

## RESEARCH ARTICLE

# Body Weight Perception, Unhealthy Weight Control Behaviors, and Suicidal Ideation Among Korean Adolescents

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## ABSTRACT

**BACKGROUND:** This study examined the mediating function of body weight perception (BWP) in the relation between body mass index (BMI) and unhealthy weight control behaviors (UWCBs; eg, fasting, using diet pills, or laxatives), and between BMI and suicidal ideation. It also explored the correlation between exposure to multiple UWCBs and suicidal ideation among Korean adolescents.

**METHODS:** Data on BMI, BWP, UWCBs, and suicidal ideation were obtained from the 2006 Korean Youth Risk Behavior Web-based Survey, a school-based survey conducted on a nationally representative sample of students in grades 7–12 (36,463 boys and 33,433 girls). Data were analyzed using bivariate and multivariate logistic regression.

**RESULTS:** BMI was significantly associated with both UWCB and suicidal ideation among boys and girls, even after controlling for covariates. However, the significance and magnitude of the association between BMI and UWCB were considerably attenuated when BWP was added to the model. When BWP was included, the association between overweight BMI status and suicidal ideation became nonsignificant in both sexes, whereas the association between underweight BMI status and suicidal ideation remained significant among boys. Adolescent boys and girls engaging in multiple UWCBs were at greater risk for experiencing suicidal thoughts.

**CONCLUSIONS:** This study suggests that BWP represents a potential mediator between BMI and UWCB, and between BMI and suicidal ideation among both boys and girls. Thus, school programs addressing issues related to BWP should be developed and targeted at adolescents to reduce the potential risks for both UWCB and suicidal behavior.

**Keywords:** adolescents; body weight perception; body mass index; unhealthy weight control behavior; suicidal ideation.

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The mortality rates for suicide among adolescents aged 10–19 years increased by 27% between 2001 and 2005, underscoring adolescent suicide as an important public health concern in South Korea (Korea hereafter).<sup>1</sup> Suicidal ideation has represented a particular focus of national suicide prevention strategies due to its correlation with both attempted and completed suicides among adolescents and young adults.<sup>2–5</sup> A great deal of research work has been published with regard to the risk factors associated with adolescent suicidal ideation, such as depression, health-related behaviors, academic performance, family functioning, and demographic and socioeconomic characteristics.<sup>6–10</sup>

Most of these studies, however, have not addressed the relation between suicidal ideation and experiences regarding the physical changes that characterize adolescence. That is, adolescents experience rapid physical changes that frequently lead to confusion concerning personal identity and perceived differences from same-sex peers. These may, in turn, affect body weight perception (BWP).<sup>11</sup> Failure to adapt to new physiques and dissatisfaction with body weight may contribute to the emergence of suicidal ideation and suicide attempts.<sup>12–18</sup> Furthermore, unhealthy weight control behaviors (UWCBs) (eg, fasting, vomiting, skipping meals, and using diet pills) have been identified as important predictors of suicidal ideation among adolescents.<sup>13–15</sup> A significant association between UWCB and suicidal ideation, on the one hand, and body mass index (BMI), on the other, has been well established.<sup>19,20</sup> However, little attention has been paid to whether BWP functions as a mediator in the relations between BMI and UWCB, and between BMI and suicidal ideation.

Eaton et al<sup>15</sup> found that the relation between BMI and suicidal ideation was mediated by BWP, and that an extreme BWP (ie, perception as either underweight or overweight) was significantly associated with suicidal ideation among high school students in the United States. Whetstone et al<sup>17</sup> replicated and expanded the study conducted by Eaton et al<sup>15</sup> and found sex differences in the relation between BWP and suicidal ideation in US middle school students, but did not include BMI as a covariate in this analysis. In addition, Eaton et al<sup>15</sup> and Whetstone et al<sup>17</sup> studied only high school students and only middle school students, respectively, rather than students within the full adolescent age spectrum. These authors have also acknowledged that their results were limited by the omission of several key variables related to suicidal ideation. For example, they did not control for depressed mood, sleeping pill use, and academic performance, thereby allowing for the possibility that both BWP and suicidal ideation may be related to these variables.<sup>7,9,21–23</sup> Previous studies<sup>14,15</sup> on the relation between UWCB and suicidal ideation have

divided UWCBs into extreme behaviors (eg, using diet pills or laxatives/diuretics, and vomiting) and other behaviors (eg, fasting, restricting food intake, using food substitutes, skipping meals, and smoking more cigarettes). Results have shown that both groups of behaviors were related to an increased risk of suicidal ideation among middle and high school boys and girls in the United States. However, the extent to which engaging in multiple UWCBs during a given period of time is associated with adolescent suicidal ideation remains unknown.

Employing a large representative sample of Korean adolescents enrolled in both high schools and middle schools, we aimed to examine the mediating function of BWP in the association between BMI and UWCB, as well as between BMI and suicidal ideation. Further, we investigated the association between engaging in multiple UWCBs and suicidal ideation.

## METHODS

### Data and Participants

Data from the 2006 Korean Youth Risk Behavior Web-based Survey conducted by the Korean Centers for Disease Control and Prevention (KCDC) were analyzed using a stratified multistage cluster sampling method in all regions of Korea. Information concerning personal identity was removed by the KCDC before the data set was released for public use. Based on the proportions of students located in each area, 400 middle schools and 400 high schools were selected. The survey proceeded as follows: during July, school teachers were trained to assist the students with participating in the survey; during August, the KCDC informed each school about the schedule for conducting the survey and provided certificate numbers for each student; and during September and October, students used their certificate numbers to access and complete questionnaires. Additional details regarding the survey design and methods have been provided elsewhere.<sup>24</sup>

Written consent was obtained from 71,404 students in grades 7–12, as well as their parents/legal guardians, for the former to participate in this study (response rate: 90.9%). However, data obtained from 1234 (1.7%) respondents were excluded due to missing information for important questions (eg, weight, height, BWP, and suicidal ideation), and data obtained from 274 (.4%) respondents were excluded because they did not meet the age criteria (ie, they were either younger than 13 or older than 19 years of age). Consequently, data obtained from 69,896 adolescents (36,463 boys and 33,433 girls) and their parents were available for analysis. This study received institutional review board approval from School of Public Health, Seoul National University.

## Instruments

Consistent with previous studies,<sup>14,15</sup> UWCB was determined with a 7-item inventory of behaviors. Respondents were asked, "Have you used the following methods in order to lose weight or keep from gaining weight during the past 30 days?: (1) fasted for at least 24 hours or more; (2) ate less; (3) took prescription diet pills; (4) took nonprescription diet pills; (5) took laxatives or diuretics; (6) vomited; and (7) ate only 1 food (1-food diet)" Respondents answered "yes" or "no" to each item. Responses were dichotomized into "yes" if respondents reported having engaged in at least 1 of the behaviors and "no" if they had engaged in none of these. Suicidal ideation was assessed by asking, "Have you ever seriously thought of killing yourself during the past 12 months?" Respondents could answer "yes" or "no."<sup>10,15-17</sup> Body mass index ( $\text{kg}/\text{m}^2$ ) was calculated on the basis of self-reported weight and height without clothes and shoes. Body mass index percentiles for age and gender were calculated according to the 1998 standard growth charts for Korean children and adolescents aged 2–18 years, published by the Korean Pediatric Society.<sup>25</sup> Three categories were created based on the BMI percentiles for age and gender: underweight ( $\leq 15$ th percentile), normal weight (16th–84th percentile), and overweight ( $\geq 85$ th percentile). Participants were asked to self-rate their BWP compared to their age-mates using a 5-point scale: very underweight, slightly underweight, about the right weight, slightly overweight, and very overweight. BWP was also classified into 3 groups to match the standard ways of categorizing BMI: underweight (very underweight and slightly underweight), about the right weight (approximately "normal weight"), and overweight (slightly overweight and very overweight). Responses to the 7 items related to UWCBs were divided into 4 categories when used to predict suicidal ideation: never, 1 method, 2 methods, and 3 or more methods.

Categorizations of other covariates, such as age (in years), living with both parents (yes or no), academic performance (low, middle, upper), parental educational attainment (middle school or less, high school, and college and beyond), perceived economic status (low, middle, and upper), current cigarette smoking (yes or no), current alcohol consumption (yes or no), current use of sleeping pills (yes or no), and depressed mood (yes or no) were significantly associated with both UWCB and suicidal ideation,<sup>9-11,26</sup> as presented in Table 1.

## Data Analysis

Separate analyses were conducted for boys and girls to address differences in the distributions of BMI, BWP, UWCB, and suicidal ideation according to gender.

Descriptive analysis was conducted to examine the univariate relations of significant factors, including those between BMI and BWP with UWCB and suicidal ideation, using chi-square tests and Student's *t* tests (Table 1).

Multivariate analyses were performed to confirm the mediating effects of BWP on the relation between BMI and UWCB, and between BMI and suicidal ideation. According to Baron and Kenny,<sup>27</sup> such associations would be required to meet the following conditions to be considered a mediating relation (Figure 1): BWP was significantly related to BMI (first condition; Table 2); BMI was significantly related to both outcomes (second condition; Model 1 of Tables 3 and 4); BWP was significantly related to both outcomes, controlling for the effects of BMI; and the significance of the relations between BMI and both outcomes decreased when BWP was added versus when BWP was not considered (third condition; Model 2 of Tables 3 and 4).

Although UWCB and suicidal thoughts were both analyzed as dependent variables, this study also treated engaging in UWCB as an additional predictor to explore whether engaging in UWCBs demonstrated unique associations with suicidal ideation (Model 3 of Table 4). Age, living with both parents, academic performance, parental educational attainment, perceived economic status, current cigarette smoking, current alcohol consumption, current use of sleeping pills, and depressed mood were largely controlled in the models. Weights originally provided by the KYRBS were employed to estimate the population parameters in both descriptive and multivariate analyses. All analyses were carried out using SAS (version 9.1; SAS Institute, Cary, N.C.).

## RESULTS

The gender-specific weighted percentage distributions of UWCBs and suicidal ideation by all key variables are provided in Table 1. In general, the prevalence of UWCBs and suicidal ideation was higher in girls (56.7% and 27.8%, respectively;  $p < .0001$ ) than in boys (31.2% and 19.2%, respectively;  $p < .0001$ ). Boys (35.5%) were more likely to perceive themselves as underweight than were girls (23.1%), whereas girls (26.5%) were more likely to perceive themselves as overweight than were boys (24.2%). High levels of BMI were positively associated with both UWCB and suicidal ideation, regardless of gender ( $p < .0001$ ). Body weight perception also showed a similar pattern in relation to UWCB ( $p < .0001$ ). However, adolescents who had extreme BWP, either underweight or overweight, were more likely to report suicidal ideation than those who perceived their BMI as about right ( $p < .0001$ ). Indeed, suicidal ideation was more

**Table 1. Weighted Percentage Distributions of UWCBs and Suicidal Ideation by BMI, BWP, and Other Independent Variables in Adolescent Boys and Girls**

	Boys (N = 36,463)					Girls (N = 33,433)				
	UWCBs		Suicidal Ideation		Unweighted Total N	UWCBs		Suicidal Ideation		Unweighted Total N
	%*	p†	%*	p†		%*	p†	%*	p†	
BMI										
Underweight	12.0		19.9		5801	26.1		26.7		5348
Normal weight	29.0	<.0001	18.6	<.0001	25,547	59.5	<.0001	27.4	<.0001	23,703
Overweight	64.0		21.3		5115	80.2		31.4		4382
BWP										
Underweight	11.9		19.2		12,926	28.5		26.5		7718
About the right weight	30.3	<.0001	17.7	<.0001	14,704	59.5	<.0001	25.8	<.0001	16,855
Overweight	60.3		21.6		8833	76.5		32.6		8860
Age (mean, SD)‡	16.22 ± 1.74	.0460	16.31 ± 1.71	<.0001	36,463	16.34 ± 1.66	<.0001	16.20 ± 1.70	.6831	33,433
Living with both parents										
No	32.4		23.1	<.0001	5651	61.2	<.0001	35.1	<.0001	5019
Yes	31.0	.0354	18.5		30,812	55.9		26.6		28,414
Academic performance										
Lower	33.2		22.3		12,249	59.9		33.7		11,130
Middle	31.8	<.0001	17.5	<.0001	9820	56.4	<.0001	25.9	<.0001	9330
Upper	29.2		17.6		12,394	54.1		24.2		12,973
Parental educational attainment										
Middle school or less	32.8		19.3		7034	56.6		28.7		4878
High school graduate	30.5	.0037	18.2	.0002	15,202	58.1	<.0001	27.4	.2341	15,562
College or more	31.2		20.0		14,227	55.2		27.8		12,993
Perceived economic status										
Lower	32.4		24.9		8173	59.3		37.4		7936
Middle	29.1	<.0001	17.8	<.0001	16,534	56.2	<.0001	25.8	<.0001	16,789
Upper	33.2		17.4		11,756	55.4		23.7		8708
Current smoking status										
No	30.5		17.6	<.0001	30,722	55.7	<.0001	26.2	<.0001	30,541
Yes	35.1	<.0001	27.6	<.0001	5741	67.0	<.0001	44.8	<.0001	2892
Current alcohol intake										
No	30.0	<.0001	16.9	<.0001	25,553	53.2	<.0001	25.0	<.0001	24,425
Yes	34.1	<.0001	24.5	<.0001	10,910	66.4	<.0001	35.7	<.0001	9008
Current use of sleeping pills										
No	30.9	<.0001	18.7	<.0001	35,882	56.6	.0872	27.4	<.0001	33,173
Yes	44.0	<.0001	46.5	<.0001	581	61.6		66.9	<.0001	260
Depressed mood										
No	28.5	<.0001	7.7	<.0001	23,182	52.2	<.0001	11.6	<.0001	17,929
Yes	35.8	<.0001	38.8	<.0001	13,281	61.8	<.0001	46.8	<.0001	15,504
Exposure to multiple UWCBs										
Never			17.4		25,125			23.6		14,279
1 method			20.2		8779			27.6		14,523
2 methods			28.2	<.0001	1716			38.2	<.0001	3320
≥3 methods			42.7		843			50.1		1311
Total weighted %	31.2		19.2			56.7		27.8		

UWCB, unhealthy weight control behavior; BMI, body mass index; BWP, body weight perception.

\*Negative response (%) to each dependent variable was not presented in this table because the answer category is either "positive" or "negative" response.

†p Values were calculated by chi-square test and t test.

‡16.18 ± 1.71 for boys without UWCB; 16.17 ± 1.72 for boys without suicidal ideation; 16.01 ± 1.78 for girls without UWCB; 16.20 ± 1.73 for girls without suicidal ideation.

prevalent among both boys and girls engaging in multiple UWCBs ( $p < .0001$ ).

Table 2 shows the significant association between BMI and BWP (both sexes:  $p < .0001$ ). That is, compared to normal-weight adolescents, underweight adolescents appeared more likely to perceive themselves as underweight, and overweight adolescents were more likely to perceive themselves as overweight. This

finding strongly supports the first condition for a mediating relation. Such patterns were observed in both genders.

Data obtained from multivariate analysis of the association between BMI and UWCB without BWP (Model 1) and with BWP (Model 2), revealing logistic regression parameter estimates as odds ratios (ORs) with 95% confidence intervals (CIs), after controlling for all covariates, are presented in Table 3. Model 1

Figure 1. Three Conditions for the Test of Mediation Effect of Body Weight Perception (BWP) on the Relations Between Body Mass Index (BMI) and Unhealthy Weight Control Behaviors (UWCBs) (A) and Between BMI and Suicidal Ideation (B)

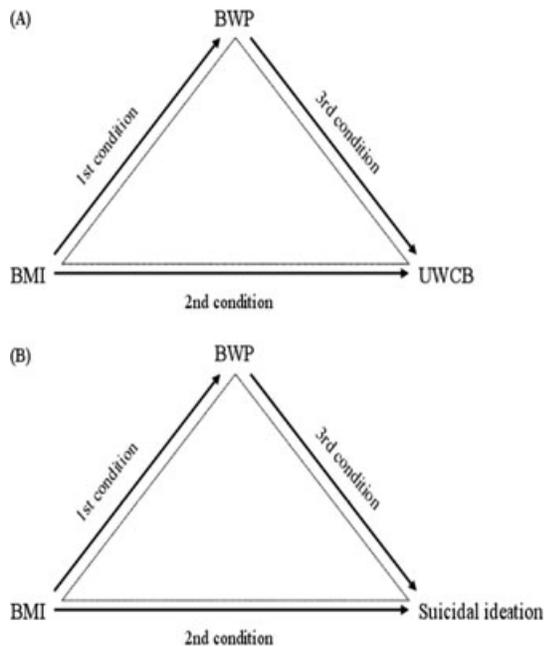


Table 2. Adjusted ORs<sup>†</sup> for the Association Between BMI and BWP in Adolescent Boys and Girls

	BWP			
	Underweight Compared to About Right Weight		Overweight Compared to About Right Weight	
	OR	(95% CI)	OR	(95% CI)
<i>Boys</i>				
BMI				
Underweight	16.43*	(14.99–18.00)	.40*	(.31–.51)
Normal weight	1.00		1.00	
Overweight	.36*	(.28–.47)	51.30*	(45.48–57.85)
<i>Girls</i>				
BMI				
Underweight	22.69*	(20.92–24.60)	.31*	(.25–.38)
Normal weight	1.00		1.00	
Overweight	.15*	(.08–.27)	33.95*	(30.27–38.07)

OR, odds ratio; CI, confidence interval; BMI, body mass index; BWP, body weight perception.

\* $p < .01$ .

<sup>†</sup>Adjusted for age, living with both parents, academic performance, parental educational attainment, perceived economic status, current smoking status, current alcohol intake, current use of sleeping pills, and depressed mood.

shows that the patterns of BMI were similar to those observed in the descriptive analysis ( $p < .0001$ ); the higher the BMI was among boys and girls, the higher was the likelihood of engaging in at least 1 UWCB (ie, the second condition was met). Although, in

Table 3. Adjusted ORs<sup>†</sup> for Adolescent Boys and Girls Engaging in at Least One Method of UWCBs by BMI and BWP

	Model 1		Model 2	
	OR	(95% CI)	OR	(95% CI)
<i>Boys</i>				
BMI				
Underweight	.33*	(.30–.36)	.75*	(.68–.82)
Normal weight	1.00		1.00	
Overweight	4.44*	(4.17–4.73)	1.68*	(1.54–1.81)
BWP				
Underweight			.34*	(.32–.36)
About right weight			1.00	
Overweight			2.73*	(2.55–2.92)
<i>Girls</i>				
BMI				
Underweight	.23*	(.22–.25)	.46*	(.43–.50)
Normal weight	1.00		1.00	
Overweight	2.66*	(2.45–2.89)	1.58*	(1.43–1.73)
BWP				
Underweight			.39*	(.36–.41)
About right weight			1.00	
Overweight			1.74*	(1.63–1.87)

OR, odds ratio; CI, confidence interval; BMI, body mass index; BWP, body weight perception; UWCBs, unhealthy weight control behaviors.

\* $p < .01$ .

<sup>†</sup>All models are adjusted for age, living with both parents, academic performance, parental educational attainment, perceived economic status, current smoking status, current alcohol intake, current use of sleeping pills, and depressed mood.

general, the associations of individual covariates with UWCB did not change in magnitude or significance (not shown in the table), the association between BMI and UWCB was considerably weaker when BWP was included in Model 2 than when BWP was not included, as was the case in Model 1. This finding holds for both boys and girls. Thus, BWP was independently and positively associated with UWCB, which supports the third condition of the mediating effect of BWP.

The findings of the multivariate logistic regression analyses (OR and 95% CI) for the associations between BMI and suicidal ideation, without BWP (Model 1) and with BWP (Model 2) are presented in Table 4. Model 1 shows that overweight boys and girls were more likely to express suicidal ideation than were their normal-weight counterparts ( $p < .0001$ ); such patterns also appeared among underweight boys ( $p = .0071$ ), although not among underweight girls ( $p = .4231$ ). This supports the second condition of mediating effect. The association between overweight BMI status and suicidal ideation became nonsignificant when BWP was added in Model 2 ( $p = .6268$ ), while perception as overweight was independently and significantly associated with suicidal ideation ( $p < .0001$ ). This indicates that the third condition of mediating effect of BWP is satisfied. However, the ORs of the association between underweight BMI status and suicidal ideation among boys increased slightly under this condition ( $p = .0027$ ). Model 3 illustrates

Table 4. Adjusted ORs<sup>†</sup> for Adolescent Boys and Girls Regarding Suicidal Ideation by BMI, BWP, and Exposure to UWCBs

	Model 1		Model 2		Model 3	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
<i>Boys</i>						
BMI						
Underweight	1.11**	(1.03–1.20)	1.14**	(1.05–1.25)	1.14**	(1.04–1.25)
Normal weight	1.00		1.00		1.00	
Overweight	1.19**	(1.10–1.29)	1.03	(.93–1.14)	1.01	(.91–1.12)
BWP						
Underweight			1.01	(.94–1.08)	1.03	(.96–1.11)
About right			1.00		1.00	
Overweight			1.22**	(1.12–1.33)	1.17**	(1.05–1.28)
Exposure to multiple UWCBs						
Never					1.00	
1 method					1.08*	(1.01–1.16)
2 methods					1.35**	(1.19–1.53)
≥3 methods					2.40**	(2.04–2.82)
<i>Girls</i>						
BMI						
Underweight	.97	(.90–1.04)	1.02	(.93–1.12)	1.06	(.96–1.16)
Normal weight	1.00		1.00		1.00	
Overweight	1.21**	(1.12–1.31)	.99	(.91–1.09)	.97	(.88–1.07)
BWP						
Underweight			1.01	(.93–1.09)	1.06	(.97–1.15)
About right weight			1.00		1.00	
Overweight			1.33**	(1.23–1.43)	1.28**	(1.19–1.38)
Exposure to multiple UWCBs						
Never					1.00	
1 method					1.14**	(1.07–1.21)
2 methods					1.46**	(1.33–1.60)
≥3 methods					1.92**	(1.69–2.19)

OR, odds ratio; CI, confidence interval; BMI, body mass index; BWP, body weight perception; UWCBs, unhealthy weight control behaviors.

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

<sup>†</sup>All models are adjusted for age, living with both parents, academic performance, parental educational attainment, perceived economic status, current smoking status, current alcohol intake, current use of sleeping pills, and depressed mood.

that the magnitude and significance of overweight BWP in relation to suicidal ideation decreased slightly among those engaging in multiple UWCBs, and shows that engaging in a greater number of UWCBs was positively associated with suicidal ideation ( $p < .05$ ).

## DISCUSSION

This study had 2 specific purposes. The first one involved examining whether BWP functioned as a mediator between BMI and UWCBs, and between BMI and suicidal ideation. The second one involved investigating the effects of exposure to multiple UWCBs on suicidal ideation among Korean adolescent boys and girls. Following the 3 mediation criteria suggested by Baron and Kenny,<sup>27</sup> we found that the BMI-UWCB relation was mediated in part by BWP for both sexes. This result is consistent with a previous study among Lebanese youth aged 15–23 years,<sup>28</sup> which reported that BWP accounted for a considerable portion of the correlation between BMI and weight loss behaviors. It is interesting to observe that the percent reduction in

the ORs for BMI in relation to UWCB after adding BWP was more pronounced in boys than in girls (62.7% for underweight boys and 80.2% for overweight boys versus 29.9% for underweight girls and 65.1% for overweight girls). This finding indicates that the mediating effect of adolescent perceptions of body weight on UWCB may be stronger among boys than among girls. To conclude, however, that boys were more affected by their BWP when they used UWCB remains difficult because such a conclusion would be incongruent with traditional wisdom holding that both body weight dissatisfaction and UWCB are more common in girls than in boys.<sup>14,15,17</sup> Future research should examine gender differences in terms of these issues.

In this study, consistent with a previous study among Hong Kong adolescents aged 12–18 years,<sup>29</sup> UWCBs were less prevalent among adolescent boys than among girls when comparing them at the same level of BMI and BWP. As noted above, UWCBs were used to lose weight; thus, boys and girls with underweight BMI or BWP status did not tend to engage in UWCB because they already had attained a slimmer body type.<sup>30,31</sup>

Consistent with the findings of Eaton et al,<sup>15</sup> we found that BWP functioned as a mediator between overweight BMI status and suicidal ideation in both genders. However, the association between underweight BMI and suicidal ideation remained significant among boys even after controlling for BWP. In many industrialized countries, including Korea, males experience sociocultural expectations to be muscular (or large), which differs dramatically from the sociocultural norms with regard to the ideal female body. Boys are more likely to want to increase the size of their muscles during adolescence than do girls.<sup>32,33</sup> Thus, underweight boys would be more likely to show dissatisfaction with their bodies, and to be bullied or teased by peers; this phenomenon may be linked to suicidal thoughts.<sup>17,34,35</sup> Suicidal ideation was more prevalent among participants of both genders who perceived themselves to be overweight than among those who perceived themselves to be about the right weight.<sup>15,17</sup> However, no difference was observed between BWP as underweight and as about right weight in relation to suicidal thoughts.

As suggested by Eaton et al,<sup>15</sup> we also confirmed that the inclusion of UWCB as a covariate in the analysis could reduce the possibility of overestimating the association between BWP as overweight and suicidal ideation in both genders. However, the significance and magnitude of the association between BMI as underweight and suicidal ideation in boys did not decrease when UWCB was taken into account because the likelihood of engaging in UWCBs increased among those with a high level of BMI (overweight). In addition, consistent with the first study, engaging in multiple UWCBs was significantly and positively associated with suicidal ideation in both genders, even after controlling for BMI, BWP, and other covariates. It is to be noted that respondents were queried about engaging in seven items of UWCB within the past 30 days, possibly reflecting their recent attitudes and concerns about body weight. Indeed, engaging in multiple types of UWCB during such a brief period may reflect more immediate and intense negative evaluations of body weight, leading to suicidal ideation. Data regarding other important variables significantly associated with both outcomes are not presented or discussed because these findings were largely consistent with those of previous similar studies.<sup>7,9,10</sup>

### Limitations

Although the findings of this study, derived from a representative sample in Korea, can be generalized to relations among BMI, BWP, and suicidal ideation in Korean adolescents, this study has some limitations. First, self-reported weight and height information was used to calculate BMI status. Although self-reports of these characteristics have been reported

to be highly correlated with actual measures of such characteristics,<sup>36,37</sup> some have argued that accepting this information from adolescent populations, especially girls, may be slightly problematic due to frequent misperceptions of weight (underestimated) and height (overestimated) among this group.<sup>38</sup> Second, we did not include several important variables associated with suicidal ideation, such as aggressiveness, sexual orientation, eating disorders, and family dysfunction, because these factors were not available for measurement.<sup>7-10</sup> Thus, the findings of this study cannot be interpreted directly in terms of the association between BWP and suicidal ideation. Third, the time frames of suicidal ideation (during the past 12 months), UWCBs (during the past 30 days), and BMI and BWP (at the time of the survey) differed; thus, their causality cannot be clearly determined. Future research should collect longitudinal data to identify underlying causal mechanisms.

### Conclusions

Despite these limitations, in a nationally representative sample of adolescent boys and girls, BWP may in part mediate between BMI and UWCBs, and between BMI and suicidal ideation, thus underscoring the importance of BWP. Indeed, not only the type of UWCBs engaged in by adolescents,<sup>14,15</sup> but also the number of UWCBs they exhibit, might serve as important predictors of suicidal ideation. As suggested by Xie et al,<sup>39</sup> engaging in UWCB during adolescence may have long-term detrimental effects. This underscores the need to develop school programs addressing extreme BWP to reduce the potential risks for both UWCBs and suicidal behaviors.

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