

# Increasing effect of body weight perception on suicidal ideation among young Korean women: Findings from the Korea National Health and Nutrition Examination Survey 2001 and 2005

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**Objective:** To examine the prevalence of actual and perceived overweight and to compare the mediating effect of perceived overweight on the relationship between actual overweight and suicidal ideation among young Korean women between 2001 and 2005.

**Methods:** Data were gathered from the 2001 and 2005 Korean National Health and Nutrition Examination Surveys involving a nationally representative sample of young women (568 in 2001 and 385 in 2005) aged 20–29 years.

**Results:** Over the 5-year period, the prevalence of actual overweight (body mass index  $\geq 23$  kg/m<sup>2</sup>) and perceived overweight increased by 10.5% and 22.8%, respectively. The discrepancy between actual and perceived body weights was much wider in 2005 than in 2001. After controlling for covariates (age, marital status, educational attainment, employment status, smoking status, alcohol consumption, and regular exercise), overweight women were more likely to think about suicide than their normal-weight counterparts in both periods. However, in both periods, the association between overweight and suicidal ideation became nonsignificant when perceived weight was considered. In both periods, a self-perception of overweight was associated with an increased risk of suicidal ideation, but the association was much stronger in 2005 than in 2001.

**Conclusion:** This study suggests a need for educational programs or effective treatments to help young women who perceive themselves as overweight to reduce the potential risk of suicidal ideation in later life.

**Keywords:** body mass index, perceived body weight, body weight, body image, suicidal ideation

## Introduction

Most industrialized countries, including Korea, have undergone a rapid nutritional transition, leading to an increase in the number of overweight women.<sup>1</sup> Meanwhile, Korean women are becoming increasingly concerned with their body image, and the thin, Western ideal body image has become an important standard of comparison in the context of social interactions.<sup>2</sup> However, recently, a substantial difference between the rates of increase among adult Korean women who are overweight in terms of body mass index (BMI) and body weight perception (BWP) has appeared. Between 2001 and 2005, the prevalence of overweight BMI ( $\geq 23$  kg/m<sup>2</sup>)<sup>3</sup> among Korean women older than 20 years increased by 3.3%, whereas the prevalence of overweight BWP increased by 18.0%.<sup>4</sup> Nonetheless, in both periods, the prevalence of overweight BMI was around 1.3 times higher than the prevalence of overweight BWP. However, this prevalence is based on the

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total number of adult women. I believe that young women in their 20s could reveal a reverse pattern; namely, the prevalence of overweight BWP might be higher than the prevalence of overweight BMI, because this population is most likely to face strong sociocultural pressure, which underscores the value placed on a slim body, to be thin compared with those aged in their 30s, 40s, and 50s. This pressure has become increasingly common in recent years and might cause a wide discrepancy between actual and perceived body weights among young women. According to a recent study by Wardle et al,<sup>5</sup> female Korean college students aged 17–30 years had a lower mean BMI but a higher prevalence of dieting than corresponding Western and other Asian populations. This phenomenon may be partly influenced by BWP. In particular, social-comparison jealousy, which involves being envied by others and feeling envy toward others, is reportedly one major factor leading to suicide.<sup>2,6</sup> Researchers have already investigated BWP as an important mediator of the relation between overweight and suicidal ideation in Western societies.<sup>7</sup> In 2006, suicide was the leading cause of death among Korean women aged 20–29 years,<sup>8</sup> but this issue has remained understudied in Korea. To my knowledge, no previous studies of young women have investigated the mediating effect of BWP on BMI and suicidal ideation over time. The current study evaluated BMI and BWP among young Korean women and investigated the mediating effects of BWP on the relation between actual overweight and suicidal ideation in 2001 and 2005.

## Methods

This study was based on data gathered from the Korean National Health and Nutrition Examination Surveys (KNHNES), which was conducted in 2001 and 2005 by the Korean Ministry of Health and Welfare according to regulations in the National Health Promotion Act. The survey is a nationally representative study that uses a stratified, multistage, probability-sampling design for the selection of household units. It consists of four parts: the Health Interview Survey, the Health Behavior Survey, the Health Examination Survey, and the Nutrition Survey. Further details regarding the survey design and methods have been given elsewhere.<sup>4</sup> The current analysis included data from female respondents aged 20–29 years only. Of these, 65 of the 633 women (10.3%) in 2001 and 17 of the 402 women (4.2%) in 2005 did not provide important data, such as responses to questions about BWP and suicidal ideation, and were thus excluded from the current study. Consequently, the final dataset used for analysis contained information for 568 women in 2001 and 385 women in 2005, respectively.

## Measures

### Suicidal ideation

Consistent with previous studies,<sup>9,10</sup> self-reported suicidal ideation as a dependent variable was ascertained by asking, “Have you ever thought of killing yourself during the past 12 months?” with a choice of yes or no for an answer.

### BMI

Height and weight were measured to the nearest 0.1 cm and 0.1 kg, respectively, using a portable stadiometer and a portable digital scale, to calculate BMI ( $\text{kg}/\text{m}^2$ ) during the Health Examination Survey. The Asia–Pacific BMI criterion suggested by the World Health Organization was used for the analysis.<sup>3</sup> Therefore, participants were categorized as underweight ( $<18.5$ ), normal weight (18.5–22.9), or overweight ( $\geq 23.0$ ).

### BWP

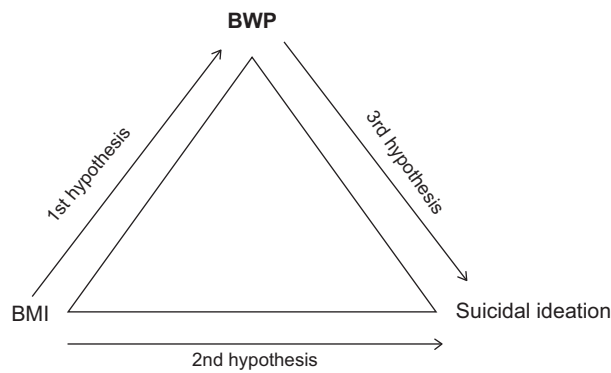
Participants were asked to rate their perceptions of body weight using a 5-point answer scale: very underweight, slightly underweight, about the right weight (hereafter referred to as “normal weight”), slightly overweight, and very overweight. Participants were then classified as underweight (“slightly and very underweight”), normal weight, or overweight (“slightly and very overweight”).

### Other covariates

The Health Behavior Survey of KNHNES also provides important information associated with suicidal ideation, such as age, marital status, educational attainment, employment status, current smoking status, current alcohol consumption, and regular exercise. Age was not categorized because of a limited age range. Marital status was classified into married and unmarried status. Educational attainment was classified into high school or less and college or more. Employment status was divided into nonmanual, manual, and unemployed. Smoking status, alcohol consumption, and regular exercise were determined by asking whether respondents currently smoke cigarettes, drink alcohol, and do regular exercise. Each variable was dichotomized into smoker/drinker/regular exercise and nonsmoker/nondrinker/regular exercise.

### Statistical analysis

Figure 2A presents the prevalence of BMI and BWP in 2001 and 2005; Figure 2B, the prevalence of BMI and BWP in 2005 in comparison with those in 2001. Differences in



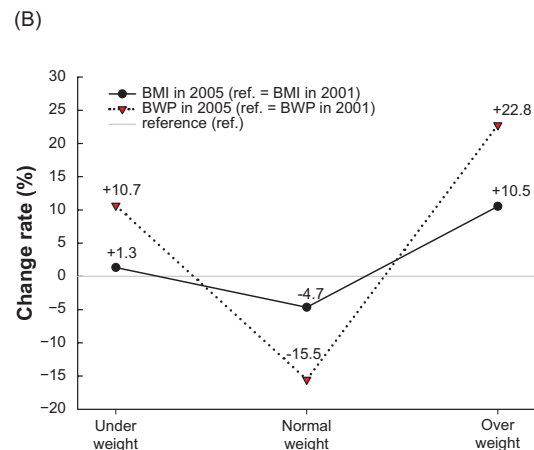
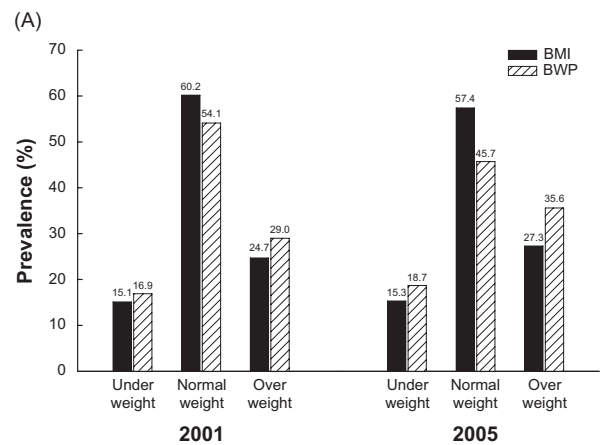
**Figure 1** Three hypotheses of the test for mediation effect of BWP on the association between BMI and suicidal ideation.

**Abbreviations:** BMI, body mass index; BWP, body weight perception.

the mean of each BMI category between 2001 and 2005 were calculated using *t*-tests, and differences in the mean prevalences of suicidal ideation between 2001 and 2005 were calculated using chi-square tests. Logistic regression analyses were performed to test the mediating effect of BWP on the associations of BMI and suicidal ideation by confirming the three hypotheses proposed by Baron and Kenny:<sup>11</sup> First hypothesis, BMI is related to BWP; second hypothesis, BMI is related to suicidal ideation; and third hypothesis, BWP is related to suicidal ideation, controlling for BMI, and the significant association between BMI and suicidal ideation is weaker when BWP is considered than when BWP is not added (Figure 1). All analyses were carried out using SAS (version 9.1; SAS Institute, Cary, NC).

## Results

Figures 2A and 2B show BMI and BWP between 2001 and 2005. Overall, the mean (standard deviation) BMI was 21.3 (3.1) in 2001 and 21.6 (3.4) in 2005, respectively. The prevalence of normal-weight BMI decreased by 4.7% (from 60.2% to 57.4%), whereas the prevalence of overweight BMI increased by 10.5% (from 24.7% to 27.3%). Over the same period, the prevalence of normal-weight BWP decreased by 15.5% (from 54.1% to 45.7%), whereas the prevalence of overweight BWP increased by 22.8% (from 29.0% to 35.6%). In contrast to overall trends among adult women (overweight BMI exceeding overweight BWP), a reverse pattern (overweight BWP exceeding overweight BMI) appeared among young women in both periods. As expected, the discrepancy between BMI and BWP according to weight status was wider in 2005 than in 2001. No significant differences were found between the prevalences of suicidal ideation in 2001 and 2005.



**Figure 2** Prevalence of BMI and BWP in 2001 and 2005 (A) and prevalence of BMI and BWP in 2005 in comparison with those in 2001 (B) among young Korean women aged 20–29 years.

**Abbreviations:** BMI, body mass index; BWP, body weight perception.

Table 1 shows that compared with normal-weight women, underweight women tended to perceive themselves as underweight, and overweight women tended to perceive themselves as overweight, which supports the first hypothesis of mediation ( $P < 0.01$ ).

In the left-hand panel of Table 2, unadjusted odds ratios (ORs) in both periods showed a significant association between suicidal ideation among women with overweight BMI and suicidal ideation among women with overweight BWP (ie, the second hypothesis of mediation was accepted) ( $P < 0.05$ ). In the right-hand panel of Table 2, Model 1 (without BWP) indicated that the BMI pattern was similar to the unadjusted results in both periods, with control of covariates. Women with an overweight BMI in 2005 (OR, 2.54; 95% confidence interval [CI]: 1.35–4.81) were more likely to have suicidal ideation than those with an overweight BMI in 2001 (OR, 1.73; 95% CI: 1.07–2.79). However, the association between overweight BMI and suicidal ideation in both periods became

**Table 1** Unadjusted odds ratios (ORs) and 95% confidential intervals (CIs) for the association between body mass index (BMI) and body weight perception (BWP) in 2001 and 2005

	2001 KNHANES				2005 KNHANES			
	BWP				BWP			
	Underweight compared to normal weight		Overweight compared to normal weight		Underweight compared to normal weight		Overweight compared to normal weight	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
BMI								
Normal weight	1.00		1.00		1.00		1.00	
Underweight	14.46*	(8.16–25.63)	0.17 <sup>†</sup>	(0.02–1.24)	24.86**	(11.50–53.78)	N/A	
Overweight	0.22	(0.03–1.64)	15.49*	(9.46–25.37)	0.71	(0.15–3.24)	13.26*	(7.28–24.13)

Notes: <sup>†</sup> $P < 0.1$ ; \* $P < 0.01$ .

Abbreviation: N/A, not available.

nonsignificant when BWP was added to Model 2 (ie, the third hypothesis of mediation was accepted), suggesting that BWP mediates the association (Table 2). In addition, an overweight BWP was moderately ( $P = 0.0770$  in 2001) or significantly ( $P = 0.0490$  in 2005) associated with an increased risk of suicidal ideation. Specifically, the OR for overweight BWP was greater in 2005 (OR, 2.20; 95% CI: 1.01–4.81) than in 2001 (OR, 1.68; 95% CI: 0.95–2.98).

## Discussion

This study demonstrated that overweight young women were more likely than their normal-weight counterparts to think about suicide, which supports the conclusions of previous studies.<sup>7,10,12,13</sup> It expands on the existing literature, which is normally based on self-reported height and weight and can lead to an underestimation of the association between BMI and suicidal ideation, especially in a female population,<sup>14</sup> because this study used anthropometric measurements. Notably, the significant association between overweight BMI and suicidal ideation was more obvious in 2005 than in 2001. This may be because the prevalence of overweight BMI (which is significantly associated with a higher likelihood of suicidal ideation) increased between 2001 and 2005, whereas the prevalence of normal BMI (which is significantly associated with a lower likelihood of suicidal ideation) decreased.

In both periods, however, the significant association between overweight BMI and suicidal ideation completely disappeared when BWP was considered. This finding was consistent with the study conducted by Eaton et al<sup>7</sup> and Kim et al,<sup>10</sup> which showed that BWP mediates the association between BMI and suicidal ideation among United States and Korean adolescents. Furthermore, overweight BWP was moderately and significantly associated with an elevated risk of suicidal ideation in 2001 and 2005, respectively, even after controlling for individual demographic and socioeconomic

characteristics and health-related behaviors. Of particular interest is the fact that the association was much stronger in 2005 than in 2001. This phenomenon may be, at least to some extent, associated with an increased prevalence of overweight BWP, which may in turn have promoted increased suicidal ideation among young women. Further study of long-term data will be required to identify whether the likelihood of suicidal ideation exhibits an upward or downward trend as the prevalence of perceived overweight changes.

In contrast to the findings of Eaton et al,<sup>7</sup> the present study did not find a significant association between underweight BWP and suicidal ideation. However, these findings should be interpreted with caution, because the two studies focused on different populations (adolescents in Eaton et al's study versus young adult women in this study), and Eaton et al did not analyze data according to gender. Indeed, Eaton et al used five categories (ranging from very underweight to very overweight), whereas the present study combined the "very underweight" category with the "slightly underweight" category and the "very overweight" category with the "slightly overweight" category, due to the small sample sizes of extreme perceptions of body weight. However, a study conducted by Whetstone et al,<sup>15</sup> using the same categories as the present study and using the data analyzed by Eaton et al, found a nonsignificant association between underweight BWP and suicidal ideation among girls, although BMI was not considered.

Although the findings of the present study, derived from a representative sample in Korea, can be generalized to BMI, BWP, and suicidal ideation among young Korean women, the study had some limitations. First, the findings cannot be interpreted directly in terms of the association between BWP and suicidal ideation in young women, because suicidal ideation usually results from the influence of multiple factors, such as family function, social support, and social capital.<sup>16</sup>

**Table 2** Distributions (%) and unadjusted/adjusted odds ratios (ORs) (95% confidence intervals, CIs) for young Korean women aged 20–29 years reporting suicidal ideation<sup>a</sup> by body mass index (BMI) and body weight perception (BWP) in the 2001 and 2005 Korean National Health and Nutrition Examination Survey (KNHANES)

	2001 KNHANES (N = 568)						2005 KNHANES (N = 385)							
	N	%	Unadjusted		Adjusted model 1 <sup>c</sup>		N	%	Unadjusted		Adjusted model 1 <sup>c</sup>			
			OR	(95% CI)	OR	(95% CI)			OR	(95% CI)	OR	(95% CI)		
BMI														
Normal weight	342	16.96	1.00		1.00		221	11.76	1.00		1.00		1.00	
Under weight	86	19.77	1.21	(0.66–2.20)	1.19	(0.65–2.18)	59	22.03	2.12*	(1.01–4.44)	1.84	(0.84–4.02)	1.77	(0.62–5.05)
Over weight	140	27.14	1.82*	(1.14–2.91)	1.73*	(1.07–2.79)	105	23.81	2.34*	(1.28–4.30)	2.54*	(1.35–4.81)	1.69	(0.79–3.62)
BWP														
Normal weight	307	15.96	1.00		1.00		176	10.23	1.00		1.00		1.00	
Under weight	96	19.79	1.30	(0.72–2.34)	1.29	(0.63–2.65)	72	19.44	2.12	(0.99–4.53)	2.68*	(1.43–5.01)	1.51	(0.55–4.13)
Over weight	165	27.27	1.97**	(1.25–3.13)	1.68†	(0.95–2.98)	137	23.36	2.68*	(1.43–5.01)	2.20*	(1.01–4.81)	2.20*	(1.01–4.81)

**Notes:** <sup>a</sup>P < 0.1; <sup>b</sup>P < 0.05; <sup>c</sup>P < 0.01; <sup>d</sup>19.9% females in 2001 and 16.6% females in 2005 reported thinking about suicide during the past 12 months; <sup>e</sup>Percentage of “non-suicidal ideation” was not presented in this table because the answer category was either “non-suicidal ideation” or “suicidal ideation”; <sup>f</sup>Model 1 was adjusted for age, marital status, educational attainment, employment status, smoking status, alcohol intake, and regular exercise; Model 2 was adjusted for Model 1 and BWP.

Therefore, multidimensional risk factors linked to suicidal ideation should be considered in future research. Second, few participants selected “very underweight (2.5% in 2001 and 2.3% in 2005)” and “very overweight (3.5% in 2001 and 5.5% in 2005)”, the “very underweight” category was collapsed into the “slightly underweight” and “very overweight” category was merged with the “slight overweight” category, though those with extreme perceptions of body size could be at elevated risk for mental health disorders, including suicidal ideation.<sup>7,13</sup> Thus, further effort to clarify the link between extreme BWPs and suicidal ideation are required. Third, this study used data from the 2001 and 2005 KNHANES, respectively. However, the study sample sizes between two periods were different due to the fact that the original sample sizes of both periods were different (much higher original sample sizes in 2001 than that in 2005). Thus, its different sample size may affect the internal and external validity of this study, though the samples of both periods were based on the same stratified probability-sample design. Finally, the time frames of suicidal ideation (the 12-month period before each survey) and BMI and BWP (measured at the time of the survey) differed, and because the associations of BMI and BWP with suicidal ideation were based on cross-sectional data in both periods, their causality cannot be determined. To identify underlying causal mechanisms, future research should consider the assembly of longitudinal data.

Despite these and other limitations, this study has produced an important finding: regardless of BMI, young women who perceive themselves as overweight are at greater risk for suicidal ideation, and the prevalence of perceived overweight has been increasing in recent years. Given the recent trend of overweight BMI and the desire for thinness among young Korean women, there is a strong likelihood that the increase in overweight BWP will continue. However, it is very difficult to implement public health policies aimed at regulating the sociocultural norms and value systems that contribute to the establishment of the slim female body as an ideal body image. Therefore, not only overweight women, but also normal-weight women who deviated greatly from the sociocultural ideal of body size could be vulnerable to a distorted BWP, which can lead women who have normal BMI to perceive themselves to be overweight. In particular, such a phenomenon in young adult women could, to some extent, be attributed to their feelings of alienation between expectation and uncertainty about their body size in the process of physical change in adolescence. BWP, especially overweight BWP, has been known as an important predictor for depression, anxiety, and psychological distress among

women across all age groups, but its health effect, in general, decreases as they age.<sup>13</sup> Thus, this study suggests a need for educational programs or effective treatments to help young women with overweight BWP to reduce the potential risk of suicidal ideation in later life.

## Disclosure

The author reports no conflicts of interest in this work.

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