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## The Interaction Effects of Age and Body Size on Body Appreciation and Health-Related Behaviors

Los efectos de interacción de la edad y tamaño corporal en los comportamientos relacionados con la salud y la apreciación corporal

Minsun Lee<sup>1</sup>, Hyun-Hwa Lee<sup>2,\*</sup>

<sup>1</sup>*Dept. of Fashion Design, Konkuk University Glocal Campus, 268 Chungwon-daero, Chungju, Chungcheongbuk-do, South Korea, 27478.*

<sup>2</sup>*Dept. of Fashion Design & Textiles, Inha University, 100 Inharo, Michuhol-gu, Incheon, South Korea, 22212.*

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**\*Corresponding author:**

Hyun-Hwa Lee.

Email: [hyunhwa@inha.ac.kr](mailto:hyunhwa@inha.ac.kr)

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### Abstract.

Whilst the associations among age, body size, body (dis)satisfaction, and weight management behavior have been well documented, there is little research on how the combination of age and body size is related to body appreciation and health-related behavioral intentions. The purpose of this study is to identify the associations of age, body size, and their interactions with body appreciation and health-related behavioral intentions among Korean women. A cross-sectional research design was adopted with a convenience sampling method. Using an online survey questionnaire, complete data on body appreciation, health-related behavioral intentions, body size, height, weight, and age were collected from 531 Korean adult women aged 20-77 years. Using average scores for each variable, a series of hierarchical regression analyses were performed to identify the relative contributions of predictor variables on each criterion variable. The significant interaction terms were further examined using the PROCESS macro in SPSS. Overall, older Korean women were found to be more likely to have a positive body image and lower levels of behavioral intentions towards striving for a healthy body than younger women. This study confirmed the relative contribution of subjective body size in explaining women's body-related perceptions and behaviors, as compared to their actual BMI.

### Resumen.

Mientras que las asociaciones entre edad, tamaño corporal, (in)satisfacción corporal y comportamiento del control del peso han sido bien documentadas, existe poca investigación sobre cómo la combinación de edad y el tamaño corporal se relacionan con la apreciación corporal y las intenciones de comportamiento relacionadas con la salud. El propósito de este estudio es identificar las asociaciones de edad, tamaño corporal y sus interacciones con la apreciación corporal e intenciones de comportamiento relacionadas con la salud entre mujeres coreanas. Se adoptó un diseño de investigación multisectorial con un método de muestreo de conveniencia. Utilizando un cuestionario en línea, se recopilaron datos completos sobre apreciación corporal, intenciones de comportamiento relacionadas con la salud, tamaño corporal, altura, peso y edad de 531 mujeres coreanas adultas entre los 20 y los 77 años. Utilizando resultados promedio para cada variable, se realizó una serie de análisis de regresión jerárquica para identificar las contribuciones relativas de las variables predictivas sobre cada variable de criterio. Los términos de interacción significativos fueron examinados más a fondo utilizando el PROCESO macro en SPSS. En general, las mujeres coreanas mayores fueron halladas más propensas a tener una imagen corporal positiva y menores niveles de intenciones de comportamiento esforzado por un cuerpo saludable que las mujeres más jóvenes. Este estudio confirmó la contribución relativa del tamaño corporal subjetivo para explicar los comportamientos y percepciones relacionadas con el cuerpo de las mujeres, en comparación con sus IMC reales.

### Keywords.

Body Appreciation; Health-Related Behavioral Intentions; Age; Body Mass Index; Subjective Body Size..

### Palabras Clave.

Apreciación corporal; Intenciones de comportamiento relacionadas con la salud; Edad; índice de masa corporal; Tamaño corporal subjetivo.

## 1. Introduction

With an increase in overall life expectancy, attention from individuals, professionals, the public, and the government towards supporting healthy and successful aging has increased (Rodríguez-Hernández, 2019; Yu & Lee, 2019). Exercise, healthy eating, and maintaining a healthy body weight are known to contribute to one's overall health and well-being at any age (Chen et al., 2017). In addition to these health-related behaviors, recent research has emphasized the importance of enhancing positive body image due to its benefits for women's psychological well-being (Tylka & Wood-Barcalow, 2015). Positive body image refers to an appreciation, acceptance, and respect for one's body (Tiggeman & McCourt, 2013). As a broader and more complex concept, it distinctively differs from a high level of body satisfaction or the absence of body dissatisfaction (Gillen, 2015). Individuals with a positive body image are likely to accept their body and feel confident, regardless of body size or weight, which consequently influences their happiness and quality of life (Andrew et al., 2016). Positive body image, usually measured in the level of body appreciation, has been emphasized given its important contributions to women's health and psychological well-being in terms of eating disorders, depression, self-esteem, and overall mental health (Tylka, 2018).

Women's body image perceptions and health-related behaviors are associated with two important indicators: age and body size (Noh et al., 2018). Body concerns and health-related behaviors are important issues for women throughout adulthood. Most women are concerned about their weight and body shape and engage in health-related behaviors (i.e., weight and eating control behaviors) throughout their life span (Lee & Damhorst, 2019). Numerous studies have examined how age and body size are associated with women's body image and health-related behaviors such as physical activity, dieting, and weight management (Bradbury et al., 2017; Clarke et al., 2017; Radwan et al., 2019). Previous studies have reported that age is positively associated with body appreciation (Tiggeman & McCourt, 2013), while overweight and obese women usually have lower levels of body satisfaction than women of average weight (Radwan et al., 2019). Regarding the associations between age and health-related behaviors, previous studies have reported that the proportions of people engaging in adequate amounts of exercise decrease with age (Clarke et al., 2017). Other studies have reported an inverse relationship between BMI (body mass index) and physical activity (Bradbury et al., 2017). These results are quite interesting because most women experience significant body size increases due to the aging process (Montemurro & Gillen, 2013) and health-related body concerns significantly increase as women age (Lee & Damhorst, 2019). Life course theory, which has been widely em-

bedded into research on body image and physical activity across the life span, also emphasizes the importance of understanding the developmental changes in one's body perceptions and health-related behaviors as people age (Elder et al., 2003; Liechty & Yarnal, 2010). Yet, the current literature clearly demonstrates that we have limited knowledge on how age and body size interact with women's body image and health-related behaviors. To that end, this study intended to examine the associations of age, body size, and their interactions with body appreciation and health-related behavior intentions among Korean women. In addition, the current study aimed to identify whether objective/subjective body size is associated with the criterion variables after controlling subjective/objective body size. Previous studies have found that both objective and subjective body size are related to body image perceptions and health-related behaviors (Lee & Lee, 2019b; Madanat et al., 2007). We focused on Korean women because women born in South Korea (hereafter Korea) by 2030 are projected to have the longest life expectancy in the world; at birth, Korean women have more than a 90% chance to live longer than 86.7 years (Kontis et al., 2017). Moreover, the prevalence of negative body image, such as body dissatisfaction and eating disorders, is very high among Korean women (Jang et al., 2018).

### 1.1 Objective versus Subjective Body Size

Given the significant associations between body size and women's body perceptions and behaviors, numerous studies on body image and physical activity have included BMI as either a predictor or control variable (Yu & Lee, 2019). BMI has been frequently adopted as an indicator of objective body size because it is the measure of one's weight in relation to height. Yet, many studies have also attached greater importance to one's subjective body size in terms of its associations with women's body image perceptions (Lee & Lee, 2019b). Lee and Lee (2019b) found the relative importance of subjective comparisons, as compared to objective comparisons, to thin media models and their associations with media pressure on young Korean women to achieve a thin ideal.

The fact that misperceptions around body size have been prevalent in many contemporary societies provides additional support to this notion (Kim et al., 2008). Due to society's excessive emphasis on a thin female ideal, many Korean women feel great pressure to be thin and have distorted standards for their own bodies. As a result, many women are likely to perceive themselves as overweight despite having a normal BMI (Noh et al., 2018). Meanwhile, other studies have reported that some overweight and obese women are likely to underestimate their body weight (Robinson, 2017). Some overweight and obese women who are frequently exposed to others with larger body sizes can recalibrate

their perceived range of normal body size and thereby accept themselves as being normal (Robinson, 2017). These studies reporting the pervasiveness of body size misperceptions in both directions of under- and overestimations indicate the importance of subjective body size in understanding women's body image. Therefore, it is important to identify whether objective or subjective body size is significantly related to body image perceptions and health-related behavior intentions after controlling the other variables.

## 1.2 Current Study

Maintaining a healthy body and cultivating a positive body image become increasingly important for supporting a prolonged life expectancy. Whilst the associations among age, objective body size, body (dis)satisfaction, and weight management behaviors have been well documented with a variety of samples across various life stages and from different countries (Bibiloni et al., 2017), there is little research on how age is related to women's positive body image and behavioral intentions to have a healthy body. In addition, the interactive effects of age and body size on body-related perceptions and behavior intentions remain unexplored even though most women experience significant changes in their body size as they age.

This study primarily aimed to examine the associations of age, body size (objective versus subjective), and the interaction terms of age and body size (objective versus subjective) with body appreciation and health-related behavioral intentions among Korean women. Based on the existing literature, our research questions are:

**RQ1:** Does the combination of age and objective/subjective body size predict body appreciation after controlling subjective/objective body size among Korean women?

**RQ2:** Does the combination of age and objective/subjective body size predict health-related behavioral intentions after controlling subjective/objective body size among Korean women?

## 2. Method

### 2.1 Participants and Procedure

This study adopted a cross-sectional research design with a convenience sampling method. Participants were recruited through a marketing research firm in Korea and the survey invitation email was sent to female adults. Participants were limited to adult women over age 20 because women are more likely to be concerned about their body size and body image than men. Upon completing the online survey questionnaire, participants received membership points from the marketing research firm as an incentive. Based on the sample size rule of thumb for multiple regression ( $N > 50 + 8 \times$  number of predictors; Green, 1991), a minimum of 90 participants are required for data analysis. The final sample of this study consisted of 531 women living in various

locations in Korea. Their ages ranged from 20 to 77 ( $M = 46.87$ ,  $SD = 14.35$ ) and BMIs ranged from 15.43 to 36.51 ( $M = 22.38$ ,  $SD = 3.29$ ). The majority of participants had a bachelor's degree (52.4%) and were employed (51.8%). The institutional review board of the author's university approved this study, and an online informed consent was obtained from all participants.

### 2.2 Measures

#### 2.2.1 Objective and subjective body size

Objective body size was assessed by calculating the individual's BMI based on self-reported height and weight (underweight:  $n = 58$ , 10.9%; normal weight:  $n = 261$ , 49.2%; overweight:  $n = 104$ , 19.6%; obese:  $n = 108$ , 20.3%). Subjective body size was assessed with one item: 'How do you think of yourself in terms of body size?' About 8.3% of participants ( $n = 44$ ) perceived themselves as underweight, 42.7% as normal and healthy weight ( $n = 227$ ), 37.5% as overweight ( $n = 199$ ), and 11.5% as obese ( $n = 61$ ). Similar to previous studies (Sonneville et al., 2016), the underweight and normal/healthy weight categories and the overweight and obese categories were collapsed for both objective and subjective body size, resulting in two groups for each variable (under/normal weight and overweight/obese).

#### 2.2.2 Body appreciation

Ten items of the State Body Appreciation Scale-2 (SBAS-2) from Homan (2016) were used to assess participants' perceived levels of positive body image. Participants reported how they felt about various aspects of their bodies (e.g., 'right now, I respect my body') on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The internal consistency of this scale was highly acceptable in this study (Cronbach's alpha = .93).

#### 2.2.3 Behavioral intentions to have a healthy body

To measure participants' behavioral intentions towards a healthy body, three subscales of behavioral intentions to change their diet (BI-diet, 3 items), be more active (BI-active, 3 items), and manage weight (BI-weight, 3 items) were adopted from Ogden and Arulgnanaseelan (2017). Participants' responses were rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach's alphas were .80 for BI-diet, .87 for BI-active, and .72 for BI-weight in this study.

#### 2.2.4 Demographics

Participants self-reported their age, occupations, annual household income, height (cm), and weight (kg). Height and weight data were used to calculate BMI ( $\text{kg}/\text{m}^2$ ).

### 2.3 Data Analysis

Data analysis was performed using SPSS 24 for descriptive statistics, correlations, and hierarchical regressions. Prior to the primary data analysis, five assumptions of linear regression were examined by testing scatter plots, skewness (less than 3.00), and kurtosis (less than 10.00)

for all variables (Kline, 2010), tolerance (greater than .1) and Variance Inflation Factor (VIF less than 10) (Hair et al., 2010), the values of Durbin-Watson's  $d$  ( $1.5 < d < 2.5$ ) (Savin & White, 1977), and scatter plots of residuals versus each independent variable. These results confirmed that all of the assumptions were satisfactory.

Separate hierarchical linear regression analyses were performed on body appreciation and three behavioral intentions as criterion variables. For all regression models, predictor variables were entered at each step in the following order: (a) age at step 1, (b) objective body size at step 2, (c) subjective body size at step 3, and (d) interactions between age, objective, and subjective body size at step 4. The effect size of each regression model was calculated with Cohen's  $f^2$ . According to Cohen's (1988) guidelines,  $f^2$  values of .02, .15, and .35 indicate small, medium, and large effects, respectively.

Based on the results of the hierarchical regression analysis, the significant interaction terms were further examined using the PROCESS macro (Model 1) in SPSS (Hayes, 2013). To report standardized coefficients,  $z$ -scores for each variable were used for the analysis.

### 3. Results

#### 3.1 Preliminary Analyses

Exploratory factor analysis (EFA) conducted on body appreciation, BI-diet, BI-active, and BI-weight extracted one factor for each variable with eigenvalues greater than 1. Factor loadings ranged from .60 to .87 for body appreciation, from .61 to .83 for BI-diet, from .80 to .87 for BI-active, and from .59 to .85 for BI-weight. The results of EFA and the Cronbach alphas for each variable ( $\geq .70$ ; Nunnally, 1978) supported the structural validity and reliability of the measures used in this study.

The means, standard deviations, and inter-correlations of the research variables are presented in Table 1. Age was positively associated with body appreciation ( $r = .17, p < .001$ ), but negatively associated with BI-active ( $r = -.15, p < .001$ ) and BI-weight ( $r = -.16, p < .001$ ). Both objective and subjective body size were negatively associated with body appreciation (objective body size:  $r = -.22, p < .001$ ; subjective body size:  $r = -.27, p < .001$ ), but positively associated with BI-diet (objective body size:  $r = .12, p < .01$ ; subjective body size:  $r = .15, p < .001$ ) and BI-weight (objective body size:  $r = .28, p < .001$ ; subjective body size:  $r = .30, p < .001$ ).

#### 3.2 Hierarchical Multiple Regression

A summary of the hierarchical regression examining the associations between age, objective body size, and subjective body size on body appreciation is presented in Table 2. The significant positive effect of age and the negative effect of objective body size on body appreciation were found in step 2. However, as subjective body size was entered into the model in step 3, objective body

size was not associated with body appreciation. The addition of the interaction terms (in step 4) explained the significant additional variance for body appreciation. In step 4, only subjective body size and the interaction between age and subjective body size were revealed as significant. Higher levels of subjective body size were associated with lower levels of body appreciation. For the final model in step 4, the global effect size of Cohen's  $f^2$  was .14, representing a small effect size.

A summary of the hierarchical regressions examining the associations between age, objective body size, and subjective body size on behavioral intentions to change diet (BI-diet) are presented in Table 3. The significant positive effect of objective body size on BI-diet was found in step 2. However, in step 3, when subjective body size was entered into the model, objective body size was no longer associated with BI-diet. The addition of the interaction terms (in step 4) did not explain the model's additional variance. For the final model in step 4, the global effect size of Cohen's  $f^2$  was .02, representing a small effect size.

A summary of the hierarchical regression examining the associations between age, objective body size, and subjective body size on behavioral intentions to be more active (BI-active) is presented in Table 4. In steps 2 and 3, objective and subjective body size were not associated with BI-active, controlling age. The addition of interaction terms revealed a significantly greater variance of the model (in step 4). Overall, age and subjective body size showed significant negative associations with BI-active. The interaction of age and subjective body size was also revealed to have a significant role in predicting BI-active. For the final model in step 4, the global effect size of Cohen's  $f^2$  was .04, representing a small effect size.

A summary of the hierarchical regression examining the associations between age, objective body size, and subjective body size on behavioral intentions to manage weight (BI-weight) is presented in Table 5. In step 2, age negatively and objective body size positively predicted BI-weight. As subjective body size was entered in step 3, the standardized regression coefficient of objective body size decreased; yet was still significant. The addition of interaction terms (in step 4) did not explain the significant additional variance for BI-weight. However, the significant effect of the interaction between age and subjective body size on BI-weight was found in step 4. For the final model in step 4, the global effect size of Cohen's  $f^2$  was .16, representing a medium effect size.

#### 3.3 Moderation Analyses

A hierarchical regression analysis revealed that the interaction between age and subjective—not objective—body size had significant effects on body appreciation, BI-active, and BI-weight. The significance of the moderating effects of subjective body size on the associations between age and these three criterion variables were fur-



**Table 1**

*Means, Standard Deviations, and Correlations between Study Variables (N = 531)*

Variables	Mean (SD)	Correlations						
		1	2	3	4	5	6	7
1. Age	46.87 (14.35)	1						
2. Objective body size	1.40 (.49)	.07	1					
3. Subjective body size	1.49 (.50)	.05	.71***	1				
4. Body appreciation	3.30 (.70)	.17***	-.22***	-.27***	1			
5. BI-diet	3.88 (.71)	-.04	.12**	.15***	-.01	1		
6. BI-active	3.88 (.64)	-.15***	-.01	.02	.16***	.53***	1	
7. BI-weight	3.97 (.65)	-.16***	.28***	.30***	-.14**	.58***	.51***	1

*Note.* BI-diet=behavioral intention to change diet, BI-active=behavioral intention to be more active, BI-weight=behavioral intention to manage weight.

\*\* $p < .01$ , \*\*\* $p < .001$ .

**Table 2**

*Summary of Hierarchical Regression Analysis Predicting Body Appreciation*

Variable	Step 1 <sup>a</sup>		Step 1 <sup>b</sup>		Step 1 <sup>c</sup>		Step 1 <sup>d</sup>	
	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI
Age	.17***	[.00, .01]	.19***	[.00, .01]	.19***	[.00, .01]	-.10	[-.02, .01]
Objective Body Size			-.23***	[-.45, -.21]	-.07	[-.26, .08]	.08	[-.53, .87]
Subjective Body Size					-.23***	[-.49, -.16]	-.69**	[-1.64, -.38]
Age $\times$ Objective Body Size							-.21	[-.02, .01]
Age $\times$ Subjective Body Size							.64*	[.00, .03]
$\Delta R^2$	.03***		.05***		.03***		.01*	
$F$ for $\Delta R^2$	15.74***		31.28***		16.34***		3.65*	

*Note.* BI-diet=behavioral intention to change diet, BI-active=behavioral intention to be more active, BI-weight=behavioral intention to manage weight.

Standardized regression coefficients and confidence intervals from bootstrapped analyses are presented.

<sup>a</sup> $R^2 = .03$ ,  $F(1, 529) = 15.74***$ ; <sup>b</sup> $R^2 = .08$ ,  $F(2, 528) = 23.96***$ ; <sup>c</sup> $R^2 = .11$ ,  $F(3, 527) = 21.88$ ; <sup>d</sup> $R^2 = .12$ ,  $F(5, 525) = 14.72***$ .

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

**Table 3**

*Hierarchical Regression Analysis Predicting BI-diet*

Variable	Step 1 <sup>a</sup>		Step 1 <sup>b</sup>		Step 1 <sup>c</sup>		Step 1 <sup>d</sup>	
	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI
Age	-.04	[-.01, .00]	-.04	[-.01, .00]	-.04	[-.01, .00]	-.04	[-.02, .01]
Objective Body Size			.12**	[.05, .28]	.03	[-.14, .23]	.11	[-.57, .90]
Subjective Body Size					.13*	[-.00, .36]	.06	[-.65, .80]
Age $\times$ Objective Body Size							-.10	[-.02, .01]
Age $\times$ Subjective Body Size							.09	[-.01, .02]
$\Delta R^2$	.00		.01**		.01*		.00	
$F$ for $\Delta R^2$	0.68		7.66**		4.26*		0.06	

*Note.* BI-diet=behavioral intention to change diet, BI-active=behavioral intention to be more active, BI-weight=behavioral intention to manage weight.

Standardized regression coefficients and confidence intervals from bootstrapped analyses are presented.

<sup>a</sup> $R^2 = .00$ ,  $F(1, 529) = 0.68$ ; <sup>b</sup> $R^2 = .02$ ,  $F(2, 528) = 4.17**$ ; <sup>c</sup> $R^2 = .02$ ,  $F(3, 527) = 4.22**$ ; <sup>d</sup> $R^2 = .02$ ,  $F(5, 525) = 2.55*$ .

\* $p < .05$ , \*\* $p < .01$ .

Table 4

*Hierarchical Regression Analysis Predicting BI-active*

Variable	Step 1 <sup>a</sup>		Step 1 <sup>b</sup>		Step 1 <sup>c</sup>		Step 1 <sup>d</sup>	
	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI
Age	-.15***	[-.01, .00]	-.15***	[-.01, .00]	-.15***	[-.01, .00]	-.46**	[-.03, -.01]
Objective Body Size			-.00	[-.12, .11]	-.04	[-.21, .12]	.23	[-.32, .93]
Subjective Body Size					.05	[-.11, .22]	-.55*	[-1.34, -.08]
Age $\times$ Objective Body Size							-.37	[-.02, .01]
Age $\times$ Subjective Body Size							.83**	[.00, .03]
$\Delta R^2$	.02***		.00		.00		.02**	
<i>F</i> for $\Delta R^2$	12.84***		0.01		.69		4.84**	

Note. BI-diet=behavioral intention to change diet, BI-active=behavioral intention to be more active, BI-weight=behavioral intention to manage weight.

Standardized regression coefficients and confidence intervals from bootstrapped analyses are presented.

<sup>a</sup> $R^2 = .02$ ,  $F(1, 529) = 13.56^{***}$ ; <sup>b</sup> $R^2 = .11$ ,  $F(2, 528) = 32.71^{***}$ ; <sup>c</sup> $R^2 = .13$ ,  $F(3, 527) = 26.66^{***}$ ; <sup>d</sup> $R^2 = .14$ ,  $F(5, 525) = 17.05^{***}$ .

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Table 5

*Hierarchical Regression Analysis Predicting BI-weight*

Variable	Step 1 <sup>a</sup>		Step 1 <sup>b</sup>		Step 1 <sup>c</sup>		Step 1 <sup>d</sup>	
	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI
Age	-.16***	[-.01, .00]	-.18***	[-.01, .00]	-.18***	[-.01, .00]	-.37**	[-.03, -.01]
Objective Body Size			.29***	[.28, .49]	.15*	[.05, .35]	.34	[-.06, .99]
Subjective Body Size					.21***	[.12, .41]	-.20	[-.78, .25]
Age $\times$ Objective Body Size							-.26	[-.02, .01]
Age $\times$ Subjective Body Size							.56*	[.00, .02]
$\Delta R^2$	.02***		.09***		.02***		.01	
<i>F</i> for $\Delta R^2$	13.56***		50.59***		13.06***		1.42	

Note. BI-diet=behavioral intention to change diet, BI-active=behavioral intention to be more active, BI-weight=behavioral intention to manage weight.

Standardized regression coefficients and confidence intervals from bootstrapped analyses are presented.

<sup>a</sup> $R^2 = .02^{***}$ ,  $F(1, 529) = 12.84^{***}$ ; <sup>b</sup> $R^2 = .02$ ,  $F(2, 528) = 6.41^{**}$ ; <sup>c</sup> $R^2 = .03$ ,  $F(3, 527) = 4.50^{**}$ ; <sup>d</sup> $R^2 = .04$ ,  $F(5, 525) = 4.68^{***}$ .

\*\* $p < .01$ , \*\*\* $p < .001$ .

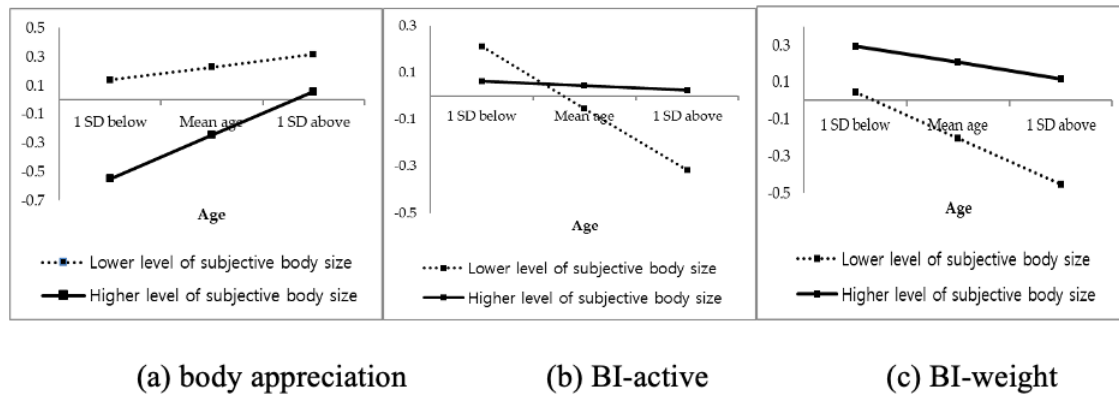
ther tested. In this analysis, objective body size was used as a covariate. When controlling for objective body size, subjective body size was found to moderate the relationships between age and body appreciation:  $R^2 = .12$ ,  $F(4, 526) = 18.29$ ,  $p < .001$ ;  $b_{\text{int}} = .11$ ,  $p < .01$ , BI-active  $R^2 = .04$ ,  $F(4, 526) = 5.46$ ,  $p < .001$ ;  $b_{\text{int}} = .12$ ,  $p < .01$ , and BI-weight  $R^2 = .14$ ,  $F(4, 526) = 21.10$ ,  $p < .001$ ;  $b_{\text{int}} = .08$ ,  $p < .05$ .

Simple slopes tests for the associations between age, and the three criterion variables were conducted for high and low subjective body size (1 *SD* above the mean and 1 *SD* below the mean, respectively; see Figure 1). The results revealed that for women with higher levels of subjective body size, older ages were associated with high-

er levels of body appreciation,  $b_{\text{simple}} = .30$ ,  $p < .001$ . However, for women with lower levels of subjective body size, the association between age and body appreciation was not significant,  $b_{\text{simple}} = .09$ ,  $p = .11$ . The associations between age and BI-active were not significant for women with higher levels of subjective body size ( $b_{\text{simple}} = -.02$ ,  $p = .77$ ), but were negative and significant for those with lower levels of subjective body size ( $b_{\text{simple}} = -.26$ ,  $p < .001$ ). Similarly, the associations between age and BI-weight were not significant for women with higher levels of subjective body size ( $b_{\text{simple}} = -.09$ ,  $p = .15$ ), but were negative and significant for those with lower levels of subjective body size ( $b_{\text{simple}} = -.25$ ,  $p < .001$ ).

Figure 1

Interaction plots of (a) body appreciation, (b) BI-active, and (c) BI-weight by age and subjective body size



Note. BI-diet=behavioral intention to change diet, BI-active=behavioral intention to be more active, BI-weight=behavioral intention to manage weight.

#### 4. Discussion

The current study examined the associations of age, body size, and the interaction terms of age and body size with body appreciation and health-related behavioral intentions among Korean women. Even though previous studies have supported the significant associations between body size, in terms of both objective and subjective body size, body image perceptions, and behavior intentions, no study to our knowledge has identified the interaction effects of age and objective/subjective body size on body appreciation and behavior intentions to have a healthy body. In addition, it is still not clear whether objective or subjective body size plays a more critical role in those dependent variables. Therefore, the current study performed a series of hierarchical regressions with body appreciation and three behavioral intentions as the criterion variables, and age, objective body size, subjective body size, and the interactions between age and objective/subjective body size as predictors.

Consistent with previous studies (Lee & Lee, 2019b), the results of this study confirmed that subjective body size is more detrimental to body-related perceptions and behaviors than objective body size. A series of hierarchical regressions revealed significant predictive relationships between subjective body size and all criterion variables, except for BI-active, after controlling objective body size. The relative contribution of subjective body size over objective body size may result from an increase in body size misperceptions among women in contemporary Korean society (Kim et al., 2008).

In addition, this study contributes to the existing literature about body image development across one's life span by identifying different patterns in the associations between age and body appreciation based on women's subjective body size perceptions. Researchers have explained that a number of other aspects of women's bod-

ies and lives become more important than appearance as they age, and this can result in positive associations between age and body image (Karazsia et al., 2017). Tiggemann and McCourt (2013) also reported a positive correlation between age and body appreciation with a sample of U.S. adult women in their cross-sectional study. Extending these previous studies, the findings of this study showed that changes in women's body appreciation and behavioral intentions to be more active and manage weight as they age differed according to their subjective body size perceptions. Our findings clarify the significant moderating effect of subjective body size on the association between age and body appreciation, that is, we found significant positive associations between age and body appreciation among women with higher levels of subjective body size whereas no significant association was found among women with lower levels of subjective body size, replicating and extending previous research (Tiggemann & McCourt, 2013). However, in view of our results, we should note that the levels of body appreciation are consistently shown to be lower for overweight and obese women than underweight and normal weight women, in terms of subjective body size.

For those women who categorized themselves as underweight and normal weight, intentions to be more active and manage weight significantly decreased as they aged. An important finding from this study is that subjective body size moderated the associations between age and behavioral intentions to be more active and manage weight. Overall, we found negative associations between age and behavioral intentions to be more active and manage weight, which is consistent with previous research (Clarke et al., 2017). Regarding the moderating effect of subjective body size, these negative associations between age and behavioral intentions to have a healthy body were only significant for women with lower levels of subjective body size. In contrast, for women who

perceive themselves as overweight and obese, intentions to be more active and manage weight did not significantly decrease across their life span. Older women who are overweight and obese are at higher risk of many health problems than normal weight women (Stommel & Schoenborn, 2010) and, thus, they may be more concerned with physical activities and weight management. Interestingly, the findings revealed no significant association between age and behavioral intention to change diet. This might be explained by the social trend towards healthy eating in Korea (Kim et al., 2013).

The findings of this study imply that our public health strategies to enhance healthy body image should focus more on women who perceived themselves as being underweight and of normal weight. Researchers and public health administrators should take one's subjective body size into consideration to develop effective health programs to enhance women's positive body image and encourage their behavioral intentions to have a healthy body.

#### 4.1 Limitations and Future Directions

We suggest several topics for future research based on the limitations of our study. First, future studies should investigate the associations among age, subjective body size, and body-related perceptions and behaviors, based on samples that consist of diverse ethnicities and cultural backgrounds. The results of this study can only be affirmed with high accuracy within Korean culture. As each society has its own standards for ideal appearance, women from different cultures may have different body-related perceptions (Bakhshi, 2011). Second, future research focusing on male samples could provide a broader understanding of the nature of age- and body size-related body image and behavioral intentions to have a healthy body. With the continual increase in life expectancy, concerns for healthy living in later life also continue to increase. Based on the widely accepted notion that women live longer than men (Chrisler et al., 2016) and that body concerns are of greater importance for women (Karazsia et al., 2017), the current study focused on female samples. However, enhanced longevity is also projected among Korean men (Kontis et al., 2017), and recent studies have reported that body concerns and problems are among the most important issues affecting men (Lee & Lee, 2019a). Third, it is also worth noting that the proportion of people categorized as underweight based on their BMI calculation has increased in both men and women in Korea (Park et al., 2013). Given the risk levels for depression and the fact that health issues are also predominant for people who are underweight (de Wit et al., 2009), further attention on this particular group is warranted. Fourth, further research needs to focus in more depth on how to enhance women's behavioral intentions to have a healthy body. As body image is a complex concept and it is influenced

by various sociodemographic and sociocultural factors, future studies should consider more personal and social factors to suggest detailed directions for public health strategies. Lastly, the results of this study should be carefully interpreted due to its cross-sectional research design. The significant age effects on behavioral intentions to be more active and manage weight found in this study can only indicate the differences in those dependent variables among different age groups. Further longitudinal studies to determine body image within the same person will expand our understanding of the effects of aging on women's body-related perceptions and behaviors.

## 5. Conclusions

Body and health-related issues are undoubtedly a lifetime concern for many women. Supported by the life course theory, women experience significant changes to their body size as they age, and these changes can be major determinants of their body perceptions and health-related behavioral intentions. Consistently, the findings of this study indicated that age is significantly related to women's body appreciation and behavioral intentions to be more active and manage weight. The suggested research questions were answered with the hierarchical regression and moderation analyses, that is, this study identified that the associations of age with body appreciation, behavioral intentions to be more active and manage weight significantly differ according to one's subjective body size, controlling for objective body size. The current study is important for targeting interventions for adult women to enhance positive body image and behavioral intentions to be healthier.

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