

### Gender Differences in Body Image Misperception According to Body Mass Index, Physical Activity, and Health Concern among Korean University Students

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#### ABSTRACT

##### Background and Objective

The purpose of this study was to investigate the gender differences in body image misperception, analyzed according to the body-mass index (BMI), physical activity, and health concern among Korean university students.

##### Material and Methods

Three-hundred-and-thirty-nine students participated. Body image misperception was examined through data on subjective body image perception and differences in the measured BMI.

##### Results

A total of 45.9% of the male students perceived their body shape measurements to be lower and 18.9% of the female students perceived them to be higher than the actual values. Body image misperception, according to the BMI, significant differences by gender were observed in the underweight ( $p < .045$ ), standard weight ( $p < .000$ ), and overweight groups ( $p < .000$ ). For body image misperception, according to the amount of physical activity, significant differences by gender were observed in the inactivity ( $p < .001$ ), minimum activity ( $p < .000$ ), and health-enhancing activity groups ( $p < .000$ ); significant differences by gender were also observed in the low health concern ( $p < .000$ ) and high health concern groups ( $p < .000$ ). **Conclusion** The prevalence of body image misperception was high, and the degree of misperception varies by gender. Therefore, educational efforts to reduce instances of body image misperception are needed for healthy weight management, and these efforts should take into consideration the gender differences.

**Key words:** *body image misperception; body-mass index; health concern; physical activity*

The prevalence of overweight and obesity both epidemics is steadily on the rise, and obesity, in particular, is perceived as a major public health concern, worldwide<sup>1</sup>. According to a report published by the Korea Centers for Disease Control and Prevention (KCDC), 32.8% of adults (36.1% of men, 29.7% of women) were found to be obese, when the World Health Organization (WHO) Western Pacific Regional Office (WPRO) obesity standard (body mass index [BMI]  $\geq 25$ ) was applied. The prevalence of obesity is gradually increasing in Korea as well. Obesity is not only associated with chronic diseases such as heart disease and diabetes,<sup>2</sup> but also with intense feelings of dissatisfaction with one's own body, low self-esteem, and social stigma.<sup>3</sup> These factors may negatively affect both the physical and psychological condition of an individual; therefore, efforts must be taken to reduce the prevalence of obesity.

The self-perception of body image is a major determinant of having healthy diet habits, and engaging in physical activities, for successful weight management. In other words, individuals who think they are obese are likelier to participate in weight loss activities, while those who do not perceive themselves as obese will not participate in such activities.<sup>4</sup> Therefore, having a realistic body image perception is indispensable for the maintenance of good health. In previously conducted studies, body image perception was found to be influenced by various factors such as socio-demographic factors (gender; age, and country), perceived stressors, nutritional behaviours, as well as social support and satisfaction with the social support.<sup>5</sup> Having a lean physique is portrayed as desirable in a woman, by fashion magazines and the media, and is recognized as a prerequisite for attracting the attention of men.<sup>6,7</sup> Unfortunately, the desire to have a slim physique exerts a great amount of pressure on female students. Along with this comes the desire to constantly lose weight; this can lead to unhealthy dietary behaviours.<sup>8</sup> Several previously conducted studies have focused on body image perception in women; however, few studies have focused on men.

The overall health of college students, who are just out of adolescence, is easily damaged by unhealthy behaviours and habits.<sup>9</sup> In addition, college students in Korea experience sudden freedom and independence

from the restrained life they lead until that point.<sup>10</sup> Previously conducted studies indicate that only 44% of college students meet physical activity recommendations, against the 68% of high school students.<sup>11</sup> Therefore, investigating the self-perception of body image of college students, to identify the factors that promote good weight management practices in young students, could be meaningful. Although some studies have investigated body image perception in the general population, no study till date has investigated body image perception among college students, in Korea, using the guidelines on obesity published by the WHO WPRO.

The purpose of this study was to investigate the body image misperception resulting from differences in the measured and perceived BMI. Differences in the body image misperception were then analyzed according to the BMI, physical activity status, and health concern among Korean university students.

## MATERIALS AND METHODS

### *Participants*

The sample included 339 university students from the D University, in Korea. Participants comprised 122 men and 217 women, and their general characteristics are presented in Table 1. All participants were clearly informed of the purpose and contents of this study, and written consent was obtained. All procedure of this research conducted in agreement with the Declaration of Helsinki

### BODY COMPOSITION

Body composition tests were conducted for five days, in the mornings. The height, weight, BMI, body fat percentage, and fat mass were measured using the Venus 5.5 body composition analyzer (Korea). BMI was calculated using WPRO criteria (underweight:  $<18.5 \text{ kg/m}^2$ , standard weight: 18.5 to  $22.9 \text{ kg/m}^2$ , overweight: 23.0 to  $24.9 \text{ kg/m}^2$ , obesity:  $>25.0 \text{ kg/m}^2$ ).

### *Body Image Perception*

Subjective body image perception was measured through a questionnaire, before the measurement of body composition, and it was measured as a single item. Participants chose one of the following options, based on their self-perception of body weight: underweight, standard weight, overweight, or obese; it is to

**TABLE 1** General Characteristics of the Subjects According to the Gender

Variables	Gender	
	Male (n = 122) (M ± SD)	Female (n = 217) (M ± SD)
Age (year)	21.38 ± 2.06	21.29 ± 1.52
Height (cm)	176.05 ± 5.88	162.89 ± 5.67
Weight (kg)	70.32 ± 10.92	56.43 ± 9.01
BMI (kg/m <sup>2</sup> )	22.66 ± 3.17	21.29 ± 3.25

BMI = body-mass index

be noted that we did not explain the weight reference and range for accurate measurements.

### **Physical Activity**

The amount of physical activity was analyzed using the short form of the Korean version of the self-filled questionnaire formally recognized by the International Physical Activity Questionnaires ([www.ipaq.ki.se](http://www.ipaq.ki.se)). The amount of physical activity participated in, in the past week, was calculated by the Metabolic Equivalent of Task (MET) score (in minutes), and was classified as inactivity (<600 MET-minutes/week), minimum activity (600 to <1500 MET-minutes/week), and health-enhancing activity (1,500 to <3,000 MET-minutes/week),

### **Health Concern**

The degree of health concern was estimated based on reliable questionnaires used in previously conducted studies.<sup>12,13</sup> The Health Concern Scale comprises six items: Considering the usual health condition, Consciousness about the health condition, Efforts to maintain and promote health, Responsibility for health status, Comparison of interest in health with that of others, and the Importance given to health, and uses a 5-point Likert scale (1=strongly disagree; 5=strongly agree). A higher total score signifies having a higher degree of health concern. In this study, the degree of health concern was classified as low or high, based on the median (21 points) of the total score (minimum=10 points, maximum=30 points).

### **Statistics Analysis**

A total of 350 questionnaires were distributed, and 339 questionnaires were used for analysis, except for 11 questionnaires with low credibility. All data were

analyzed using the SPSS WIN 22.0 statistical program (IBM SPSS Statistics, Armonk, NY), and frequency analysis, reliability verification and a Pearson  $\chi^2$  test were performed. All statistical significance levels were set at  $p = .05$ .

## **RESULTS**

Table 2 presents the statistical analyses of the socio-demographic characteristics of 339 participants, who were either underweight, standard weight, overweight or obese.

In terms of body image perception, the participants most frequently answered that they had a standard weight (male: 60.7%, female: 58.1); this was followed by those who perceived themselves as overweight (male: 19.7%, female: 25.8), underweight (male: 19.7%, female: 25.8), and obese (male: 5.7%, female: 6.5). In terms of BMI, the proportion of male students with standard weight, overweight, obesity, and underweight were 50.8%, 23%, 23%, and 3.3%, respectively; the corresponding values for female students were 59.4%, 15.7%, 13.4%, and 11.5%, respectively. In terms of body image misperception, which is analyzed by the difference between the measured and perceived BMI, male students perceived their body image in the order of: perceived as correct, underweight, and overweight, compared to the measured BMI (52.5%, 45.9%, and 1.6%, respectively); however, female students perceived their body image in the order of: perceived as correct, overweight, and underweight compared to the measured BMI (68.7%, 18.9%, and 12.4%, respectively). In the case of physical activity, most male students participated in health-enhancing activities (59.8%), but for female students, the physical

**TABLE 2** Frequency Analysis for Each Variable

	Variables	Gender		Total (n)
		Male (n, %)	Female (n, %)	
Body image perception	Underweight	17 (13.9)	21 (9.7)	38
	Standard weight	74 (60.7)	126 (58.1)	200
	Overweight	24 (19.7)	56 (25.8)	80
	Obesity	7 (5.7)	14 (6.5)	21
BMI	Underweight	4 (3.3)	34 (15.7)	38
	Standard weight	62 (50.8)	129 (59.4)	191
	Overweight	28 (23.0)	25 (11.5)	53
	Obesity	28 (23.0)	29 (13.4)	57
Body image misperception	Perceived as underweight	56 (45.9)	27 (12.4)	83
	correct	64 (52.5)	149 (68.7)	213
	Perceived as overweight	2 (1.6)	41 (18.9)	43
	Inactivity	30 (24.6)	71 (32.7)	101
Physical activity	Minimum activity	19 (15.6)	69 (31.8)	88
	Health enhancing activity	73 (59.8)	77 (35.5)	150
Health concern	Low	46 (37.7)	109 (50.2)	155
	High	76 (62.3)	108 (49.8)	184

BMI = *Body mass index*.

activity participation was in the order of health-enhancing activity, inactivity, and minimum activity (35.5%, 32.7%, and 31.8%, respectively). In terms of their health concern, 62.3% of male and 49.8% of female students perceived it as high.

### **1. Gender Differences in Body Image Misperception, According to the BMI**

Significant differences in the body image misperception ( $X^2=150.714$ ,  $p < .000$ ), according to the BMI, were observed, and are presented in Table 3. Over half of the underweight and standard weight students had an accurate perception of their BMI (52.6%, and 78.5, respectively), while overweight and obese students perceived their BMI to be lower than the measured BMI (49.1%, and 68.4, respectively).

In the gender difference analysis, significant differences in the body image misperception, according to the BMI, were observed. In the case of underweight students, all the male students' perceived BMI was the same as their actual BMI, while 52.9% of the female

students' perceived BMI was higher than the actual BMI ( $X^2 = 4.024$ ,  $p < .045$ ). In the case of those with a standard weight, most male and female students' perceived BMI (77.4%, and 79.1%, respectively) was accurate, but 21.0% of male students perceived their BMI to be lower and 17.1% of female students perceived their BMI to be higher than their actual BMI ( $X^2 = 21.286$ ,  $p < .000$ ). In the case of overweight students, 75.0% of male students perceived their BMI to be lower than the actual BMI, and 76.0% of female students perceived their BMI to be the same as the actual BMI ( $X^2 = 16.489$ ,  $p < .000$ ).

### **2. Gender Differences in Body Image Misperception, according to Physical Activity**

Table 4 presents differences in the body image misperception, according to the physical activity, and significant differences were observed ( $X^2 = 12.662$ ,  $p < .013$ ). Most of the students across the categories of inactivity, minimum activity, and health-enhancing activity had an accurate perception of their body image

(64.4%, 64.8%, and 60.7%, respectively), but 32% of the students who took part in health-enhancing activities perceived their BMI to be lower than the actual BMI.

In the gender difference analysis, the rates of body image misperception were found to be significantly different between the genders, according to physical activity. In the case of inactive students, most male and female students had an accurate perception of their body shape (66.7%, and 63.4%, respectively), but 33.3% of male students perceived their body shape measurements to be lower, as was the case with 25.4% of female students who perceived their values as being higher ( $X^2 = 13.403, p < .001$ ). In the case of students with minimum physical activity, 57.9% of the male students had a lower perceived body image, and 71.0% of female students perceived it to be the same as the actual BMI ( $X^2 = 24.444, p < .000$ ). In the case of students who participated in health-enhancing

activities, most male and female students accurately perceived their body shape (49.3%, and 71.4%, respectively), while 47.9% of male students perceived their values to be lower compared to their actual body shape ( $X^2 = 18.411, p < .000$ ).

**3. Gender Differences in Body Image Misperception, according to the Health Concern**

Table 5 presents differences in the body image misperception, according to the degree of health concern. No significant differences in body image misperception were noted, according to the health concern ( $X^2 = 4.631, p < .099$ ).

In the gender difference analysis, the body image misperception was found to be significantly between the genders, according to the health concern. In case of students with a low degree of health concern, most male and female students had an accurate perception of body image (50.0%, and 66.1%, respectively);

**TABLE 3** Gender Differences of Body Image Misperception according to the BMI

Variables	Body image misperception			X <sup>2</sup> (p)
	Underweight (%)	A match (%)	Overweight (%)	
BMI				
Underweight	0	52.6	47.4	150.714 (.000)
Standard weight	9.4	78.5	12.0	
Overweight	49.1	47.2	3.8	
Obesity	68.4	31.6	0	
Underweight				
Male	0	100	0	4.024 (.045)
Female	0	47.1	52.9	
Standard weight				
Male	21.0	77.4	1.6	21.286 (.000)
Female	3.9	79.1	17.1	
Overweight				
Male	75.0	21.4	3.6	16.489 (.000)
Female	20.0	76.0	4.0	
Obesity				
Male	78.6	21.4	0	2.624 (.091)
Female	58.6	41.4	0	

BMI = Body mass index

**TABLE 4** Gender Differences of Body Image Misperception according to the MET

Variables	Body image misperception			X <sup>2</sup> (p)
	Underweight (%)	A match (%)	Overweight (%)	
Physical activity				
Inactivity	17.8	64.4	17.8	
Minimum activity	19.3	64.8	15.9	12.662 (.013)
Health enhancing activity	32.0	60.7	7.3	
Inactivity				
Male	33.3	66.7	0	
Female	11.3	63.4	25.4	13.403 (.001)
Minimum activity				
Male	57.9	42.1	0	
Female	8.7	71.0	20.3	24.444 (.000)
Health enhancing activity				
Male	47.9	49.3	2.7	
Female	16.9	71.4	11.7	18.411 (.000)

**TABLE 5** Gender Differences of Body Image Misperception According to the Health Concern

Variables	Body image misperception			X <sup>2</sup> (p)
	Underweight (%)	A match (%)	Overweight (%)	
Health concern				
Low	21.9	61.3	19.7	
High	26.6	64.1	9.2	4.631 (.099)
Low				
Male	47.8	50.0	2.2	
Female	11.0	66.1	22.9	29.663 (.000)
High				
Male	44.7	53.9	1.3	
Female	13.9	71.3	14.8	26.832 (.000)

however, 47.8% of male students perceived their body image values to be lower and 22.9% of female students perceived their body shape measurements to be higher than the actual values ( $X^2 = 29.663$ ,  $p < .000$ ). In the case of students with a high degree of health concern, most male and female students had an accurate perception of their actual body image (53.9%, and 71.3%, respectively), but 44.7% of male

students perceived their body shape values to be lower and 14.8% of female students perceived them to be higher than the actual values ( $X^2 = 26.832$ ,  $p < .000$ ).

### DISCUSSION

Subjective body image perception plays an important role in students' participation in physical activity and healthy eating habits for successful weight management.

In other words, dissatisfaction with one's body image increases as the BMI increases, and weight-control activities such as exercise, diet, and fasting are started, accordingly<sup>14,15</sup> In this aspect, accurate perception of one's body image is a key factor in the participation in weight-control activities. The purpose of this study was to investigate the degree of body image misperception, by applying the Asian Body Mass Index criteria, and to compare gender differences in the body image misperception, according to BMI, physical activity and degree of health concern.

The results of this study showed that most of the male students perceived their body image to be accurate or lower than the actual values, and female students perceived themselves to be overweight. These results are similar to those of studies conducted in other countries, in that the errors in body image perception differ by gender.<sup>16,17</sup> In a previously conducted study focusing on ideal body image shape, male participants chose a person whose physique was more robust than their own, while female participants chose a person with a smaller physique as ideal, healthy, and attractive body shapes.<sup>18,19</sup> Worries pertaining to weight gain were more prevalent in women than in men.<sup>20</sup> Colleagues and parents play an important role in shaping an individual's perception of weight status; in particular, mass media is a major contributor to gender differences in the formation of people's preferred body image.<sup>21</sup> According to the results of this study, there is a risk of obesity developing in the male participants as most of them perceived their weight to be lower than their actual weight; on the other hand, as most of the female participants perceived their weight to be higher than the actual weight, there is a risk of them attempting inappropriate weight loss.

Body image misperception is clearly related to abnormal weight status. In other words, underweight and obese students tend to underestimate or overestimate their bodies, compared to standard weight students. This tendency was higher among college students than other youth.<sup>22</sup> In a previously conducted study, 10.6% and 58.3%, respectively, of standard weight and obese students perceived their weight to be lower than their actual weight; therefore, it was concluded that body image misperception occurs more frequently in the case of obese individuals.<sup>23</sup> The results of this study

also showed that underweight, overweight, and obese students had a higher body image misperception than standard weight students; the results were consistent with those of a previously conducted study. In particular, it is important to note that male and female students with the same BMI had different tendencies. Male participants of all underweight students perceived to be consistent, while more than half of the female participants felt that they were overweight. In the case of overweight, 75% of the male students perceived their BMI to be lower than it actually was, while only 20% of female students perceived it be lower than the actual BMI. Thus, the results of this study suggest that female participants who are underweight may participate in inappropriate weight loss activities, while those who are overweight and obese may not participate in exercise and diet control for weight reduction, and may progress to obesity of a higher degree.

It is clear that dietary restriction and exercise, as well as a combination of both, are the most effective ways to resolve obesity.<sup>24,25</sup> Regular physical activity is performed for weight control, but gender differences in the participation in physical activity are apparent. In general, men tend to exercise more actively, through activities to increase their muscle mass and competitive exercises,<sup>26,27</sup> while women are likelier to exercise mildly for body shape and weight management, through activities such as walking and dancing.<sup>27,28</sup> In addition, men are the likeliest to employ exercise, fasting, and food therapy, while females are likeliest to use fasting, exercise, and device therapy as weight control methods.<sup>29</sup> The likelihood of the occurrence of errors in the perception of body image is lower among people who exercise often, due to the conduction of periodic body measurements, and the ease of obtaining accurate information on their body status.<sup>30</sup> The results of this study showed that most of the participants accurately perceived their actual body shape, regardless of the degree of participation in physical activity. However, half of the male participants who engaged in minimum physical activity and health-enhancing activity perceived their weight to be lower than the actual weight; this differs from the findings of a previously conducted study. This difference can be attributed to the fact that most of the

men in this study participate in a higher intensity of exercise and, therefore, tend to perceive their weight as lower. The results of this study also showed that most of the male participants perceived themselves as having lower body shape values than the actual values, regardless of their level of health consciousness. This suggests that the characteristics of gender differences are more influential than the effect of one's health consciousness on body image misperception.

This study has some limitations. First, we could not deduce the causal relationships between subjective body image perception, BMI, physical activity, and health consciousness, due to the nature of the questionnaire. In addition, the questionnaire on body image perception included only one question and did not provide numerical values and information on underweight, standard weight, overweight, and obesity for accurate error evaluation. Another limitation of this study is that we did not investigate the other factors that could affect body image perception, such as psychological state, nutritional status, medication use, income, and personality. Despite these limitations, this study analyzed subjective body image perception and misperception, and their effects on health maintenance and improvement efforts. Body composition, physical activity, and health consciousness, which affect body image misperception, were compared and analyzed, and the finding that there were differences by gender is valuable.

### CONCLUSION

The prevalence of body image misperception was high, and the degree of misperception varies by gender. Therefore, educational efforts to reduce instances of body image misperception are needed for healthy weight management, and these efforts should take into consideration the gender differences indicated in this study.

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### CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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