

The Association between Body Weight Misperception and Psychosocial Factors in Korean Adult Women Less than 65 Years Old with Normal Weight

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With society's increasing interest in weight control and body weight, we investigated the association between psychological factors and body image misperception in different age groups of adult Korean women with a normal weight. On a total of 4,600 women from the Korea National Health and Nutrition Examination Survey 2007-2009, a self-report questionnaire was used to assess body weight perception and 3 psychological factors: self-rated health status, stress recognition, and depressed mood. Through logistic regression analysis, a poor self-rated health status ($P = 0.001$) and a higher recognition of stress ($P = 0.001$) were significantly associated with body image misperception and this significance remained after controlling for several sociodemographic (Model 1: adjusted odds ratio [aOR], 1.62; 95% confidence interval [CI], 1.31-2.00), health behavior and psychological factors (Model 2: aOR, 1.59; 95% CI, 1.29-1.96; Model 3: aOR, 1.36; 95% CI, 1.01-1.84). Especially, highly stressed middle-aged (50-64 yr) women were more likely to have body image misperception (Model 2: aOR, 2.85; 95% CI, 1.30-6.26). However, the correlation between depressed mood and self-reported body weight was inconsistent between different age groups. In conclusion, self-rated health status and a high recognition rate of severe stress were related to body weight misperception which could suggest tailored intervention to adult women especially women in younger age or low self-rated health status or a high recognition rate of severe stress.

Keywords: Korean; Women; Psychological; Body Weight Misperception; Normal Weight

INTRODUCTION

Misperception of one's body weight occurs frequently in Korea and Japan, and it is likely caused by the impact of the mass media in both countries (1,2). Specifically, the mass media and the fashion industry promote a distorted perception of weight by conveying the idea that being thin is required for a woman to be considered beautiful or to be able to attract male attention (3). The mass media in these countries seems to have a particular powerful effect on image—for instance, Chinese adolescents are influenced more by the mass media from Korea, Japan, and Taiwan than by that from the United States or European countries (4). In addition, according to a report from England conducted with 18,512 university students from 22 countries, 63% of Japanese women considered themselves overweight (which was the highest percentage among the investigated countries). In addition, 77% of Korean women were trying to lose weight, and this was the largest percentage among the investigated countries (5). This same report also indicated that losing weight was all women's highest priority (5). These results suggest that there

is a substantial population of female students in both countries who are attempting weight control and that the number of women who have a misperception about their weight exceeds the actual number of overweight individuals (5).

The increase in the number of women of healthy weight who misperceive their weight as being higher than it is has become a serious problem (6-8). One reason is that body weight misperception affects weight control, which can lead to negative outcomes, such as inadequate nutritional intake, eating disorders, and further weight problems (6,9,10). These unhealthy weight-change behaviors can lead to serious medical situations (11) and even suicide (12-14).

Despite growing concerns regarding women's misperceptions of their weight and the negative impact on health status, there is a paucity of research on this issue. A little research that has been conducted has focused on the younger population (i.e., 20 yr and younger). Moreover, the recent increase in exposure to social media, easy access to incorrect information (e.g., online), growing concerns of the effect of weight on quality of life, and aspirations to remain young have resulted in body wei-

ght misperceptions among the adult population as well. Therefore, a study that focuses on the adult population is necessary (6-8). Previous studies have been conducted in the Korean population, but they only focused on adolescents (9), and certain psychological factors were not investigated. Knowledge of the psychological factors associated with body weight misperception will improve our understanding of the psychosocial aspects of body weight misperception and provide us with useful information for appropriate weight-management strategies. Thus, this study analyzed the association between body weight misperception and the psychological factors of self-rated health status, stress recognition, and depressed mood in normal-weight Korean women aged 20-65 yr using data from the Korea National Health and Nutrition Examination Survey 2007-2009 (KNHANES IV).

MATERIALS AND METHODS

Study population

The KNHANES is a national household survey that assesses comprehensive information on health status, health behaviors, health care utilization, and sociodemographic variables of a nationally representative sample (24,871 households). The KNHANES IV includes data from 2007 to 2009 and consists of four parts: a health interview survey, a health behavior survey, a health examination survey, and a nutrition survey.

We performed a cross-sectional analysis of data from women. We selected individuals between the ages of 19 and 65 yr in order to confine the study group to the adult population. Further, we included individuals who had a normal Body mass index (BMI) and excluded individuals who answered “don’t know” and “skinny” on the self-reported body weight questionnaire. This resulted in a final sample size of 4,600 women (Fig. 1).

Definition of body weight misperception

Body weight misperception was defined as a self-reported body weight that was inconsistent with the participant’s actual BMI. BMI was calculated by measured height and weight, so that if the BMI is between 18.5 and 25, it was defined as normal weight.

Previous studies on similar topics focused on either body weight satisfaction (3,5,12,14,15) in a psychological manner or on body weight perception (16,17) rated using a numeric scale, and not the combination of body weight and body weight perception. Thus, our definition of body weight misperception is a new approach to this topic. Body weight perception was assessed with one of the questions from KNHANES IV, “What do you think of your body?” The answer options of this question were “very underweight,” “slightly underweight,” “normal,” “slightly obese” and “very obese.” Women with a normal BMI (i.e., between 18.5 and 25) who responded “slightly obese” and “very obese” were classified as having a body weight misperception.

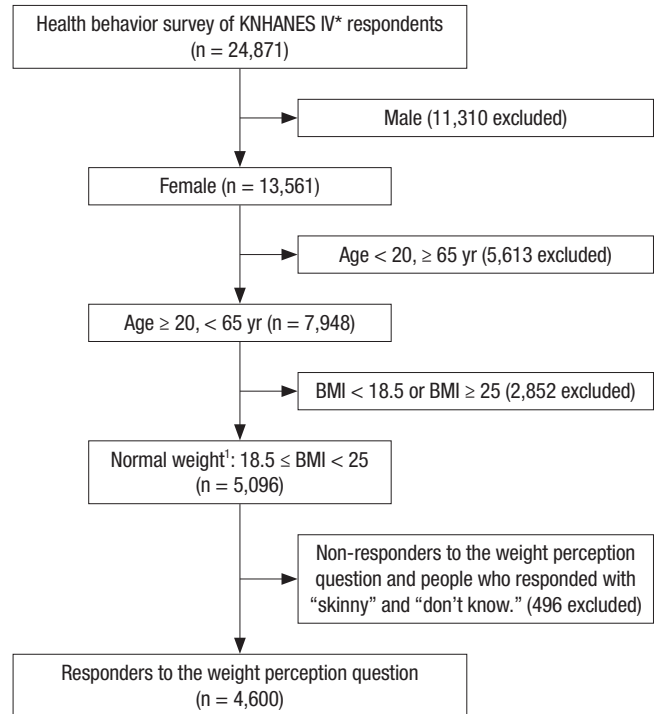


Fig. 1. The study population framework. *The 2007-2009 Korean National Health and Nutrition Examination Survey.

Psychosocial factors

We chose three psychological factors measured by the KNHANES IV that we predicted would be associated with body weight misperception: self-rated health status, stress recognition, and a current feeling of depression. Self-rated health status was assessed with the question, “What do you think of your health?” The response options included, “very good,” “good,” “middle,” “bad,” and “very bad.” We combined responses of “very good” and “good” into a “good” group and those of “bad” and “very bad” into “poor” group (i.e., for a total of three response categories: good, middle, and poor). Stress recognition was assessed with the question, “How much do you feel stressed?” The response options included, “very much,” “much,” “little,” and “hardly.” A current feeling of depression was assessed with the question, “Have you felt depressed within the last 2 weeks?” The response options were “yes” and “no.”

Statistical analysis

The dependent variable of interest was whether the participant had a body weight misperception, and the independent variables were the three psychological factors described above. Statistical analysis was performed using STATA® version 12.0. Descriptive methods were used to describe the general characteristics of the study population (Table 1). Data from the KNHANES IV questionnaire can be used to calculate the metabolic equivalent task minutes (MET-min), as defined by the International Physical Activity Questionnaire (IPAQ). Thus, we were

able to measure each participant's weekly amount of physical activity. Total physical activity MET-minutes/week = sum of Walking + Moderate + Vigorous METminutes/week scores (18).

We sought to find the relevance of each psychological factor to body weight misperception using the following steps (applied

to each factor). First, using univariate logistic regression analysis, we calculated the odds ratio and 95% confidence intervals for body weight misperception. Next, each factor was analyzed using multivariate logistic regression analysis in the following manner. Odds ratio was calculated in Model 1 with corrections

Table 1. Basic characteristics of study population (n = 4,600)

Characteristics	Whole population Number (%)	Body weight misperception: Number (%)		P for trend	
		No	Yes		
Sociodemographic factors					
Age (yr)	20-34	1,426 (42.7)	776 (28.8)	650 (34.0)	< 0.001
	35-49	1,964 (26.3)	1,150 (42.8)	814 (42.6)	
	50-64	1,210 (31.0)	763 (28.4)	447 (23.4)	
Residence*	Capital city	1,216 (26.4)	719 (26.7)	497 (26.0)	0.991
	Metropolitan	980 (21.3)	543 (20.2)	437 (22.9)	
	Town or city	2,404 (52.3)	1,427 (53.1)	977 (51.1)	
Household income [†]	Lowest third	461 (10.0)	299 (11.1)	162 (8.5)	0.060
	Middle third	2,541 (55.2)	1,475 (54.9)	1,066 (55.8)	
	Highest third	1,516 (33.0)	864 (32.1)	652 (34.1)	
	No response	82 (1.8)	51 (1.9)	31 (1.6)	
Education	≤ Elementary school	632 (13.7)	425 (15.8)	207 (10.8)	0.774
	Middle/high school	2,475 (53.8)	1,414 (52.6)	1,061 (55.5)	
	≥ College	1,490 (32.4)	848 (31.5)	642 (33.6)	
	Unknown	3 (0.1)	2 (0.1)	1 (0.1)	
Marital status [‡]	Married, with spouse	3,443 (74.8)	1,997 (74.3)	1,446 (75.7)	0.651
	Married, without spouse	450 (9.8)	286 (10.6)	164 (8.6)	
	Not married	699 (15.2)	400 (14.9)	299 (15.6)	
	Unknown	8 (0.2)	6 (0.2)	2 (0.1)	
Occupation [§]	White collar	957 (20.8)	559 (20.8)	398 (20.8)	0.279
	Blue collar	1,393 (30.3)	862 (32.0)	531 (27.8)	
	Unemployed (housewife, student, etc.)	1,815 (39.5)	1,016 (37.8)	799 (41.8)	
	No response	435 (9.4)	252 (9.4)	183 (9.6)	
General health status					
Self-rated health status	Good	1,912 (41.6)	1,151 (42.8)	761 (39.8)	< 0.001
	Middle	1,839 (40.0)	1,099 (40.9)	740 (38.7)	
	Poor	847 (18.4)	437 (16.2)	410 (21.5)	
	Unknown	2 (0.0)	2 (0.1)		
Health behavior					
Frequency of drinking	Never	1,351 (29.4)	834 (31.0)	517 (27.0)	0.001
	1/month	1,777 (38.6)	1,053 (39.2)	724 (37.9)	
	2-4/month	994 (21.6)	558 (20.7)	436 (22.8)	
	2-3 times/week	390 (8.5)	199 (7.4)	191 (10.0)	
	More than 4 times/week	88 (1.9)	45 (1.7)	43 (2.3)	
Smoker	No	4,067 (88.4)	2,397 (89.1)	1,670 (87.4)	0.671
	Yes	279 (6.1)	146 (5.4)	133 (7.0)	
	Former	254 (5.5)	146 (5.4)	108 (5.6)	
Exercise (MET-min)	≤ 600	1,206 (26.2)	725 (27.0)	481 (25.2)	0.425
	601-2,999	1,626 (35.4)	908 (33.7)	718 (37.6)	
	≥ 3,000	1,059 (23.0)	629 (23.4)	430 (22.5)	
	No response	709 (15.4)	427 (15.9)	282 (14.7)	
Mental status					
Stress recognition	Hardly	511 (11.1)	339 (12.6)	172 (9.0)	< 0.001
	Little	2,725 (59.2)	1,626 (60.5)	1,099 (57.5)	
	Much	1,139 (24.8)	621 (23.1)	518 (27.1)	
	Very much	225 (4.9)	103 (3.8)	122 (6.4)	
Depressed mood	No	3,859 (83.9)	2,262 (84.1)	1,597 (83.6)	0.061
	Yes	741 (16.1)	427 (15.9)	314 (16.4)	

*There are 7 metropolitan areas in Korea: the remaining areas were defined as either town or country; [†]Household income was defined as household income divided by the square root of the number of people in the household; [‡]Without spouse" includes participants who were divorced or whose spouse had died; [§]White collar" includes managers, professionals, and office workers. "Blue collar" includes people in service areas, business sales, technicians, manual laborers, and people working in the agriculture, forestry, and fishing industries. MET, The Metabolic Equivalent of Task.

for each psychological factor and for the sociodemographic factors of education, residence, household income, occupation, and marital status. In Model 2, further corrections for health behavior factors (drinking alcohol, smoking, physical activity, and hours spent sleeping) were made. In Model 3, odds ratio was calculated with a correction for each psychological factor, sociodemographic factors, health behavior factors, and other psychological factors, such as suicide ideation. For factors with multiple choices on the questionnaire (e.g., self-rated health status and stress recognition), *P* values for trend were also calculated in each model. The significance level was set at $P < 0.05$. Every analysis was performed with the “svy” command. “svy” command which can be also called as estimation commands for survey data is performed by applying sampling weights, as this can take multiple variables into account and simultaneously enhance the reliability and representativeness of the study population.

Ethics statement

As the survey data analyzed are publicly available, this study was exempted from review by the institutional review board of

Seoul National University Bundang Hospital.

RESULTS

The general characteristics of the study population are summarized in Table 1. Across the different age groups, 45.6% of women 20-34 yr, 41.5% of women 35-49 yr, and 36.9% of women 50-64 yr were classified as having a body weight misperception. The percentage of having body weight misperception significantly increased as the participants' age decreased ($P < 0.001$), self-rated health status lowered, ($P < 0.001$), and stress recognition increased ($P < 0.001$).

Self-rated health status and body weight misperception

Response rate for self-rated health status was 99.96% (4,598/4,600). Table 2 shows that self-rated health status was associated with body weight misperception. As self-reported health status worsened, body weight misperception increased ($P < 0.001$). Although this trend was not significant in Models 3, participants in the poor health status group had higher odds ratio for body weight misperception than did those in the good health status

Table 2. Associations between self-rated health status and body weight misperception by age

Misperception by age	Self-rated health status			<i>P</i> value
	Good	Middle	Poor	
Entire sample (n = 4,600)				
Proportion (%)	39.2	40.9	49.0	
OR (95% CI)				
Unadjusted	1 (ref)	1.07 (0.92-1.26)	1.49 (1.22-1.82)*	< 0.001
Model 1	1 (ref)	1.12 (0.95-1.33)	1.62 (1.31-2.00)*	< 0.001
Model 2	1 (ref)	1.10 (0.93-1.31)	1.59 (1.29-1.96)*	< 0.001
Model 3	1 (ref)	0.97 (0.76-1.22)	1.36 (1.01-1.84)*	0.108
20-34 yr old (n = 1,426)				
Proportion (%)	41.7	44.2	56.8	
OR (95% CI)				
Unadjusted	1 (ref)	1.11 (0.84-1.46)	1.84 (1.23-2.75)*	0.010
Model 1	1 (ref)	1.12 (0.84-1.49)	1.62 (1.07-2.46)*	0.032
Model 2	1 (ref)	1.06 (0.79-1.42)	1.50 (1.00-2.26)*	0.086
Model 3	1 (ref)	0.89 (0.58-1.35)	1.40 (0.78-2.49)	0.518
35-49 yr old (n = 1,964)				
Proportion (%)	37.5	41.1	49.6	
OR (95% CI)				
Unadjusted	1 (ref)	1.16 (0.91-1.48)	1.64 (1.20-2.24)*	0.003
Model 1	1 (ref)	1.15 (0.89-1.47)	1.72 (1.24-2.40)*	0.003
Model 2	1 (ref)	1.08 (0.84-1.39)	1.68 (1.21-2.34)*	0.006
Model 3	1 (ref)	0.99 (0.69-1.43)	1.47 (0.92-2.35)	0.192
50-64 yr old (n = 1,210)				
Proportion (%)	37.3	34.1	42.3	
OR (95% CI)				
Unadjusted	1 (ref)	0.87 (0.62-1.22)	1.23 (0.86-1.77)	0.304
Model 1	1 (ref)	0.95 (0.66-1.37)	1.33 (0.92-1.93)	0.157
Model 2	1 (ref)	0.90 (0.61-1.31)	1.31 (0.89-1.92)	0.210
Model 3	1 (ref)	0.92 (0.56-1.51)	1.27 (0.73-2.19)	0.445

“OR” refers to odds ratio and “CI” refers to confidence interval. Model 1 was adjusted for self-rated health status and sociodemographic factors (education, residence, household income, occupation, and marital status). Model 2 was adjusted for self-rated health status, sociodemographic factors, health behavior factors (frequency of drinking, smoking, physical activity [defined as MET-min], and hours spent sleeping). Model 3 was adjusted for self-rated health status, sociodemographic factors, health behavior factors, and other psychological factors (stress recognition, depressed mood, and suicide ideation). * $P < 0.05$.

Table 3. Associations between stress recognition and body weight misperception by age

Misperception by age	Stress recognition				P
	Hardly	Little	Much	Very much	
Entire sample (n = 4,600)					
Proportion (%)	31.6	40.5	44.7	59.3	
OR (95% CI)					
Unadjusted	1 (ref)	1.47 (1.15-1.88)*	1.74 (1.33-2.29)*	3.15 (2.12-4.69)*	< 0.001
Model 1	1 (ref)	1.20 (0.92-1.56)	1.67 (1.25-2.22)*	2.88 (1.89-4.38)*	< 0.001
Model 2	1 (ref)	1.25 (0.96-1.62)	1.71 (1.28-2.27)*	2.92 (1.91-4.45)*	< 0.001
Model 3	1 (ref)	0.89 (0.61-1.29)	1.24 (0.82-1.88)	2.10 (1.13-3.90)*	0.004
20-34 yr old (n = 1,426)					
Proportion (%)	37.7	42.8	44.8	68.7	
OR (95% CI)					
Unadjusted	1 (ref)	1.23 (0.75-2.03)	1.34 (0.80-2.26)	3.63 (1.68-7.87)*	0.003
Model 1	1 (ref)	0.79 (0.48-1.32)	1.13 (0.66-1.92)	2.63 (1.18-5.87)*	0.002
Model 2	1 (ref)	0.84 (0.50-1.42)	1.16 (0.67-2.00)	2.76 (1.24-6.13)*	0.003
Model 3	1 (ref)	0.64 (0.32-1.28)	0.87 (0.41-1.84)	1.54 (0.51-4.68)	0.258
35-49 yr old (n = 1,964)					
Proportion (%)	30.5	40.0	47.0	52.3	
OR (95% CI)					
Unadjusted	1 (ref)	1.52 (1.03-2.23)*	2.03 (1.33-3.10)*	2.51 (1.36-4.62)*	< 0.001
Model 1	1 (ref)	1.35 (0.90-2.02)	2.03 (1.31-3.16)*	2.74 (1.44-5.20)*	< 0.001
Model 2	1 (ref)	1.35 (0.91-1.99)	1.96 (1.27-3.01)*	2.63 (1.39-4.98)*	< 0.001
Model 3	1 (ref)	0.84 (0.47-1.51)	1.41 (0.73-2.71)	2.15 (0.81-5.67)	0.018
50-64 yr old (n = 1,210)					
Proportion (%)	27.9	37.7	39.3	53.5	
OR (95% CI)					
Unadjusted	1 (ref)	1.56 (1.03-2.38)*	1.68 (1.02-2.74)*	2.97 (1.49-5.92)*	0.004
Model 1	1 (ref)	1.68 (1.06-2.66)*	2.05 (1.21-3.48)*	3.32 (1.60-6.88)*	0.001
Model 2	1 (ref)	1.50 (0.95-2.38)	1.88 (1.11-3.17)*	2.85 (1.30-6.26)*	0.003
Model 3	1 (ref)	1.54 (0.81-2.92)	1.53 (0.70-3.33)	2.12 (0.72-6.23)	0.205

* $P < 0.05$. "OR" refers to odds ratio and "CI" refers to confidence interval. Model 1 was adjusted for stress recognition and sociodemographic factors (education, residence, household income, occupation, and marital status). Model 2 was adjusted for stress recognition, sociodemographic factors, health behavior factors (frequency of drinking, smoking, physical activity [defined as MET-min], and hours spent sleeping). Model 3 was adjusted for stress recognition, sociodemographic factors, health behavior factors, and other psychological factors (self-rated health status, depressed mood, and suicide ideation).

group (Model 1: adjusted odds ratio [aOR], 1.62; 95% confidence interval [CI], 1.31-2.00; Model 2: aOR, 1.59; 95% CI, 1.29-1.96; Model 3: aOR, 1.36; 95% CI, 1.01-1.84). In the age-specific analysis, participants aged 20-34 and 35-49 yr showed similar results to the general population. Self-rated health status for those aged 50-64 yr, however, was not significantly related to body weight misperception.

Stress recognition and body weight misperception

Response rate for stress recognition was 100% (4,600/4,600). Table 3 shows the association between stress recognition and body weight misperception. In the overall population, participants who had greater stress recognition were more likely to have body weight misperception ($P < 0.001$), and this remained significant in the multivariable-adjusted Models 1-3 ($P < 0.001$, $P < 0.001$, and $P = 0.004$, respectively). In the age-specific analysis, similar results were seen in participants aged 35-49 and 50-64 yr. Among all age groups, the association between stress recognition and body weight misperception was significant in the unadjusted analysis ($P = 0.003$, $P < 0.001$, and $P = 0.004$ for the 20-34, 35-49, and 50-64 yr groups, respectively). This associ-

ation was also significant for Models 1 ($P = 0.002$, $P < 0.001$, and $P = 0.001$, respectively) and 2 ($P < 0.001$, $P = 0.003$, and $P = 0.003$, respectively), but not for Model 3.

Depressed mood and body weight misperception

Response rate for depressed mood within 2 weeks was 100% (4,600/4,600). There was a slight association between depressed mood and body weight misperception in Models 1 and 2 (Model 1: aOR, 1.30; 95% CI, 1.06-1.59; Model 2: aOR, 1.23; 95% CI, 1.00-1.51; Table 4). In particular, participants aged 20-34 yr with a depressed mood during the previous 2 weeks were likely to have a body weight misperception (Model 1: aOR, 1.82; 95% CI, 1.25-2.66; Model 2: aOR, 1.62; 95% CI, 1.12-2.34). However, individuals aged 50-64 yr with a depressed mood were less likely to suffer from a body weight misperception in Model 2 (aOR, 0.55; 95% CI, 0.29-1.01).

DISCUSSION

This was the first study to investigate body weight misperception and its associated factors in a nationally representative sam-

Table 4. Associations between depressed mood and body weight misperception by age

Misperception by age	Feeling depressed	
	No	Yes
Entire sample (n = 4,600)		
Proportion (%)	40.8	45.5
OR (95% CI)		
Unadjusted	1 (ref)	1.21 (0.99-1.48)
Model 1	1 (ref)	1.30 (1.06-1.59)*
Model 2	1 (ref)	1.23 (1.00-1.51)*
Model 3	1 (ref)	0.88 (0.63-1.21)
20-34 yr old (n = 1,426)		
Proportion (%)	42.4	55.3
OR (95% CI)		
Unadjusted	1 (ref)	1.68 (1.16-2.44)*
Model 1	1 (ref)	1.82 (1.25-2.66)*
Model 2	1 (ref)	1.62 (1.12-2.34)*
Model 3	1 (ref)	1.19 (0.66-2.12)
35-49 yr old (n = 1,964)		
Proportion (%)	40.6	44.0
OR (95% CI)		
Unadjusted	1 (ref)	1.15 (0.84-1.57)
Model 1	1 (ref)	1.10 (0.80-1.51)
Model 2	1 (ref)	1.05 (0.76-1.46)
Model 3	1 (ref)	0.94 (0.55-1.59)
50-64 yr old (n = 1,210)		
Proportion (%)	38.3	33.9
OR (95% CI)		
Unadjusted	1 (ref)	0.83 (0.58-1.17)
Model 1	1 (ref)	1.04 (0.72-1.49)
Model 2	1 (ref)	1.02 (0.69-1.50)
Model 3	1 (ref)	0.55 (0.29-1.01)

“OR” refers to odds ratio and “CI” refers to confidence interval. Model 1 was adjusted for depressed mood and sociodemographic factors (education, residence, household income, occupation, and marital status). Model 2 was adjusted for depressed mood, sociodemographic factors, health behavior factors (frequency of drinking, smoking, physical activity [defined as MET-min], and hours spent sleeping). Model 3 was adjusted for depressed mood, sociodemographic factors, health behavior factors, and other psychological factors (self-rated health status, stress recognition, and suicide ideation). * $P < 0.05$.

ple of adult Korean women from diverse age groups. We found that poor self-rated health status and severe stress recognition were positively related to body weight misperception; in contrast, feeling depressed had a weaker association with body weight misperception than did the other psychological factors.

According to previous studies, body weight misperception is a serious problem in younger females, such as adolescents and university students. Previous studies which studied the misperception within the population of adolescents and university students demonstrated that girls who overestimate their body weight are more likely to choose unhealthy dieting methods such as skipping meals, taking laxatives or diet pills, self-induced vomiting, and also likely to have severe eating disorder, suicidal thoughts and behavior (1,6). In this context, comprehensive study on the body weight misperception among the adult population has been strongly needed as the connections of body weight misperception with the harmful behaviors as above could appear in such population.

Several previous studies related to body weight perception conducted with western populations found no difference in body weight dissatisfaction between age groups (19,20). In our study, approximately half of the participants older than 20 yr exhibited body weight misperception; and we found that body weight misperception differs between different age groups. The proportion of participants with a misperception decreased as the age of participants increased. With this result, our study extends previous studies on body weight misperception of young women to older women.

Until recently, little was known about body weight misperception in middle-aged Korean women (i.e., the so-called “baby boomers”). However, such misperceptions in this population are important because a majority of these women are parents who can influence their children’s perceived body weight. The middle-aged population in Korean society has had substantial exposure to the mass media. As a result, this generation has seen an increase in the number of women who are trying to control their weight and maintain their youthfulness. In addition, members of this generation are showing a growing interest in their own well-being later in life (6-8). Therefore, it is not surprising that members of this generation are also likely to exhibit body weight misperception.

Although a substantial number (i.e., more than one-third) of middle-aged women had body weight misperception, this number is relatively lower than that observed for younger generations. One possible explanation is that women reappraise their criteria of the ideal body weight as a result of facing biological limitations in achieving that weight (19,20). In addition, the older generation may have had less social pressure to be thin because the mass media’s idealized standard for feminine beauty as a thin body began after the 1960s (10,22). Furthermore, when assessing their body weight, the older generation tends to think more highly of physical functionality than of appearance. A final potential explanation is that members of the older generation have lost interest in weight and body weight as an index of beauty (23) because they have a deepened sense of self-worth as a result of their life experiences, and they feel less sexually objectified (21,22).

Our study showed that self-rated health status was significantly associated with body weight misperception, regardless of age. This result is consistent with previous studies on adolescents (24), college students (25), and adults (26). When the analysis was repeated after stratifying by age, we found that this association became weaker as age increased. One possible explanation is that younger individuals tend to establish a link between body shape and health status. In addition, older people may regard physical functionality as a more important health assessment index than appearance when they evaluate their body (23).

In participants aged 20-35 yr, the multivariate models (Models 1-4) showed weaker associations than the unadjusted mod-

el. Given that Models 1-3 were initially adjusted for sociodemographic factors, these factors could mediate the association between self-rated health status and self-reported body weight. This result is reasonable considering that previous studies have reported that low socioeconomic status and poor parental or peer relationships were significantly related to body dissatisfaction and unhealthy weight-control behaviors (9,15). This idea would be strengthened by additional research showing that low education levels, low income, and poor familial relationships are positively related to poor self-rated health status (27).

In the current study, participants who indicated that they felt a high stress level had higher odds of having a body weight misperception. This is consistent with previous studies conducted with adolescents (28,29). In addition, a longitudinal study by Murray et al. (30) showed that stress significantly predicted body dissatisfaction one year later, due to a loss of self-esteem and an increase in body importance.

Interestingly, the association between stress recognition and body weight misperception was most prominent among individuals aged 50-64 yr. There are two possible explanations for this result. First, Korean women in their 50s are diagnosed with severe stress and adjustment disorders more often than any other age group (398 people per 1 billion) (31). The primary cause of this stress is menopause. During menopause, women experience declining hormone levels and loss of muscle mass, which can lead to difficulty in managing weight, and thus a negative assessment of body weight (32,33). Moreover, body weight changes could be threatening to women because they represent a decline in physical appearance and sexual attractiveness. This situation may induce body weight misperception in a way similar to what teenagers in puberty experience (34-36).

Similar to other studies that have reported that depression and body weight misperception are positively associated (37,38), our study showed a significant correlation between those two variables in the general population. The results of the age-specific analysis showed that this result also held for individuals in the 20-34 yr age group, but not for individuals in the other age groups. One possible explanation is that young individuals are more likely to establish a link between being depressed and body weight perception, just as has been found in the adolescent population (39).

One unexpected finding was that having a depressed mood was associated with a lower odds ratio for body weight misperception in individuals aged 50-64 yr. This result must be interpreted with caution because it is inconsistent with previous results with different age groups (37-39). Also more studies on correlation between body weight misperception and depression based on older women population are needed to analyze and interpret our result comprehensively. Thus, additional research is needed to confirm this finding.

This study has several limitations. First, a cross-sectional study

design cannot clearly reveal the cause-and-effect relationships between the psychological factors and body weight misperception. Therefore, further research is necessary to investigate the potential explanations suggested by the current results which can confirm these relationships in further details. Second, there are other factors that may be related to both body weight misperception and psychological distress that were not considered in the present study, such as the presence of an eating disorder or anxiety. Third, study population included overweight population having BMI value within the range of 23-25 kg/m² which could possibly weaken the significances of the factors we studied (40). However, we also measured *P* value and the factors we examined above excluding overweight population (*n* = 2,992) and the result showed a consistency in outcome along with the original result (Data not shown). Finally, because this study was based on the Korean population, the results cannot be generalized to women of other countries, races, and cultures. Despite these limitations, our study is important because it is the first to investigate body weight misperception and its associated factors in a nationally representative sample of Korean women among diverse age groups.

In conclusion, the percentage of Korean women with body weight misperceptions was substantially high compared to prior research targeting the adolescent population. In the age-specific analysis, younger participants were more likely to exhibit body weight misperception than were older participants. Moreover, poor self-rated health status and severe stress recognition, but not depressed mood, were associated with body weight misperception. Thus, in order to prevent and minimize the possible harmful effect of body weight misperception on inadequate diet and health practices, interventions to reduce the body weight misperception should be made to adult women throughout the age. Especially target interventions to young normal weight women with low self-rated health status or a high recognition rate of severe stress are needed. Possible interventions are to adopt education program, counseling, present healthy body image through mass media campaign to obtain the better understanding of healthy weight status and diet and prevent the possible risks unhealthy diet and behaviors (2,3). Additional research is required in order to confirm these findings.

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DISCLOSURE

The authors have no conflicts of interest to disclose.

AUTHOR CONTRIBUTION

Study concept and design of article: Choi YH, Park SM. Data collection and analysis: Choi YH, Choi EJ, Shin DS, Lee K. Writing draft: Choi YH, Lee K. Revision: Choi EJ, Shin DS, Park SM, Lee K. Approval of final manuscript and agreement of submission: Choi YH, Choi EJ, Shin DS, Park SM, Lee K.

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REFERENCES

- Lim H, Wang Y. *Body weight misperception patterns and their association with health-related factors among adolescents in South Korea. Obesity (Silver Spring) 2013; 21: 2596-603.*
- Sakamaki R, Amamoto R, Mochida Y, Shinfuku N, Toyama K. *A comparative study of food habits and body shape perception of university students in Japan and Korea. Nutr J 2005; 4: 31.*
- Yahia N, El-Ghazale H, Achkar A, Rizk S. *Dieting practices and body image perception among Lebanese university students. Asia Pac J Clin Nutr 2011; 20: 21-8.*
- Xie B, Chou CP, Spruijt-Metz D, Reynolds K, Clark F, Palmer PH, Galaher P, Sun P, Guo Q, Johnson CA. *Weight perception and weight-related sociocultural and behavioral factors in Chinese adolescents. Prev Med 2006; 42: 229-34.*
- Wardle J, Haase AM, Steptoe A. *Body image and weight control in young adults: international comparisons in university students from 22 countries. Int J Obes (Lond) 2006; 30: 644-51.*
- Marshall C, Lengyel C, Utioh A. *Body dissatisfaction among middle-aged and older women. Can J Diet Pract Res 2012; 73: e241-e7.*
- Biggs S, Phillipson C, Leach R, Money A-M. *The mature imagination and consumption strategies: age & generation in the development of a United Kingdom baby boomer identity. Int J Age Later Life 2008; 2: 31-59.*
- Howarton R, Lee B. *Market analysis of fit preferences of female boomers. Fashion Market Manag 2010; 14: 219-29.*
- Lee K. *Weight-related behaviors among non-overweight adolescents: results from the Korean national survey from 2005 to 2007. Asia Pac J Clin Nutr 2012; 21: 215-9.*
- Garner DM, Garfinkel PE, Schwartz D, Thompson M. *Cultural expectations of thinness in women. Psychol Rep 1980; 47: 483-91.*
- Lee S. *How abnormal is the desire for slimness? A survey of eating attitudes and behaviour among Chinese undergraduates in Hong Kong. Psychol Med 1993; 23: 437-51.*
- Verplanken B, Velsvik R. *Habitual negative body image thinking as psychological risk factor in adolescents. Body Image 2008; 5: 133-40.*
- Kim DS, Kim HS, Cho Y, Cho SI. *The effects of actual and perceived body weight on unhealthy weight control behaviors and depressed mood among adult women in Seoul, Korea. J Prev Med Public Health 2008; 41: 323-30.*
- Brausch AM, Muehlenkamp JJ. *Body image and suicidal ideation in adolescents. Body Image 2007; 4: 207-12.*
- Kim DS. *Body image dissatisfaction as an important contributor to suicidal ideation in Korean adolescents: gender difference and mediation of parent and peer relationships. J Psychosom Res 2009; 66: 297-303.*
- Kim DS, Cho Y, Cho SI, Lim IS. *Body weight perception, unhealthy weight control behaviors, and suicidal ideation among Korean adolescents. J Sch Health 2009; 79: 585-92.*
- Odono A, Gallus S, Lugo A, Zuccaro P, Colombo P, Bosetti C, La Vecchia C, Galeone C. *Weight perception among Italian adults, 2006-2010. Eur J Cancer Prev 2014; 23: 141-6.*
- IPAQ Research Committee. *Guidelines for data processing and analysis of the International Physical Activity Questionnaire (IPAQ): short and long forms (November 2005). 2005. Available at <http://www.ipaq.ki.se> [accessed on 5 May 2015].*
- Siegel I. *Does body weight dissatisfaction change with age? A cross-sectional analysis of American women. New School Psychol Bull 2009; 7: 42-50.*
- Webster J, Tiggemann M. *The relationship between women's body satisfaction and self-image across the life span: the role of cognitive control. J Genet Psychol 2003; 164: 241-52.*
- Tiggemann M. *Body image across the adult life span: stability and change. Body Image 2004; 1: 29-41.*
- Peat CM, Peyerl NL, Muehlenkamp JJ. *Body image and eating disorders in older adults: a review. J Gen Psychol 2008; 135: 343-58.*
- Reboussin BA, Rejeski WJ, Martin KA, Callahan K, Dunn AL, King AC, Sallis JF. *Correlates of satisfaction with body function and body appearance in middle- and older aged adults: the activity counseling trial (ACT). Psychol Health 2000; 15: 239-54.*
- Xie B, Liu C, Chou CP, Xia J, Spruijt-Metz D, Gong J, Li Y, Wang H, Johnson CA. *Weight perception and psychological factors in Chinese adolescents. J Adolesc Health 2003; 33: 202-10.*
- Kim MJ, Lim YR, Kwak HK. *Dietary behaviors and body image recognition of college students according to the self-rated health condition. Nutr Res Pract 2008; 2: 107-13.*
- Herman KM, Hopman WM, Rosenberg MW. *Self-rated health and life satisfaction among Canadian adults: associations of perceived weight status versus BMI. Qual Life Res 2013; 22: 2693-705.*
- Xu J, Zhang J, Feng L, Qiu J. *Self-rated health of population in Southern China: association with socio-demographic characteristics measured with multiple-item self-rated health measurement scale. BMC Public Health 2010; 10: 393.*
- Murray KM, Byrne DG, Rieger E. *Investigating adolescent stress and body image. J Adolesc 2011; 34: 269-78.*
- Marcotte D, Fortin L, Potvin P, Papillon M. *Gender differences in depressive symptoms during adolescence role of gender-typed characteristics, self-esteem, body image, stressful life events, and pubertal status. J Emot Behav Disord 2002; 10: 29-42.*
- Murray K, Rieger E, Byrne D. *A longitudinal investigation of the mediating role of self-esteem and body importance in the relationship between stress and body dissatisfaction in adolescent females and males. Body Image 2013; 10: 544-51.*
- A press release. *National Health Insurance Service Health insurance re-*

- search Institute. Available at <http://stat.mu.go.kr/front/notice/statPress-ReleaseView.jsp?menuId=31&bbsSeq=4&nttSeq=18899&nPage=30&searchKey=&searchWord=&sttsDataSeq=> [accessed on 23 July 2012].
32. Deeks AA, McCabe MP. Menopausal stage and age and perceptions of body image. *Psychol Health* 2001; 16: 367-79.
 33. Deeks AA, McCabe MP. Sexual function and the menopausal woman: the importance of age and partner's sexual functioning. *J Sex Res* 2001; 38: 219-25.
 34. Lewis DM, Cachelin FM. Body image, body dissatisfaction, and eating attitudes in midlife and elderly women. *Eat Disord* 2001; 9: 29-39.
 35. Dillaway HE. (Un)Changing menopausal bodies: how women think and act in the face of a reproductive transition and gendered beauty ideals. *Sex Roles* 2005; 53: 1-17.
 36. McKinley NM, Lyon LA. Menopausal attitudes, objectified body consciousness, aging anxiety, and body esteem: European American women's body experiences in midlife. *Body Image* 2008; 5: 375-80.
 37. Guinn B, Semper T, Jorgensen L, Skaggs S. Body image perception in female Mexican-American adolescents. *J Sch Health* 1997; 67: 112-5.
 38. Keel PK, Mitchell JE, Davis TL, Crow SJ. Relationship between depression and body dissatisfaction in women diagnosed with bulimia nervosa. *Int J Eat Disord* 2001; 30: 48-56.
 39. Al Mamun A, Cramb S, McDermott BM, O'Callaghan M, Najman JM, Williams GM. Adolescents' perceived weight associated with depression in young adulthood: a longitudinal study. *Obesity (Silver Spring)* 2007; 15: 3097-105.
 40. Pan WH, Yeh WT. How to define obesity? Evidence-based multiple action points for public awareness, screening, and treatment: an extension of Asian-Pacific recommendations. *Asia Pac J Clin Nutr* 2008; 17: 370-4.