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Gender Differences in the Effects of Weight, Weight Perception, and Weight Satisfaction on Depression in Adolescents

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Purpose: This study aims to investigate gender differences in the association between depressive symptoms and weight, weight perception, and body satisfaction among Korean adolescents. **Methods:** A secondary data analysis was performed on data from 33,374 adolescents who participated in the 2015 Adolescent Health Behavior Online Survey. They were classified as underweight, normal weight, or overweight/obese; weight perception was classified into perception of being underweight, normal weight, or overweight/obese; and weight satisfaction into desire to gain weight, satisfied, and desire to lose weight. **Results:** Among boys, perception of being underweight (adjusted odds ratio [AOR]: 1.20, 95% confidence interval [CI]: 1.07~1.35) and desire to gain weight (AOR: 1.45, 95% CI: 1.30~1.62) were associated with depression. Among girls, perception of being overweight or obese (AOR: 1.18, 95% CI: 1.07~1.29) and a desire to lose weight (AOR: 1.30, 95% CI: 1.18~1.42) were associated with depression. **Conclusion:** Gender differences were observed in the association between weight perception and depression in adolescents. The perception of being underweight among boys and the perception of being overweight/overweight among girls were associated with depression. Thus, gender-specific intervention programs to correct weight perception and weight satisfaction are needed in order to relieve depressive symptoms in adolescents.

Key Words: Depression, Body weight, Weight perception, Ideal body weight, Adolescent

INTRODUCTION

Globally, depression is the most prevalent mental health problem among adolescents. In 2013, 7% adolescents aged 12 to 17 years in the U.S. experienced a major depressive episode in the last 12 months [1]. In Korea, approximately 22% male adolescents and 32% female adolescents showed depressive symptoms in 2014[2]. In particular, those in early adolescence were at an increased risk for psychological problems such as depression [3]. These psychological problems are associated with extensive physical, emotional, and cognitive changes during early adolescence, and become an important turning point in an individual's development [3]. Depression in adolescence leads to negative effects on physical health such as obesity, [4] as well as adverse social and academic problems [5]. Depressive symptoms in adolescents are significantly associated with suicidal thoughts and behaviors [6]. In addition, depressive adolescents tend to grow into adults with higher emotional stress, and increased alcohol consumption and smoking intensity [7]. Thus, we should identify the factors associated with depressive symptoms in early adolescence for early intervention.

Distorted body image might result in depressive symptoms in early adolescence [8]. Individuals in early adolescence might be sensitive to the perception of others' evaluation and social norms with regard to their body size and shape [9]. Thus, individuals in early adolescence might perceive their body size and weight based on a subjective evaluation rather than an objective measurement [9]. During early adolescence, body size and shape before puberty are considered ideal; however, physiological changes

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following puberty differ from this ideal [10]. Thus, those in early adolescence are likely to have a distorted weight perception and body dissatisfaction [11]. According to Demuth et al. [12], a negative body image including distorted weight perception and body dissatisfaction was associated with psychosocial distress. Similarly, White [13] presented a model that suggests that perceived changes in appearance might lead to body image emotions such as depression. Additionally, distorted weight perception and body dissatisfaction were considered risk factors for depression during early adolescence [14]. In previous studies, distorted weight perception and body dissatisfaction were more closely associated than objective weight and psychological well-being among adolescents [15]. Thus, individuals in early adolescence with distorted weight perception and body dissatisfaction might be at an increased risk for depressive symptoms regardless of their body mass index (BMI) and objective evaluation of weight. In particular, Korean societies tend to value physical appearance as the evaluation of an individual's competence and superiority [8,16]. Thus, the effects of distorted weight perception and body dissatisfaction on depressive symptoms might be more severe among Korean adolescents than among adolescents in Western societies.

An individual's weight perception is developed based on the ideal body weight determined by cultural standards [17]. Western and Asian cultures have different cultural standards for the ideal body size of children [18]. While a slimmer body is considered ideal in Western societies, current Asian societies, including Korea and China, have two paradoxical standards for ideal body size with the coexistence of the traditional standard that prefers a slightly plump body, and the standard from Western societies [19]. With the shared ideal body weight norms of Western societies through mass media, current Asian adolescent boys including those in Korea and China selected large and muscular figures as having an ideal and attractive body shape, while adolescent girls chose a small and slim body as an ideal and attractive body shape [20,21]. In these contexts, among adolescent boys, perceived underweight and desired weight gain might have negative effects on psychological distress such as depression. In contrast, adolescent girls with perceived overweight issues and desired weight loss had depression. According to Xie et al.[21], distorted weight perception and concern associated with negative body image might differ among adolescents based on gender. Similarly, Korean adolescent boys with perceived underweight had low self-esteem, while adolescent girls with perceived underweight had high self-esteem [22]. Distorted perception regarding body size and negative body image could contribute to depression through low self-esteem [9]. In these contexts, Kim et al. [23] suggested further studies to examine gender differences in the associations between actual and perceived weight and depression symptoms. However, identification of gender differences in the association of objective weight, weight perception, and body satisfaction with psychological health was limited in Korea. Thus, the purpose of our study was to investigate the associations between depressive symptoms and weight (BMI percentile), weight perception, and body satisfaction among Korean middle school students in early adolescence based on gender.

METHODS

1. Research Design and Participants

We applied a cross-sectional design for the secondary analysis of data from the 2015 Korea Adolescent Health Behavior Web-Based Survey (KYRBS). The KYRBS is an online survey performed annually to monitor health-related behaviors in Korean adolescents. In the 2015 KYRBS, 70,362 adolescents were selected as a sample from 800 schools in 17 provinces of Korea, including middle and high school students. Of this sample, 68,043 (96.7%) participated in the survey. In our study, data from 33, 374 middle school students (17,369 boys and 16,005 girls) aged 12~15 years; and who answered questions to assess height and weight to calculate BMI, percentile weight perception, and weight satisfaction were analyzed.

2. Measures

1) Outcome variable

(1) Depressive symptoms

Depressive symptoms in this study were considered as feelings of sadness or hopelessness that interrupted the daily life of participants in the last over 2 weeks. Thus, depressive symptoms were evaluated using a single question: "In the past 12 months, have you ever had a sense of sadness or hopelessness to an extent that you had to stop your daily activities for 2 weeks?" The participants responded by selecting "yes" or "no."

2) Independent variables

(1) Weight

Weight was classified in terms of BMI, and was calculated with the self-reported height and weight of the adolescents. BMI was classified into underweight (<5th percentile), normal weight (5th to 85th percentile), over-

weight (85th to 95th percentile), or obese (>95th percentile) using the gender-and age-specific growth chart for Korean children [24].

(2) Weight perception

Weight perception was assessed by a single question: "How do you perceive your weight?" Responses to the question were "underweight," "normal weight," and "overweight or obese."

(3) Weight satisfaction

Weight satisfaction was assessed using a single question: "Have you tried weight loss or gain in the past 30 days?" Responses to the question were "tried weight loss," "satisfied with my current weight," and "tried weight gain." A response of "tried weight loss" indicated a desire to lose weight, a response of "satisfied with my current weight" indicated satisfaction with weight, and a response of "tried weight gain" indicated a desire to gain weight.

3) Covariates

1) Participants' grade was categorized into 1st year, 2nd year, and 3rd year of middle school, and they were 12~15 years of age. 2) Area of residence was categorized into rural areas, small and medium cities, and metropolitan cities. 3) Experience of alcohol consumption and smoking were categorized into yes and no. 4) Participants' academic achievement and household economic status were categorized into low, middle, and high. 5) Perceived health status was categorized into healthy, fair, and unhealthy. 6) Perceived happiness was categorized into happy, fair, and unhappy. 7) Stress experience in a month was categorized into yes and no.

3. Data analysis

General characteristics of the adolescents, including depressive symptoms, weight, weight perception, weight satisfaction, and covariates were analyzed in terms of frequency and percentage. Gender differences in the prevalence of depressive symptoms, weight, weight perception, and weight satisfaction were analyzed using the x^2 test. To identify the associations among depression and weight, weight perception, and weight satisfaction with adjustment of covariates, a logistic regression analysis using a complex samples procedure was conducted on weighted data using SPSS version 22.0 for Windows (IBM, Armonk, NY, USA). Since we performed a statistical analysis with data collected from the KYRBS that used stratified clustered, and systematic sampling methods; sampling weight with complex samples procedures were needed to be adjusted for the unequal probabilities of selection in their estimates and to decrease the bias associated with no-response and non-coverage of the population [25,26].

RESULTS

1. Characteristics of the Participants with Regard to Depressive Symptoms, Weight, Weight Perception, and Weight Satisfaction

Of the participants, 16.6% adolescent boys and 25.7% adolescent girls had depressive symptoms. Additionally, 78.9% boys and 82.0% girls had normal weight. More than 10% of the participants (15.1% boys and 13.4% girls) perceived themselves to be obese or overweight. Also, 6.0% boys and 4.6% girls perceived themselves to be underweight. In addition, 32.3% boys and 45.6% girls were dissatisfied with their weight (Table 1).

2. Gender Differences in Depressive Symptoms, Weight, Weight Perception, and Weight Satisfaction

With respect to weight, adolescent girls were of normal weight than adolescent boys (x^2=23.81, p<.001). In particular, adolescent boys were either underweight or overweight compared to adolescent girls. With regard to weight perception, perception of underweight was more prevalent among boys than among girls (x^2=248.17, p< .001). With regard to weight satisfaction, adolescent girls were more dissatisfied with their weight than were adolescent boys (x^2=1,017.95, p<.001). In particular, adolescent boys more commonly desired weight gain, while adolescent girls more commonly desired weight loss.

3. Association of Weight, Weight Perception, and Weight Satisfaction with Depressive Symptoms among Adolescent Boys and Girls

In Model 1 to Model 3 in Tables 2, weight, weight perception, and weight satisfaction were put into a logistic regression model with covariate adjustment. In Model 4, weight, weight perception, and weight satisfaction were put together into a logistic regression with covariate adjustment.

After covariate adjustment, among adolescent boys, from Model 1 to Model 3, perception of being underweight (Adjusted odds ratio (AOR): 1.20, 95% CI: 1.07~1.35), and the desire to gain weight (AOR: 1.45, 95% CI: 1.30~1.62) and

Table 1. Characteristics of Participants Regarding Depressive Symptoms, Weight, Weight Perception, Weight Satisfaction, and Covariates related to Depressive Symptoms (*N*=33,374)

Variable	Categories	Boys (n=17,369)	Girls (n=16,005)
		n† (%)‡	n† (%)‡
Grade	1st year	5,432 (29.3)	5,085 (37.4)
	2nd year	5,880 (33.2)	5,264 (33.3)
	3rd year	6,057 (37.5)	5,656 (29.3)
Residence area	Rural areas	1,419 (6.5)	1,338 (6.0)
	Small and medium cities	8,251 (50.3)	7,551 (50.6)
	Metropolitan cities	7,699 (43.1)	7,116 (43.3)
Experience of alcohol consumption	Yes	5,202 (30.2)	3,417 (21.2)
	No	12,167 (69.8)	12,588 (78.8)
Experience of smoking	Yes	2,429 (13.9)	819 (5.0)
	No	14,940 (86.1)	15,186 (95.0)
Academic achievement	Low	5,632 (32.4)	5,087 (31.2)
	Middle	4,527 (25.6)	4,247 (26.5)
	High	7,210 (42.0)	6,671 (42.3)
Economic status of household	Low	1,942 (10.7)	2,051 (12.0)
	Middle	7,515 (42.8)	7,633 (47.0)
	High	7,912 (46.6)	6,321 (41.0)
Perceived health status	Unhealthy	552 (3.3)	705 (4.2)
	Fair	2,779 (15.9)	3,515 (22.0)
	Healthy	14,038 (80.8)	11,785 (73.7)
Perceived happiness	Unhappy	1,005 (6.1)	1,117 (6.9)
	Fair	3,545 (20.8)	4,051 (25.3)
	Happy	12,819 (73.2)	10,837 (67.8)
Stress experience (in a month)	Yes	12,181 (70.7)	12,858 (80.4)
	No	5,188 (29.3)	3,147 (19.6)
Weight (BMI percentile)	Underweight	1,006 (6.0)	718 (4.6)
	Overweight and obese	2,711 (15.1)	2,316 (13.4)
	Normal weight	13,652 (78.9)	12,971 (82.0)
Weight perception	Underweight	5,862 (34.2)	3,510 (22.1)
	Overweight and obese	5,479 (31.2)	6,150 (37.6)
	Normal weight	6,028 (34.7)	6,345 (40.3)
Weight satisfaction	Desire to lose weight	3,792 (21.9)	6,929 (43.4)
	Desire to gain weight	1,817 (10.4)	367 (2.2)
	Satisfied	11,760 (67.7)	8,709 (54.4)
Depressive symptoms	Yes	2,870 (16.6)	4,082 (25.7)
	No	14,499 (83.4)	11,923 (74.3)

BMI=body mass index; †Unweighted; ‡Weighted.

lose weight were associated with depressive symptoms. Among adolescent girls, from Model 1 to Model 3, perceptions of being underweight or overweight or obese were associated with depressive symptoms after covariate adjustment. Additionally, the desire to lose weight and gain weight was associated with depressive symptoms after covariate adjustment. Among adolescent girls, in Model 4, perception of being overweight or obese (AOR: 1.18, 95% CI: 1.07~1.29) and desire to lose weight (AOR: 1.30, 95% CI: 1.18~1.42) were associated with depressive symptoms after covariate adjustment (Table 2).

DISCUSSION

This study reports gender differences in the association between depressive symptoms and weight, weight per-

Table 2. Association of Body Mass Index, Weight Perception, and Weight Satisfaction with Depressive Symptoms

Variables		Categories	Model 1	Model 2	Model 3	Model 4
			OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Boys	Weight (BMI percentile) (Ref. normal weight)	Underweight	1.12 (0.94~1.33)			1.02 (0.85~1.23)
		Overweight and obese	0.98 (0.87~1.11)			0.96 (0.83~1.11)
	Weight perception (Ref. normal weight)	Underweight		1.17 (1.06~1.30)*		1.20 (1.07~1.35)**
		Overweight and obese		1.04 (0.92~1.17)		0.95 (0.83~1.09)
	Weight satisfaction (Ref. satisfied)	Desire to lose weight			1.33 (1.20~1.48)***	1.45 (1.30~1.62)***
		Desire to gain weight			1.27 (1.11~1.45)**	1.15 (0.99~1.34)
Girls	Weight (BMI percentile) (Ref. normal)	Underweight	1.06 (0.87~1.28)			1.19 (0.97~1.47)
		Overweight and obese	0.91 (0.81~1.02)			0.93 (0.82~1.06)
	Weight perception (Ref. normal weight)	Underweight		1.16 (1.06~1.26)**		1.03 (0.90~1.18)
		Overweight and obese		1.23 (1.10~1.37)***		1.18 (1.07~1.29)**
	Weight satisfaction (Ref. satisfied)	Desire to lose weight			1.24 (1.14~1.35)***	1.30 (1.18~1.42)***
		Desire to gain weight			1.35 (1.08~1.71)*	1.22 (0.95~1.56)

Adjusted for grade, residence area, experience of alcohol consumption, smoking experience, academic achievement, economic status of household, perceived health status, perceived happiness, and stress; OR=odds ratio; CI=confidence interval; Ref.=reference group; BMI=body mass index; *$p < .05$, **$p < .01$, ***$p < .001$; Negelkerke R^2 in Model 4 with boys=.36, Negelkerke R^2 in Model 4 with girls=.28.

ception, and body dissatisfaction. Interestingly, in our findings, the association of weight perception and weight satisfaction with depressive symptoms differed with gender. Depressive symptoms among adolescent boys were associated with the perception of being underweight, and a desire to gain weight after covariate adjustment; while depressive symptoms among adolescent girls were associated with the perception of being overweight or obese, and a desire to lose weight. In previous studies with Dutch and Chinese adolescents, the perception of being overweight was associated with depressive symptoms regardless of gender [27]. However, perceived underweight among young adolescent boys (8th grade) and perceived overweight among young adolescent girls were associated with depressive symptoms, while perceived weight was not associated with depressive symptoms among older adolescents (11th grade) [28]. Schiefelbein and colleagues proposed that adolescent girls and boys received different messages regarding socially ideal body images such as a small and thin body shape for girls and big and strong body shape for boys. Deviation from the ideal body shape due to physical changes during puberty might result in loss of self-confidence and lead to a depressed mood [28]. Similarly, boys with a perception of underweight show depressive symptoms and tend to be teased by their peers for their small body, and desire a muscular body [28]. In contrast, girls might experience more stress than boys because of weight gain and face external pressure to control their weight [20]. Korean societies also have different social standards regarding ideal body shape based on gender. For men and boys, a big and slightly plump body is considered healthy and strong, while a small and thin body shape is considered attractive and ideal for women and girls [20].

In particular, Korean societies traditionally emphasize the value of collectivism, and gives importance to equality for all. In a collectivistic culture, acceptability by social norms might be the most important evaluation standard for the appropriateness of an individual's characteristics [8]. In this connection, people who perceived themselves with regard to a collectivistic culture were more likely to engage in social comparison through cultural values that were associated with weight dissatisfaction [8]. Similarly, Asians such as Japanese might experience high weight dissatisfaction because of the collectivistic culture that emphasizes social conformity and the need to be socially accepted [29]. Furthermore, Korean adolescents would be dissatisfied with their bodies and experience a depressed mood if they perceived their body weight as inappropriate based on social norms regarding ideal body weight [30]. In a previous study conducted with Korean middle school students, adolescent boys with perceived underweight tended to have depressive symptoms even if they had normal weight [10]. Additionally, adolescent girls with a per-

ception of being overweight reported increased depressive symptoms even though they had normal weight and were underweight [9]. In this study, while perceived underweight among adolescent boys is associated with depressive symptoms, perceived overweight among girls is associated with depressive symptoms. Thus, there are gender differences in weight perception and weight dissatisfaction associated with depressive symptoms in Korean middle school students. Therefore, to relieve depressive symptoms in adolescents, interventions targeting weight perception and weight satisfaction should consider gender differences in weight misperception and weight dissatisfaction.

CONCLUSION

Weight perception and weight satisfaction, regardless of weight, were significantly associated with depressive symptoms among Korean adolescents. Moreover, weight perception and weight satisfaction associated with depressive symptoms differed with gender. Perceived underweight among adolescent boys was associated with depressive symptoms, and perceived overweight among girls was associated with depressive symptoms. Thus, school- and community-based interventions for the improvement of correct weight perception and weight satisfaction to relieve depressive symptoms should consider gender differences in weight misperception and weight dissatisfaction.

This study has some limitations. First, we could not control the covariates associated with depressive symptoms among adolescents because of the limitations of the secondary data analysis. Original studies that can adjust the covariates are recommended to verify the association of weight, weight perception, and weight satisfaction with depression symptoms among adolescents. Second, our study only focused on the association of weight, weight perception, and weight satisfaction with depressive symptoms among individuals in early adolescence. However, the association could differ across the developmental stages of adolescence. Thus, further study is needed to identify the associations with early, middle, and late adolescence.

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