

Short Communication

Weight-related behaviors among non-overweight adolescents: results from the Korean national survey from 2005 to 2007

Kayoung Lee MD, PhD

Department of Family Medicine, Busan Paik Hospital, Inje University College of Medicine, South Korea

This study aimed to assess the prevalence of overweight misperception, unhealthy diet practices, and factors associated with these weight-related behaviors among Korean adolescents. The subjects were a nationally representative sample of non-overweight students (52,515 in 2005, 64,084 in 2006, and 67,113 in 2007) in middle and high schools who completed the Korea Youth Risk Behavior Web-Based Survey. The prevalence of weight-related behaviors and factors associated with these behaviors were assessed using a complex sampling design. Of non-overweight students, 14.9% of boys and 22.2% of girls reported their weight as overweight/obese. Dieting within the last year was reported by 19.8% of boys and 41.8% of girls. Of those who attempted dieting, 17.1% of boys and 24.6% of girls indicated practicing at least one unhealthy diet behavior within the last month. Overweight misperceptions were independently associated with diet attempts and unhealthy diets after adjustment for weight status, and demographic, social, and psychological factors. Additionally, these weight-related behaviors were also associated with psychosocial factors such as low school achievement, sadness, suicidal ideation, increased stress perception, and cigarette or alcohol use. In conclusion, the high prevalence of inappropriate weight-related behaviors suggests a need for comprehensive approaches to improve weight-related behaviors in non-overweight Korean adolescents.

Key Words: weight-related behavior, non-overweight adolescents, misperceptions about being overweight, diet, sex

INTRODUCTION

A misperception of one's own weight as overweight and dieting as a result, particularly among non-overweight adolescents, has been a concern, because the combination of these two conditions can result in negative outcomes such as inadequate nutritional intake, abnormal physical growth, eating disorders, and weight problems.¹ Despite potentially unhealthy consequences of weight misperceptions and dieting among non-overweight adolescents, only a few studies on this issue have been undertaken among nationally representative samples of adolescent populations.¹⁻⁶ The results of population-based studies among non-overweight adolescents revealed a substantially high prevalence of misperceptions about their weight and dieting attempts, cultural differences in weight-related behaviors, and an association between self-perceived weight status and engagement in weight loss behaviors, regardless of the person's actual BMI. However, weight perceptions and dieting behaviors among Asian adolescents have been relatively less frequently examined in previous studies. To extend previous knowledge of the effect of cultural differences on weight-related behaviors, assessment of weight-related behaviors among nationally representative samples of Asian populations is crucial. This study aimed to assess the prevalence of the overweight-misperception and dieting behaviors as well as factors related to these weight-related behaviors among non-overweight Korean adolescents using nation-

ally representative data from the Korea Youth Risk Behavior Web-based Survey (KYRBWS).

METHODS

The data were analyzed using KYRBWS, an epidemiologic surveillance system using a nationally representative sample of Korean middle and high school students, annually undertaken from 2005 to 2007.⁷ Students voluntarily completed the anonymous, self-administered Web-based survey during a regular class period after completing local parental permission procedures. This study was approved by the institutional review board of Busan Paik Hospital, Busan, South Korea. For the purposes of the present analysis, we selected 52,515 non-overweight students in 2005 (89.4% of students), 64,084 non-overweight students in 2006 (89.7% of students), and 67,113 non-overweight students in 2007 (89.8% of students).

Objective weight status was based on the adolescent's BMI percentile. Underweight and normal weight was defined respectively as a BMI less than 5th percentile and

Corresponding Author: Dr Kayoung Lee, Department of Family Medicine, Busan Paik Hospital, 633-165 Kaegum-dong, Busan Jin-Gu, Busan, South Korea (614-735).
Tel: 82-51-890-6229; Fax: 82-51-894-7554
Email: kayoung.fmlky@gmail.com; fmlky@inje.ac.kr
Manuscript received 4 April 2011. Initial review completed 24 November 2011. Revision accepted 5 December 2011.

a BMI between the 5th and 84th percentile. Weight categories were defined using age and sex-specific BMI (calculated as self-reported weight in kilograms divided by the square of self-reported height in meters) percentiles based on the growth charts developed in 2007 for Korean children and adolescents.⁸ Weight perception was assessed using one question: "How do you describe your weight compared with your friends?" with five response options from "very underweight" to "obese". Adolescents who were underweight or normal weight who responded "overweight" or "obese" were classified as having a misperception of overweight status. Information on weight control behaviors were collected using the following question: "During the past 12 months, did you try to control your weight?" Unhealthy weight control behavior which was surveyed among those who reported trying to lose weight in the past year was defined as engaging in at least one diet behavior during the past 30 days including fasting, taking non-prescribed weight reducing medicines, purging, and eating only one food. The kappa index of questions about weight perception and weight control behavior was 0.85 and 0.72.⁹ Other variables used in these analyses were suicidal ideation, sad feelings, self-perceived stress, alcohol use, smoking, level of school achievement, socioeconomic status (SES), and parental education level.

All analyses used sampling weights to report estimates that would be representative of Korean population. The software SPSS 17.0 [Release 17.0.0 (23rd, Apr. 2008); SPSS Inc., Chicago, IL, USA] was used to obtain variance estimates to calculate weighted percentages, standard errors, and odds ratios given the complex sampling design which took into account stratification, clustering, and multi-stage sampling. Analyses were performed separately for each gender because of gender differences in the prevalence of overweight-misperceptions and weight control behaviors. The prevalence of the overweight-misperception, weight reducing behavior, and unhealthy diets were computed. Multiple logistic regression analyses were performed to determine factors associated with these weight-related behaviors. In this analysis, independent factors included socio-demographic and psychosocial variables, and health related behaviors. Statistical significance was indicated when $p < 0.05$.

RESULTS and DISCUSSION

In general, more non-overweight girls were likely to perceive themselves as overweight, to try weight reduction, and practice unhealthy diet behaviors compared to boys.

Of non-overweight students, 14.9% of boys and 22.2% of girls reported their weight as overweight/obese. On the other hand, 26.7% of normal weight boys and 9.0% of normal weight girls reported their weight as underweight. Dieting within the last year was reported by 19.9% of boys and 41.4% of girls. Of those who attempted dieting, 17.1% of boys and 24.6% of girls indicated practicing at least one unhealthy dietary behavior within the last month. Across the three years, the prevalence of dieting behaviors increased 3-4%, while the prevalence of overweight-misperception increased less than 1% (Table 1). As shown in Table 2, all weight-related behaviors were commonly associated with higher weight status, lower school achievement, suicidal ideation, and higher levels of stress perception. The overweight-misperception itself was associated with dieting behaviors even after adjusting for other correlated factors. Trying to lose weight and unhealthy dietary behaviors were associated with a higher SES level in both sexes, while an inverse association was found between misperceptions about being overweight and SES level among boys. The dieting trial and unhealthy dietary behaviors were associated with both cigarette use and alcohol consumption in girls, while these associations were weaker in boys.

In this nationally representative data, collected from 2005 to 2007, significant percentages of Korean adolescents (14.9 % of boys and 22.2% of girls) placed themselves in the overweight/obese category and substantial percentages of them (19.9% of boys and 41.4% of girls) reported dieting within the last year in spite of being of normal weight. Of particular concern is the fact that 17.1% of boys and 24.6% of girls who attempted weight loss within the last year indicated practicing at least one unhealthy dietary behavior within the last month. The high prevalence of weight-related behaviors and evident gender differences in the prevalence found in this study are consistent with the results of previous population-based studies.^{1-6,10} Therefore, the issues of misperceptions about weight and dieting among non-overweight adolescents may not be confined to specific ethnic groups and cultural backgrounds. These findings reaffirm the previous suggestion that non-overweight adolescents, particularly girls, may be at risk for potential complications related to practicing unhealthy weight control behaviors.²

In this study, dieting behavior was related to self-perceived weight status, independent of objective weight status. Boys and girls who considered themselves as overweight were approximately four times and twice as likely, respectively, to try to lose weight within the last

Table 1. Prevalence of overweight- misperception and dieting behaviors among non-overweight students

Survey year	Overweight misperception, % (SE)		Dieting within the last year, % (SE)		Unhealthy dieting behavior within the last month [†] , % (SE)	
	Boys	Girls	Boys	Girls	Boys	Girls
Overall	14.9 ± 0.1	22.2 ± 0.2*	19.9 ± 0.2	41.4 ± 0.2*	17.1 ± 0.4	24.6 ± 0.3*
2005	14.6 ± 0.3	21.4 ± 0.3*	18.5 ± 0.3	41.7 ± 0.4*	16.1 ± 0.7	22.7 ± 0.5*
2006	15.1 ± 0.3	22.8 ± 0.3*	18.8 ± 0.3	38.0 ± 0.4*	17.8 ± 0.7	24.3 ± 0.5*
2007	15.2 ± 0.2	22.3 ± 0.3*	22.1 ± 0.3	44.6 ± 0.3*	17.2 ± 0.6	26.4 ± 0.5*

* $p < 0.001$ using chi-square test

[†] Among adolescents reported dieting within the last year

Table 2. Factors independently associated with the prevalence of overweight misperception and dieting behaviors among non-overweight students by sex

		Boys, OR (95% C.I.)			Girls, OR (95% C.I.)		
		Overweight misperception	Dieting within the last year	Unhealthy dieting behavior within the last month [†]	Overweight misperception	Dieting within the last year	Unhealthy dieting behavior within the last month*
Overweight misperception	Yes vs. No		4.39 (4.17-4.63)	1.68 (1.54-1.83)		1.87 (1.79-1.96)	1.38 (1.30-1.46)
Survey period	2006 vs. 2005	1.04 (0.98-1.11)	1.05 (0.99-1.11)	1.17 (1.08-1.28)	0.98 (0.92-1.03)	0.86 (0.82-0.90)	0.99 (0.93-1.06)
	2007 vs. 2005	1.05 (0.98-1.12)	1.31 (1.24-1.39)	1.56 (1.42-1.72)	0.94 (0.89-0.99)	1.18 (1.12-1.24)	1.64 (1.52-1.76)
Age	16-19y vs. 13-15y	0.57 (0.55-0.60)	0.81 (0.77-0.85)	0.96 (0.89-1.03)	0.98 (0.94-1.03)	0.83 (0.80-0.86)	1.09 (1.03-1.15)
Socioeconomic status	Middle vs. High	0.94 (0.89-0.99)	0.77 (0.73-0.81)	0.72 (0.66-0.79)	1.15 (1.09-1.21)	0.85 (0.81-0.89)	0.79 (0.74-0.84)
	Low vs. High	1.05 (0.98-1.14)	0.72 (0.66-0.77)	0.79 (0.71-0.87)	1.40 (1.30-1.50)	0.79 (0.74-0.84)	0.74 (0.68-0.80)
Father's education	High vs. ≤ Middle school	0.98 (0.88-1.09)	0.91 (0.83-1.00)	0.90 (0.77-1.03)	1.04 (0.96-1.14)	1.02 (0.94-1.10)	0.99 (0.90-1.10)
	≥College vs. ≤Middle school	1.06 (0.95-1.19)	0.89 (0.80-0.98)	0.81 (0.70-0.95)	1.02 (0.93-1.13)	0.94 (0.87-1.02)	0.93 (0.83-1.04)
Mother's education	High vs. ≤ Middle school	1.03 (0.93-1.14)	1.12 (1.02-1.23)	0.91 (0.80-1.04)	0.98 (0.91-1.06)	1.00 (0.93-1.08)	1.00 (0.91-1.10)
	≥College vs. ≤Middle school	0.97 (0.86-1.09)	1.16 (1.04-1.29)	1.05 (0.90-1.24)	1.02 (0.93-1.13)	0.92 (0.85-1.00)	0.94 (0.84-1.06)
School achievement	Middle vs. High	1.05 (0.99-1.11)	1.14 (1.08-1.20)	1.22 (1.12-1.32)	0.98 (0.93-1.03)	1.17 (1.12-1.22)	1.35 (1.27-1.44)
	Low vs. High	1.20 (1.12-1.28)	1.15 (1.08-1.22)	1.48 (1.35-1.62)	1.15 (1.08-1.22)	1.14 (1.09-1.20)	1.60 (1.50-1.72)
Weight status	Normal vs. Underweight	32.6 (26.6-40.0)	4.88 (4.47-5.32)	1.17 (1.07-1.28)	34.6 (29.3-41.0)	4.50 (4.27-4.75)	1.62 (1.51-1.75)
Sadness	Yes vs. No	1.02 (0.96-1.08)	1.20 (1.13-1.26)	1.59 (1.47-1.73)	1.02 (0.97-1.07)	1.19 (1.14-1.24)	1.67 (1.58-1.77)
Suicidal ideation	Yes vs. No	1.24 (1.16-1.33)	1.14 (1.07-1.21)	1.46 (1.34-1.59)	1.22 (1.15-1.28)	1.10 (1.05-1.16)	1.33 (1.25-1.42)
Stress	Much vs. Never to moderate	1.25 (1.19-1.32)	1.07 (1.02-1.13)	1.26 (1.17-1.36)	1.27 (1.21-1.33)	1.06 (1.02-1.10)	1.36 (1.28-1.44)
Smoking	Yes vs. No	0.82 (0.78-0.87)	1.03 (0.98-1.09)	1.26 (1.17-1.37)	0.96 (0.91-1.01)	1.23 (1.18-1.30)	1.60 (1.50-1.70)
Alcohol drinking	Yes vs. No	0.87 (0.82-0.91)	1.09 (1.03-1.14)	0.98 (0.90-1.05)	1.03 (0.98-1.08)	1.24 (1.19-1.29)	1.47 (1.39-1.57)

The odds ratio (OR) was weighted OR using multiple logistic regression analysis where all variables were simultaneously included as independent variables.

[†]Among adolescent who reported dieting within the last year

year than their counterparts. Previous studies have also demonstrated the independent effect of self-perceived weight status on dieting behavior among non-overweight adolescents.^{2,5,6} These findings and previous evidence support the hypothesis that adolescents that have a misperception that they are overweight may set unrealistic weight goals and practice weight control behaviors.⁴ Low school achievement, sadness, suicidal ideation, increased stress perception, and cigarette or alcohol use were also associated with weight reduction behaviors, while lower SES was a protective factor. Particularly in girls, lower SES was inversely associated with dieting although it was associated with higher odds for overweight misperception. Probably environmental factors related to lower SES in girls may inhibit dieting behavior even though they perceive themselves as overweight. The relationship between SES and dieting has been inconsistent in previous studies. For example, in the NHANES III and NHANES (2005-2006), no relationship was found between SES and self-perceived weight status or dieting,^{3,5} while Story *et al.* reported greater weight satisfaction and a lower rate of unhealthy weight control behaviors in children of higher SES.¹¹

The major strengths of this study are the use of a large nationwide representative sample of Korean adolescents and the assessment of diverse psychosocial factors. However, before drawing conclusions, limitations should be taken into account. Given the cross-sectional nature of the analyses, we cannot infer a temporal pathway in the association between misperceptions about weight and weight loss attempts. The BMI was calculated using self-reported weights and heights, leading to possible weight status misclassifications because the perception of weight may have an influence on the accuracy of self-reported weight and height. Other information biases can also not be ruled out. The survey was conducted in schools and the data were collected by self-report, and peer groups may have influenced students' replies to some sensitive questions.

In conclusion, the significant percentages of misperceptions about being overweight and weight loss attempts, coupled with the significant association between such misperceptions and weight loss attempts, including unhealthy weight loss behaviors, suggest a need to intervene to improve weight-related behaviors, even in adolescents who are not overweight. Additionally, further consideration needs to be directed toward adolescents who are at a higher risk of practicing unhealthy weight control behaviors.

AUTHOR DISCLOSURE

The authors declared no conflict of interest.

REFERENCES

1. Neumark-Sztainer D, Hannan PJ. Weight-related behaviors among adolescent girls and boys: results from a national survey. *Arch Pediatr Adolesc Med.* 2000;154:569-77.
2. Talamayan KS, Springer AE, Kelder SH, Gorospe EC, Joye KA. Prevalence of overweight misperception and weight control behaviors among normal weight adolescents in the United States. *ScientificWorldJournal.* 2006;6:365-73.
3. Yan AF, Zhang G, Wang MQ, Stoessen CA, Harris BM. Weight perception and weight control practice in a multiethnic sample of US adolescents. *South Med J.* 2009; 102:354-60.
4. Felts WM, Parrillo AV, Chenier T, Dunn P. Adolescents' perceptions of relative weight and self-reported weight-loss activities: analysis of 1990 YRBS (Youth Risk Behavior Survey) national data. *J Adolesc Health.* 1996;18:20-6.
5. Strauss RS. Self-reported weight status and dieting in a cross-sectional sample of young adolescents: National Health and Nutrition Examination Survey III. *Arch Pediatr Adolesc Med.* 1999;153:741-7.
6. Al Sabbah H, Vereecken C, Abdeen Z, Kelly C, Ojala K, Nemeth A, Ahluwalia N, Maes L. Weight control behaviors among overweight, normal weight and underweight adolescents in Palestine: findings from the national study of Palestinian schoolchildren (HBSC-WBG2004). *Int J Eat Disord.* 2010;43:326-36.
7. Korea Centers for Disease Control and Prevention. Korea youth risk behavior web-based survey, 2007. Survey summaries. 2009. Seoul, Republic of Korea: Korea Centers for Disease Control and Prevention; 2009.
8. Korea Centers for Disease Control and Prevention, The Korean Pediatric Society, The Committee for the Development of Growth Standard for Korean Children and Adolescents. 2007 Korean Children and Adolescents Growth Standard (commentary for the development of 2007 growth chart) 2007. Seoul, Republic of Korea: Division of Chronic Disease Surveillance.
9. Bae J, Joung H, Kim J, Kwon KN, Kim YT, Park S. Test-retest reliability of a questionnaire for the Korea Youth Risk Behavior Web-based Survey. *J Prev Med Public Health.* 2010;43:403-10.
10. Shi Z, Lien N, Nirmal Kumar B, Holmboe-Ottesen G. Perceptions of weight and associated factors of adolescents in Jiangsu Province, China. *Public Health Nutr.* 2007;10: 298-305.
11. Story M, French SA, Resnick MD, Blum RW. Ethnic/racial and socioeconomic differences in dieting behaviors and body image perceptions in adolescents. *Int J Eat Disord.* 1995;18:173-9.

Short Communication

Weight-related behaviors among non-overweight adolescents: results from the Korean national survey from 2005 to 2007

Kayoung Lee MD, PhD

Department of Family Medicine, Busan Paik Hospital, Inje University College of Medicine, South Korea

非過重青少年的體重相關行為：2005-2007年韓國國民調查結果

本篇研究目的是評估韓國青少年他們在過重錯覺、不健康飲食行為和與這些體重相關行為有關因子的盛行率。研究對象是一群具國家代表性且完成韓國青少年危險行為網路調查的非過重初級及高級中學生（2005年 52,515人、2006年 64,084人、2007年 67,113人）。與體重相關行為以及和這些行為攸關因子盛行率的評估是使用複雜抽樣設計。非過重學生中，有 14.9%男孩和 22.2%女孩自述他們的體重是過重或肥胖；自述在過去一年裡曾節食的男孩有 19.8%和 41.8%的女孩。在那些曾節食的學生中，有 17.1%男孩和 24.6%女孩表示，他們上個月裡至少有一次不健康的飲食行為。在調整體重狀況、人口學、社會和心理因素後，過重錯覺和嘗試節食、不健康飲食具獨立相關。此外，這些與體重相關行為也和社交心理因素，例如低學校成就、悲傷、自殺想法、自覺壓力增加、抽菸或飲酒具有相關性。總之，由不適當體重相關行為的高盛行率顯示，需要有全面性的方案來改善非過重韓國青少年的體重相關行為。

關鍵字：體重相關行為、非過重青少年、過重錯覺、飲食、性別