

Weight Misperception and Factors Associated with it in Older Korans: KNHANES VIII-I

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ABSTRACT

Accuracy of body weight perception is essential for older adults. Many previous studies suggested that misperception of body weight may be an obstacle to maintaining a healthy lifestyle. However, the prevalence and associated factors in the older Korean population are still unclear. This study aimed to examine the prevalence and identify associated factors contributing to the discordance of weight perception among older Korean adults. Using nationally representative data from the 2018 KNHANES VIII-1, 2,907 participants aged 65 or over were included in this study. Body weight misperception was defined as self-reported body weight inconsistent with the participant's actual body mass index (BMI). Data were analyzed using complex sample analysis considering weight, stratification, and cluster variables. Further, we create three variables (underestimate, correct estimate, overestimate) to classify weight perception compared with obesity level measured by BMI. In the results, 68.1% of seniors misperceived their weight, and the discordance of body weight perception was more prevalent among older men than women. Men were more likely to underestimate their weight than women (69.6% men and 62.3% women). Age, education, household income, marital status, aerobic exercise participation, and BMI status were significantly associated with discordance in body weight perception in older women.

Keywords: Weight Perception; Misperception; Seniors; Aging Population; Discordance; Obese

Introduction

South Korea became an Aged Society in 2017 as the rate of older population over 65 years of age reached 14.2 percent. By the year 2030, 24.3 percent of the population will be over the age of 65 years, and 46.4 percent by the year 2070 (Statistics Korea, [1]). Obesity is not unique to the middle-age population and is recognized as an important public health issue in an aging population as well. The prevalence of obesity in the older population in Korea (defined as a BMI over 25 kg/m²) was 41.1% in 2019 (Korean Statistical Information Service, [2]). It showed consistently increasing trend among both older men and women over the past 10 years. Korea Center for Disease Control and prevention (KCDC) reported that there is increase in the percentage of obesity among older population from 32% to 40.3% in 75-84 years of age between 2007 and 2017 (KCDC, [3]). Further, according to big data analysis of National Health Service (data of annual medical report, national health screening data) between 2007-2017, obesity is

the one of ageing related policies and priorities in public health. Body composition changes with ageing. Importantly, redistribution of fat from peripheral and subcutaneous sources to a central location leads to increased waist circumference and waist-hip ratio. In addition, natural loss of muscle mass causes sarcopenia. These changes affect not only morbidity and mortality, but also importantly impact on quality of later life and the risk of institutionalization in older population. A systematic review by (Schaap, et al. [4]) demonstrated that obese older adults over 65 years of age had a 60% higher risk of incident disability. Further, a "U" shape relationship is also observed between BMI and nursing home admission from community dwelling adults (Zizza, et al. [5]). Although accuracy of body weight perception is crucial to have proper diet and weight management efforts for well-being life, it is consistently and substantially underestimated by self-report data from non-Hispanic European American women, non-Hispanic African American women, Mexican American women and men (Liu, et al. [6]), and South Asian women (Patel, et al. [7]). According to previous study,

the proportion of weight misperception were approximately 20 and 30% among men and women respectively (Herman, et al. [8]). Recent Korea studies reported that approximately 40% of the total study population incorrectly perceived their weight status when compared with actual BMI status (Kim, et al. [9]).

Several studies have suggested that misperception of weight acts as an obstacle for maintaining healthy lifestyle (Seo, et al. [10]). Women with overweight status who do not perceive their weight as overweight have been found to be less likely to attempt in losing weight and to adhere to behaviors to reduce weight (Duncan, et al. [11]). Women with overweight who perceived their weight as normal exhibit poor diet habits (Skinner, et al. [12]) and less level of physical activity (Chun, et al. [13,14]). Similarly, people with normal weight who perceived their weight as obese are more likely to engage in unhealthy weight control activities (Talamayan, et al. [15]). Further, weight perception might have a harmful impact on one's quality of life. (Sonnevile, et al. [16]) reported that subjects who overestimate

their weight status showed a significantly lower health related quality of life than those who accurately perceived their weight. In Korea, older women who were in normal weight category, discordance in their subjective body weight perception made them have suicidal ideation (Yong, et al. [17]). Therefore, underestimation of weight, especially in older women aged 60 and over, may seriously avoid of weight control life style changes to lose weight and medical visit (Jay, et al. [18-20]). Despite growing concerns regarding weight misperceptions and the negative impact on health status, evidence is very limited in people over 65-year-olds because studies generally include broad age ranges or focused on adolescents. This is remarkable, since the prevalence of chronic disease increases after 55 years of age, risk of suffering also increases with overweight. Therefore, a better knowledge of body weight perception in older people over 65 years old may contribute to effective health practice, which might ultimately improve their health and quality of life. The purpose of this study was to examine the prevalence of weight misperception and factors influencing body weight misperception in the Korean older population aged 65 and over.

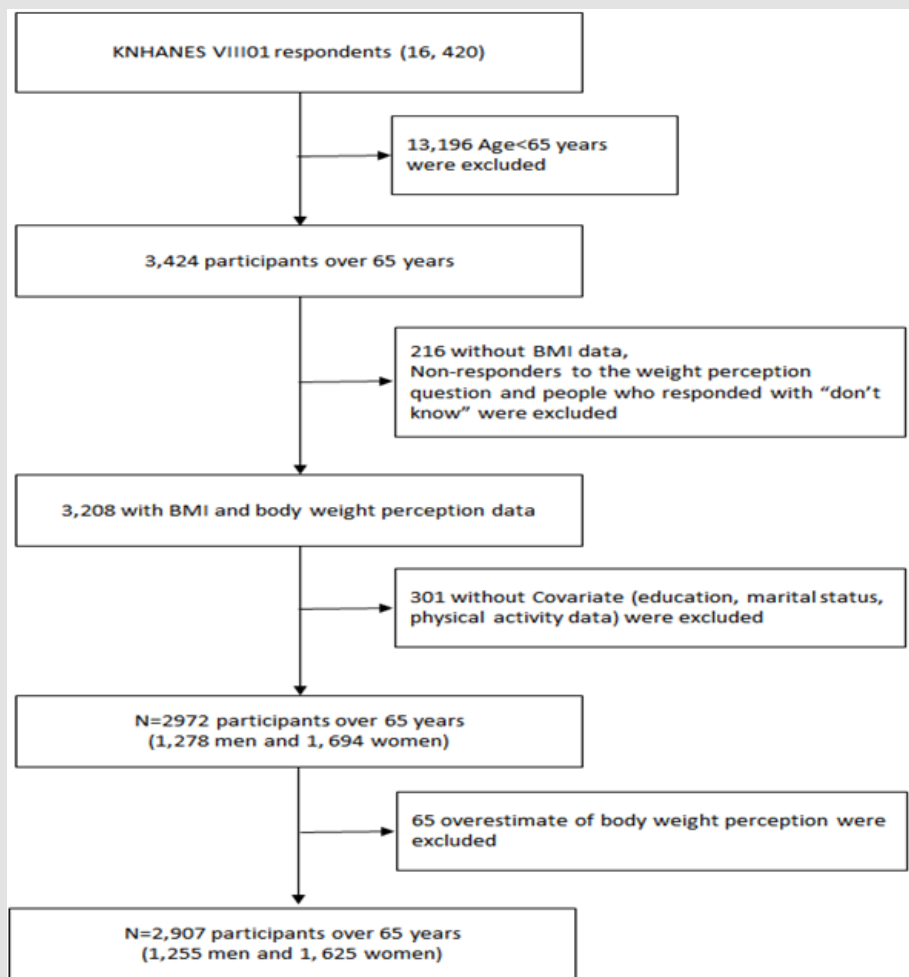


Figure 1.

Method

Study Population

Data for the present study were selected from the Korea National Health and Nutrition Examination Survey VIII-I (2018) (KNHANES VIII-I, 2018), which has been administered to assess the health status and behavior changes of the Korean population by the Korea Center for Disease Control and Prevention (KCDC) since 1998. The KNHANES is a national representative survey of household samples that collects comprehensive data of medical, health status, health behaviors, and sociodemographic variables. The KNAHENS consists of three sections, which include health interview, health examination, and nutrition survey, and is examined by trained medical staffs. In this study, raw data were extracted from the 8th KNHANES-1 (2018). All statistics of this survey have been calculated using sample weights assigned to sample participants. Among 16,420 people aged 19 and over who completed KNHANES VIII-I, we extracted data on the target population, who were older adults (65 years and over) (N=3,424). We excluded data from participants who had missing data on body weight perception and BMI (N=216) or data of people who replied body perception as “don’t know” (n=3208). Further, we excluded data from participants who had missing data on main demographic variables (N=301). To obtain statistical power in study of the associated factors, we further excluded data from people who were categorized into ‘overestimate’ in comparing BMI and body weight perception, resulting in final weighted sample of 2,907 (1,255 men and 1,625 women) (Figure 1).

Ethics Statement and Data Access

The Institutional Review Board (IRB) of the KCDC acquired access to the KNHANES after receiving approval. This study is a retrospective study that used and analyzed the data from the 2018 KNHANES survey; therefore, approval from IRB was not required. Because the dataset did not include personal information and participants gave the consent to the KNAHENS, further ethical approval for the use of open KNHANES data was exempted from Kangnam University Institutional Review Board (KNU-HR2103002).

Data Collection

Body weight misperception was defined as self-reported body weight that was inconsistent with the participant’s actual Body Mass Index (BMI). BMI was categorized according to criteria for Asian using BMI cut offs of $<18.5\text{kg}/\text{m}^2$ (underweight), $<23\text{kg}/\text{m}^2$ (normal weight), $23\leq\text{BMI}<25\text{ kg}/\text{m}^2$ (overweight), and $\text{BMI}\geq 25\text{ kg}/\text{m}^2$ (obese). For body weight perception, the participants were asked their perceived weight status by trained medical staff following standardized procedures as follows: “what do you think about your subjective shape? According to the following list: ‘very thin’, ‘Thin’, ‘Normal weight’, ‘Overweight’ or ‘Obese’? We categorized their response into four categories: underweight (combining very thin and thin),

normal weight, overweight, and obese to compare with the objective measured BMI category. Further, we initially created a variable with three values (Underestimate, Correct estimate, and Overestimate) to classify weight perception compared with obesity level as measured by BMI to represent discordance between weight perception and BMI. We matched the BMI ranged from normal to overweight to the normal of weight perception according to previous Korean studies on weight perception [Boo, et al. [9,21-23]]. Because few seniors were in the overestimate category in the analyses of this study, final data analyzed for this study included data for seniors who were in underestimate and correct estimate only.

Covariates

The health examinations included a questionnaire on health-related behaviors, medical and physical examination, and anthropometric measurements. Physical examinations were conducted by trained medical staff members following standardized procedures. In socio-demographic variables, age was categorized into 65-74 years, 75 and over. Level of education was classified as below elementary school, middle school graduate, high school graduate, and college graduate and above. Household income was categorized into quartile as Q1 (the lowest, $<25^{\text{th}}$ quartile), Q2 (Low, 25^{th} - 49^{th} percentile), Q3 (moderate, 50^{th} - 74^{th} percentile), and Q4 (high, over 75^{th} percentile). Further, marital status was classified into with spouse, without a spouse. Participants were asked about health behaviors, including cigarette smoking status and regular aerobic physical activity participation. Cigarette smoking status was indicated as “never,” “former and current” based on their smoking status as the time of the survey. Regular aerobic exercise was indicated as “yes” when subjects participated in moderate or vigorous aerobic exercise regularly more than two hours and thirty minutes per week, which cause significantly increased respiration and heart rate: more than 1 hour and 15 minutes from vigorous exercise.

Statistical Analysis

Under the direction of the KCDC, data were analyzed using complex sample analysis that took weight, stratification characteristics, and cluster variables into consideration. Weight, stratification, and clustering are examples of sampling design components that are addressed by SPSS Complex Samples analysis. Weights were provided by KCDC. The cross-tabulation analysis was conducted to identify the distribution or correct estimate and underestimate participants in each gender. Descriptive analysis was conducted to examine the distribution of all variables by gender. Complex sample chi-square tests and t-test were then conducted to compare the percentage or mean of variables by gender. Continuous and categorical variables were expressed as mean standard error (SE) and number (%), respectively. The P-values less than 0.05 were considered statistically significant. All statistical analyses were conducted with IBM SPSS version 26.0 (IBM Corp, Armonk, NY, USA).

Results

Baseline Characteristics

The baseline general characteristics of subjects by gender (n=2907) are shown in (Table 1). The study population included 1,255 men and 1,652 women aged 65 and older from KNHANES VIII-I. The study population's average age was 72.64 years (SE, 0.09; range 65-80 years, men, 72.64 years; women, 73.03). There was a significant difference in mean age between men and women (p<.05). Education level, household income, marital status, cigarette smoking status, regular aerobic physical activity, activity limitation, BMI (Body Mass Index), and perceived weight differed significantly between men and women (Table 1). Less than one-half of seniors (46.0%) perceived themselves as about normal weight, 13.2% perceived themselves as thin, and 32.5% perceived themselves as overweight or obese. Chi-square analyses revealed a significant difference in weight perception by gender (chi-square=64.21, p<.001). The percentage of subjects who believed their weight to be normal were 49.6% and 43.2% for men and women, respectively. Overall, women were more likely than men to consider themselves overweight and obese. (Table 2) shows

the percentage of respondents in correct estimate and underestimate based by gender. 68.1% of seniors misperceived their weight and there was significant gender differences in body weight misperception (men 71.6% vs women 65.5%; chi-square: 17.834, p<.001). Although the rate of misperception was similar in both sexes, the type for misperception was different between men and women. Men were more likely to underestimate their weight compared with women (69.6% men and 62.3% of women); in contrast, women were more likely to correct estimate their weight (28.4% of men and 34.5% of women). Overall agreement between the object level by BMI and the weight perception status was poor in both sexes (Kappa coefficient men = 0.028; women =0.126, p<.05) (Table 3). (Table 4) shows that factors associated with body weight misperception among participants. Older adults over 75 years were more likely to underestimate their body weight in both gender (37% and 48%, respectively) than those aged between 65 and 75 years (p<.01). Education, household income, marital status, smoking status, aerobic exercise was not associated with bodyweight misperception in men. However, women who were lower educated, lower household income, without spouse, and did not perform regular aerobic exercise were more likely to underestimate their body weight.

Table 1: General characteristics of study population(n=2907).

Variable	Classification	Total Mean(SE) or n(%) (n=2907)	M Mean(SE) or n(%) (n=1255)	F Mean(SE) or n(%) (n=1652)	t or χ^2 (p-value)
Age(yr)		72.64(0.1)	72.64(0.1)	73.03(0.1)	-2.069(0.039)
Education	Below elementary	1717(59.1)	516(41.1)	1201(72.7)	328.676(p<.001)
	Middle	439(15.1)	228(18.2)	211(12.8)	
	High	473(16.3)	307(24.5)	166(10.0)	
	Above college	278(9.6)	204(16.3)	74(4.5)	
Household income, n(%)	Q1	1423(49.2)	527(42.1)	896(54.5)	45.575(<.001)
	Q2	781(27.0)	266(29.3)	415(25.2)	
	Q3	438(15.1)	223(17.8)	215(13.1)	
	Q4	253(8.7)	135(10.8)	118(7.2)	
Marital status	With spouse	1918(66.5)	1095(88.2)	823(50.2)	500.636(<.001)
	widow/widower	842(29.2)	95(7.6)	747(45.6)	
	divorced	121(4.2)	52(4.2)	69(4.2)	
Marital status	spouse with	1903 (65.5)	1085(86.5)	818(49.5)	501.786 (<.001)
	spouse without	15(0.5)	10(0.8)	5(0.3)	
	widow/widower	842(29.0)	95(7.6)	747(45.2)	
	divorce	121(4.2)	52(4.1)	69(4.2)	
	unmarried	25(0.9)	12(0.7)	12(0.4)	
Smoking, n(%)	Never	1830(63.1)	270(21.6)	1560(94.6)	633.254(<.001)
	Former	820(28.3)	764(61.0)	56(3.4)	
	Current	251(8.7)	218(17.4)	33(2.0)	
Physical Aerobic exercise	No	2031(70.4)	816(65.4)	1215(74.1)	25.6727(<.001)
	Yes	855(29.6)	431(34.6)	424(25.9)	

BMI	Underweight	69(2.4)	37(2.9)	32(1.9)	24.245(<.001)
	Normal weight	948(32.6)	448(35.7)	500(30.3)	
	Over weight	781(26.9)	352(28.0)	429(26.0)	
	Obese	1109(38.1)	418(33.3)	691(41.8)	
Activity limitation	Yes	583(20.1)	211(16.8)	372(22.5)	14.542(<.001)
	No	2323(79.9)	1044(83.2)	1279(77.5)	
Perceived weight	Very thin	242(8.3)	105(8.4)	137(8.3)	64.218(<.001)
	Thin	384(13.2)	197(15.7)	187(11.3)	
	Normal weight	1336(46.0)	622(49.6)	714(43.2)	
	Overweight	758(26.1)	294(23.4)	464(28.1)	
	Obese	187(6.4)	37(2.9)	150(9.1)	
Body weight change last 1 year	Unchanged	2174(75.0)	963(76.8)	1211(73.6)	5.229(.073)
	Decreased	389(13.8)	168(13.4)	231(14.0)	
	Increased	326(11.2)	123(9.8)	203(12.3)	
Discordance of body weight perception and Actual BMI	Correct	1530(52.6)	595(47.4)	935(56.6)	24.148(<.001)
	Underestimate	1377(47.4)	660(52.6)	717(42.4)	

Table 2: BMI category and weight perception (n=2972).

Weight Perception		Total	Men	Women	Chi-square (p)
Correct estimate		947(31.9)	363(28.4)	584(34.5)	17.83 (.001)
Weight misperception	Underestimate	1945(65.4)	889(69.6)	1056(62.3)	
	Overestimate	80(2.7)	26(2.0)	54(3.2)	

Table 3: Agreement between BMI and weight perception by gender (n=2972).

Body weight perception n(%)					
	Thin	Normal	Overweight	Obese	Kappa (p)
Obesity level by BMI					
MEN (n=1278)					
Underweight	37(12.3)	4(0.6)	0	0	0.028
Normal	221(73.2)	227(36.5)	17(5.5)	2(5.1)	
Overweight	23(11.3)	250(39.9)	65(20.9)	3(7.7)	
Obese	10(3.3)	145(23.3)	229(73.6)	34(87.2)	
Women(n=1694)					
Underweight	32(9.9)	6(0.8)	0	0	0.126(<.001)
Normal	211(65.1)	289(40.5)	33(6.6)	3(2.0)	
Overweight	55(17.0)	237(32.9)	125(25.2)	12(7.8)	
Obese	26(8.0)	188(26.3)	339(68.2)	138(90.2)	

Table 4: Percentage of respondents in each weight perception category and gender by demographic characteristics. (n=2907).

Variable	Classification	Total (n=2907)			Men(n=1,255)			Women(n=1,652)		
		Mean(SE) or n(%)		t or Chi-square(p)	Mean(SE) or n(%)		t or Chi-square(p)	Mean(SE) or n(%)		t or Chi-square(p)
		Correct estimate	Underestimate		Correct estimate	Underestimate		Correct estimate	Underestimate	
Age(yr)	65-74	1092(71.4)	788(57.2)	63.5 (<.001)	419(70.4)	415(62.9)	7.9 (.003)	673(72.0)	373(52.0)	69.5 (<.001)
	75-84	438(28.5)	589(42.6)		176(29.6)	246(37.1)		262(26.0)	344(48.0)	
Education	<Elementary	842(55.0)	875(64.5)	22.5 (<.001)	227(88.2)	289(43.8)	6.5 (.089)	615(65.8)	586(81.7)	52.6 (<.001)
	Middle	255(16.7)	184(13.4)		109(18.3)	119(18.0)		146(15.6)	65(9.1)	
	High	267(17.5)	206(15.0)		148(24.9)	159(24.1)		119(12.7)	47(6.6)	
	Above college	166(10.8)	112(8.1)		111(18.7)	93(14.1)		55(5.9)	19(2.6)	
Household income	Q1	693(45.4)	730(53.3)	18.9 (<.001)	238(40.2)	289(43.9)	2.5 (.472)	455(48.8)	441(62.0)	31.2 (<.001)
	Q2	443(29.0)	338(24.7)		173(29.2)	193(29.3)		270(28.9)	146(20.4)	
	Q3	240(15.7)	198(14.5)		112(18.9)	111(16.8)		128(13.7)	87(12.2)	
	Q4	149(9.8)	104(7.6)		69(11.7)	66(10.0)		80(8.6)	38(5.3)	
Marital status	With spouse	1009(66.0)	909(66.0)	0	521(87.6)	574(87.0)	0.09 (.410)	488(52.2)	336(46.7)	4.9 (.015)
	Without spouse	520(34.0)	468(34.0)		74(12.4)	87(13.0)		446(47.8)	382(53.3)	
Smoking	Never	1002(65.6)	828(60.3)	8.7	118(19.8)	152(23.1)	2.2 (.331)	884(94.7)	676(94.4)	0.1 (.954)
	Former	406(26.5)	415(30.2)		374(62.9)	390(39.4)		31(3.3)	25(3.5)	
	Current	121(7.9)	130(9.5)		103(17.3)	115(17.5)		18(1.9)	14(2.1)	
Aerobic Exercise	No	1051(69.1)	980(71.8)	2.5	386(65.4)	430(65.4)	0	665(71.4)	550(77.7)	8.2 (.002)
	Yes	470(30.9)	385(28.2)		204(34.6)	227(34.6)		266(28.6)	158(22.3)	
BMI	Underweight	69(4.5)	0(0.0)	36.9 (<.001)	37(6.2)	0(0)	19.7 (<.001)	32(3.4)	0(0)	74.5 (<.001)
	Normal	516(33.7)	432(31.4)		227(36.2)	221(33.5)		289(30.9)	211(29.4)	
	Overweight	205(13.4)	576(41.8)		68(11.4)	284(43.0)		137(14.7)	292(40.7)	
	Obese	740(40.4)	369(26.8)		253(44.2)	155(23.5)		477(51.0)	214(29.6)	

Discussion

In the present study, elderly Korean men and women were examined for their misperceptions of their actual body weight. We specifically want to know if gender differences exist in how people perceive their body weight in relation to an objective assessment of it, and if so, what factors might be connected to that view. The findings revealed that 65% of individuals were overweight or obese (BMI >25 kg/m²), and the majority of this group (68.1%) had an inaccurate perception of their body weight status. A total of 65.5% of older women and 71.6% of older men in the sample misjudged their body weight status. In comparison to other research that focused on middle-aged and older persons, this is a significantly larger percentage of body weight misperception. Between 40-42% of participants in earlier studies in different countries misperceived their body weight status (Knight, et al. [24]). A recent survey conducted on middle-aged Korean individuals (aged 45 to 64) found that 25.7% of women and 45.3% of men said they were overweight (Song, et al. [25]). Research demonstrates

that elderly Koreans are more likely than older people in other countries or middle-aged Koreans to assess their body weight incorrectly. According to previous studies, women are more prone than men to perceive their body weight incorrectly. For instance, in a Brazilian study of middle-aged people, 60.6% of women and 43% of men had inaccurate perceptions of their physical weight (Silva, et al. [26]). The discovery that older men than women had a distorted body weight perception (71.6% vs. women 65.5%) among the 68.1% of individuals who misperceived their weight in the current study was unexpected. It is feasible for men to have a larger rate of body weight misperception than women since a variety of factors, including culture, and history, might have an impact on body weight perception. An earlier study found that employment status had an impact on how people felt about their actual body weight. In contrast to women whose employment position had not significantly changed in later life, men would be less conscious about their body image in terms of their weight and would engage in less social activities as a result. The objective weight status and self-perceived body weight were found to be moderately

correlated in prior studies including young and middle-aged persons (Kappa coefficients ranged from 0.30 to 0.70). These Kappa values are significantly higher than the one used in our study, which may be evidence that older Korean persons have less body weight misperception than younger Koreans.

The factors that contribute to body weight misconceptions about actual body weight vary by gender. Body gender-specific body weight perception error was linked to advanced age. Age, lesser education, weight loss in the preceding year, and reduced effort at weight control were all linked with body weight misperception in men, whereas these factors were not associated with it in women. In our study, older persons above the age of 75 were more likely than those between the ages of 65 and 75 to underestimate their body weight (37% and 48%, respectively) ($p < .01$). In earlier studies with a larger age range (Craig, et al. [27]), this tendency of declining Kappa with aging was also noted. These findings suggest that older people have a significant rise in age-related body image misconceptions. In our study, it was discovered that underestimating of self-perceived weight status increased significantly when BMI measured weight status increased, indicating that the majority were overweight or obese. According to our univariate analysis, participants who were overweight or obese were more likely than those who were normal weight to underestimate their weight status. Our findings demonstrate that underestimating happens more frequently in overweight and obese people, supporting earlier research in middle-aged individuals (Bouzas, et al. [28]). Due to the dataset's limitations, it was not able to identify any potential causes of body weight misperception using this population-based dataset. It was challenging to obtain age-specific evidence regarding the psychological impact on body weight image due to the lack of an investigation into a precise assessment of body weight perception, such as body silhouette. An in-depth discussion on what body image in relation to weight means for older men and women is required, as well as how this meaning evolves as one ages and their physical functions change. There may be solutions in qualitative study that explores the subjective experiences of the older population in Korea. Notwithstanding the aforementioned constraints, this study found that older men and women had body weight misperception at different rates, with older men experiencing it more frequently than older women. In addition, compared to women, distinct characteristics were linked to men's inaccurate perceptions of their body weight. It is significant to note how gender differences in weight awareness from the previous year might be seen. Men's awareness of weight fluctuations had no effect on their weight perception, while women's awareness of weight loss had a favorable impact on it, while knowledge of weight gain made them less likely to overestimate their weight. It is necessary to create and assess interventions to raise knowledge of healthy weight in later life. The findings of this research can help in the creation of gender-specific therapies. For instance, when creating and conducting an intervention, education program, or public health

campaign to correct body weight misconceptions among older men and women, gender-related aspects can be considered.

Conclusion

Correct body weight perception in the older population is vital for maintaining a healthy lifestyle and quality of later life. This study found that elderly Korean men and women had much more misperceived their weight, and different factors were associated with it. Gender-specific education programs or public health campaigns are required to correct body weight misperceptions among the older population.

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