (2000) *The Adonis Complex: The Secret Crisis of Male Body Obsession*. New York: Simon and Schuster.
32. Constructed H (2008) Body image, eating disorders, and the media. *Adolesc Med* **19**, 521–546.
33. Barber N (2001) Gender differences in effects of mood on body image. *Sex Roles* **44**, 99–108.
34. Jackson LA, Sullivan LA & Rostker R (1988) Gender, gender role, and body image. *Sex Roles* **19**, 429–443.
35. Kearney-Cooke A (1999) Gender differences and self-esteem. *J Gend Specif Med* **2**, 46–52.
36. Brennan M, Lalonde C & Bain J (2010) Body image perceptions: do gender differences exist? *Psi Chi J Psychol Res* **15**, 130–138.
37. Crawford D & Campbell K (1999) Lay definitions of ideal weight and overweight. *Int J Obes Relat Metab Disord* **23**, 738–745.
38. Ziebland S, Thorogood M, Fuller A *et al.* (1996) Desire for the body normal: body image and discrepancies between self

https://doi.org/10.1017/S1368980020003262 Published online by Cambridge University Press

reported and measured height and weight in a British population. *J Epidemiol Commun Health* **50**, 105–106.
39. Gross SM, Gary TL, Browne DC *et al.* (2005) Gender differences in body image and health perceptions among graduating seniors from a historically black college. *J Natl Med Assoc* **97**, 1608–1619.
40. Cash TF & Smolak L (2011) *Body Image: A Handbook of Science, Practice, and Prevention*. New York: Guilford Press.
41. Klos LA & Sobal J (2013) Marital status and body weight, weight perception, and weight management among US adults. *Eat Behav* **14**, 500–507.
42. Boo S (2014) Misperception of body weight and associated factors. *Nurs Health Sci* **16**, 468–475.
43. Luo Y, Parish WL & Laumann EO (2005) A population-based study of body image concerns among urban Chinese adults. *Body Image* **2**, 333–345.
44. Fidelix YL, Silva DAS, Pelegrini A *et al.* (2011) Body image dissatisfaction among adolescents from a small town: association with gender, age, and area of residence. *Braz J Kinanthrop Hum Perform* **13**, 202–207.
45. Petroski E, Pelegrini A & Glaner M (2009) Body image dissatisfaction among rural and urban adolescents. *Motricidade* **5**, 13–25.
46. Sirirassamee T, Phoolsawat S & Limkhunthammo S (2018) Relationship between body weight perception and weight-related behaviours. *J Int Med Res* **46**, 3796–3808.
47. Xie B, Liu C, Chou C-P *et al.* (2003) Weight perception and psychological factors in Chinese adolescents. *J Adolesc Health* **33**, 202–210.
48. Khor GL, Zalilah M, Phan Y *et al.* (2009) Perceptions of body image among Malaysian male and female adolescents. *Singapore Med J* **50**, 303.
49. Brug J, Wammes B, Kremers S *et al.* (2006) Underestimation and overestimation of personal weight status: associations with socio-demographic characteristics and weight maintenance intentions. *J Hum Nutr Diet* **19**, 253–262.
50. Park E (2011) Overestimation and underestimation: adolescents' weight perception in comparison to BMI-based weight status and how it varies across socio-demographic factors. *J Sch Health* **81**, 57–64.
51. Shin A & Nam CM (2015) Weight perception and its association with socio-demographic and health-related factors among Korean adolescents. *BMC Public Health* **15**, 1292.
52. Kweon S, Kim Y, Jang M-J *et al.* (2014) Data resource profile: the Korea national health and nutrition examination survey (KNHANES). *Int J Epidemiol* **43**, 69–77.
53. SPSS S (2008) *16.0 for Windows*. Chicago: SPSS Inc.
54. Steenhuis IH, Bos AE & Mayer B (2006) (Mis)interpretation of body weight in adult women and men. *J Hum Nutr Diet* **19**, 219–228.
55. Jang H-Y, Ahn J-W & Jeon M-K (2018) Factors affecting body image discordance amongst Korean adults aged 19–39 years. *Osong Public Health Res Perspect* **9**, 197.
56. Noh J-W, Kwon YD, Yang Y *et al.* (2018) Relationship between body image and weight status in east Asian countries: comparison between South Korea and Taiwan. *BMC Public Health* **18**, 814.
57. Bernstein M & Munoz N (2019) *Nutrition for the Older Adult*. London: Jones & Bartlett Learning.
58. Bainbridge D (2015) *Curvology: The Origins and Power of Female Body Shape*. New York: Abrams.
59. Barrett-Connor E, Edelstein SL, Corey-Bloom J *et al.* (1996) Weight loss precedes dementia in community-dwelling older adults. *J Am Geriatr Soc* **44**, 1147–1152.
60. Park D, Lee J-H & Han S (2017) Underweight: another risk factor for cardiovascular disease?: a cross-sectional 2013 behavioral risk factor surveillance system (BRFSS) study of 491,773 individuals in the USA. *Medicine (Baltimore)* **96**, e8769–e8769.
61. Kashubeck-West S & Huang H-H (2013) 12 social class relations with body image and eating disorders. In *The Oxford Handbook of Social Class in Counseling*, p. 197 [WM Liu, editor]. New York: Oxford University Press.
62. Moore ME, Stunkard A & Srole L (1962) Obesity, social class, and mental illness. *JAMA* **181**, 962–966.
63. Stice E, Maxfield J & Wells T (2003) Adverse effects of social pressure to be thin on young women: an experimental investigation of the effects of "fat talk". *Int J Eat Disord* **34**, 108–117.
64. Helfert S & Warschburger P (2011) A prospective study on the impact of peer and parental pressure on body dissatisfaction in adolescent girls and boys. *Body Image* **8**, 101–109.
65. Draper CE, Davidowitz KJ & Goedecke JH (2016) Perceptions relating to body size, weight loss and weight-loss interventions in black South African women: a qualitative study. *Public Health Nutr* **19**, 548–556.
66. Okop KJ, Mukumbang FC, Mathole T *et al.* (2016) Perceptions of body size, obesity threat and the willingness to lose weight among black South African adults: a qualitative study. *BMC Public Health* **16**, 365.
67. Holdsworth M, Gartner A, Landais E *et al.* (2004) Perceptions of healthy and desirable body size in urban Senegalese women. *Int J Obes Relat Metab Disord* **28**, 1561–1568.
68. Tlili F, Mahjoub A, Lefèvre P *et al.* (2008) Tunisian women's perceptions of desirable body size and chronic disease risk. *Ecol Food Nutr* **47**, 399–414.
69. Sabiston CM, Pila E, Vani M *et al.* (2019) Body image, physical activity, and sport: a scoping review. *Psychol Sport Exerc* **42**, 48–57.
70. Fernández-Bustos JG, Infantes-Paniagua Á, Cuevas R *et al.* (2019) Effect of physical activity on self-concept: theoretical model on the Mediation of body image and physical self-concept in adolescents. *Front Psychol* **10**, 1537.
71. Robinson E (2017) Overweight but unseen: a review of the underestimation of weight status and a visual normalization theory. *Obes Rev* **18**, 1200–1209.
72. Robinson E, Hunger JM & Daly M (2015) Perceived weight status and risk of weight gain across life in US and UK adults. *Int J Obes (Lond)* **39**, 1721–1726.
73. Robinson E, Sutin AR & Daly M (2018) Self-perceived overweight, weight loss attempts, and weight gain: evidence from two large, longitudinal cohorts. *Health Psychol* **37**, 940–947.
74. Daly M, Robinson E & Sutin AR (2017) Does knowing hurt? perceiving oneself as overweight predicts future physical health and well-being. *Psychol Sci* **28**, 872–881.
75. Haynes A, Kersbergen I, Sutin A *et al.* (2018) A systematic review of the relationship between weight status perceptions and weight loss attempts, strategies, behaviours and outcomes. *Obes Rev* **19**, 347–363.
76. Chun I, Ryu SY, Park J *et al.* (2014) The associations between discordance of body image and physical activities among adults aged 19 to 64 years: based on the data from 2010 community health survey. *Korean J Obes* **23**, 274–280.
77. Bhanji S, Khuwaja AK, Siddiqui F *et al.* (2011) Underestimation of weight and its associated factors among overweight and obese adults in Pakistan: a cross sectional study. *BMC Public Health* **11**, 363.
78. Amaro-Rivera K & Carbone ET (2019) Factors associated with underestimation of weight among adults living in Puerto Rico. *Int Quart Comm Health Educ* **40**, 185–191.
79. Choi J, Bender MS, Arai S *et al.* (2015) Factors associated with underestimation of weight status among Caucasian, Latino,

https://doi.org/10.1017/S1368980020003262 Published online by Cambridge University Press

Filipino, and Korean Americans: DiLH survey. *Ethn Dis* **25**, 200–207.
80. Farrell C, Lee M & Shafran R (2005) Assessment of body size estimation: a review. *Europ Eat Disord Rev: Prof J Eat Disord Assoc* **13**, 75–88.
81. McCabe RE, McFarlane T, Polivy J *et al.* (2001) Eating disorders, dieting, and the accuracy of self-reported weight. *Int J Eat Disord* **29**, 59–64.
82. Kim M & Lee H (2010) Overestimation of own body weights in female university students: associations with lifestyles, weight control behaviors and depression. *Nutr Res Pract* **4**, 499–506.
83. Park B, Cho HN, Choi E *et al.* (2019) Self-perceptions of body weight status according to age-groups among Korean women: a nationwide population-based survey. *PLoS One* **14**, e0210486.
84. Schieman S, Pudrovska T & Eccles R (2007) Perceptions of body weight among older adults: analyses of the intersection of gender, race, and socioeconomic status. *J Gerontol: Ser B* **62**, S415–S423.
85. Bhuiyan A, Gustat J, Srinivasan S *et al.* (2003) Differences in body shape representations among young adults from a biracial (Black-White), semirural community: the Bogalusa Heart Study. *Am J Epidemiol* **158**, 792–797.

Public Health Nutrition

https://doi.org/10.1017/S1368980020003262 Published online by Cambridge University Press