



Relationships Between Eating Behaviors and Psychological Distress Among Female High School Students: A Social Network Analysis Perspective

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Objective The purpose of this study is to examine the relationship between body image distress and disordered eating behaviors (DEBs) using peer-based social network characteristics during adolescence.

Methods Data were drawn from the Korean Study of Adolescent Health, a longitudinal cohort investigating mental and behavioral health in Korean youth. The analytic sample comprised 315 female high school students from two cohorts. Eating behaviors, body image distress, depressive and anxiety symptoms, perceived stress, personality traits, and social network centrality were assessed using self-report questionnaires. Ordinal and binary logistic regression analyses were conducted.

Results Students in Cohort 23 reported lower body image distress and binge eating compared with those in Cohort 22 ($p < 0.05$). Underweight status (body mass index [BMI] < 18.5) was associated with lower body image distress and reduced binge eating, whereas obesity was linked to body image distress but not dieting behaviors. Depressive symptoms predicted both binge eating and dieting ($p < 0.01$). Social network indices indicated that higher in-degree centrality was protective against body image distress, while higher out-degree centrality was associated with body image distress but reduced dieting behaviors.

Conclusion In addition to BMI and depressive symptoms, social network centrality emerged as a correlate of DEBs among adolescent girls. These findings highlight the importance of integrating emotional regulation and supportive peer network structures into interventions aimed at promoting healthy body image and eating behaviors.

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Keywords Adolescence; Body image; Disordered eating behavior; Social network analysis.

INTRODUCTION

Body image distress and eating behaviors during adolescence

Adolescence is a developmental period characterized by rapid biological changes and concurrent psychosocial maturation. The physical transformations occurring during this stage play a critical role in shaping self-identity and establish-

ing patterns of eating behavior. During this period, adolescents often demonstrate heightened sensitivity to body image and physical appearance, which can directly influence their eating-related attitudes and behaviors.¹

In addition, increased salience of peer relationships and heightened sensitivity to social evaluation contribute to adolescents' perceptions of their body image within social contexts, potentially leading to body image distortion and emo-

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tional distress.^{2,3} Adolescents with emotional vulnerabilities may be particularly susceptible to maladaptive eating patterns, including binge eating and other forms of disordered eating behaviors (DEBs).⁴

Therefore, eating behaviors during adolescence should not be viewed solely as biological responses to hunger but rather as complex behavioral expressions shaped by psychosocial influences, including peer dynamics, social pressure, and emotional regulation. A comprehensive understanding of adolescents' eating behaviors requires simultaneous consideration of their broader social environment and interpersonal contexts.

Review of previous studies and research direction

DEBs are not only associated with mental health concerns but also linked to significant physical complications. Prior studies have consistently shown that DEBs during adolescence are more prevalent among female students. In a study of Korean adolescents, previous studies reported that female students demonstrated higher levels of DEBs such as extreme dieting for weight loss and binge eating, as well as more irregular eating patterns compared with male students.⁵ Similarly, a study of Japanese adolescents by Otsuka et al.⁶ reported substantially higher rates of DEBs among female students, highlighting a strong association with body image distress.

Peer relationships have been widely recognized as salient social factors influencing adolescents' health behaviors, particularly eating behaviors. Early adolescence is characterized by heightened susceptibility to peer influence, during which individuals tend to conform to the behavioral norms of groups they wish to affiliate with.⁷⁻¹⁰

Numerous studies have demonstrated that female middle and high school students often engage in maladaptive eating patterns such as extreme dieting or excessive dietary restriction in efforts to align with idealized body images reinforced within their peer groups.¹¹⁻¹⁵ Consequently, peer pressure and increased sensitivity to social evaluation are considered major risk factors for DEBs among adolescent girls.

In contrast, other findings indicate that peer relationships can also facilitate positive eating behaviors. Adolescents are more likely to adopt healthy eating patterns modeled or reinforced by close friends.¹⁶ Peer norms and approval regarding food choices have been identified as key predictors of healthier eating behaviors.¹⁷ Previous study found that peer encouragement of nutritious food consumption was associated with increased intake of healthy foods and reduced consumption of unhealthy foods.¹⁸ Another study also emphasized the role of peer social development in fostering healthy eating habits.¹⁹

Collectively, these findings suggest that peer relationships exert both positive and negative influences on female adolescents' eating behaviors through mechanisms such as stress,

social perception, peer pressure, and behavioral conformity. Thus, a comprehensive understanding of adolescents' eating behaviors requires consideration of both the structural characteristics and qualitative experiences of peer interactions. Social network analysis (SNA) provides a validated quantitative methodology for capturing these network contexts.²⁰

SNA enables the quantitative examination of relationships (edges) among individuals (nodes) to identify structural patterns and explore how individuals' positions within a network influence psychological and behavioral characteristics. Unlike traditional statistical approaches that emphasize individual level variables, SNA focuses on relational structures, offering distinct theoretical and methodological advantages.²¹

On this basis, the present study examined factors associated with adolescents' body image distress and DEBs, with particular emphasis on how social factors intersect with body mass index (BMI), psychological variables, and personality traits to shape these outcomes.

METHODS

Participants and procedure

This study used data from the Korean Study of Adolescent Health (KSAH), a longitudinal project that investigates biological, psychological, and social determinants of adolescent mental health in Korea. Participants were first year students enrolled at a girls' high school in Seoul during the 2022 and 2023 academic years. The study followed a longitudinal design, tracking each incoming cohort for 3 years throughout their high school enrollment.

The school consisted of ten classes per grade, with approximately 270 to 280 students in each grade annually. Before participation, all students and their legal guardians were informed of the purpose and procedures of the study, and written informed consent was obtained from both. The first-year cohort enrolled in 2022 was designated as Cohort 22, and the cohort enrolled in 2023 as Cohort 23. The study protocol was approved by the Institutional Review Board of Yonsei University Health System. Ethical approval for Cohort 22 was granted under IRB No. 7001988-202412-HR-1452-21, and approval for Cohort 23 was granted under IRB No. 7001988-202412-HR-1806-11. All informed consent was obtained from all participants and their legal guardians.

For the present analysis, a cross-sectional design was used by combining data from the initial survey of each cohort. Data collection for Cohort 22 occurred between April and June 2022, and data collection for Cohort 23 occurred between April and May 2023. The number of respondents and response rates were 141 students (52.0 percent; 141 of 271) and 176 students (62.4 percent; 176 of 282), respectively. Surveys were

completed through self-administered questionnaires under the supervision of trained research assistants in classroom settings. Among 317 total respondents, 315 participants who provided complete data on all analytic variables were included in the final analysis.

Measures

Eating behaviors and body image distress

Self-report questionnaires were used to assess adolescents' eating behaviors, body image distress, and social networks. Dependent variables related to eating behaviors and body image were measured using items adapted from the Development and Wellbeing Assessment eating disorder module, which has been widely used in prior research on DEBs.²²⁻²⁴

Binge eating was defined as episodes characterized by a perceived loss of control overeating accompanied by the consumption of an unusually large amount of food within a short period. The presence of binge eating experiences was assessed with the question, "During the past 3 months, have you experienced episodes of binge eating?" Responses were dichotomized as "no" or "yes," and participants who responded "yes" additionally reported the frequency of such episodes during the past 3 months.

Purging behavior was defined as the use of medication or dietary products to facilitate bowel movements or to control body weight or appearance. This item was coded dichotomously (0=no experience, 1=experience), and participants who reported purging indicated the frequency of engagement during the past 3 months.

Dieting was assessed with three items: 1) deliberately eating less at meals, 2) skipping meals, and 3) refraining from eating for eight or more waking hours. Each item was rated on a 4-point scale indicating frequency during the preceding 3 months (1=never, 2=sometimes [a few times a month], 3=often [a few times a week], 4=almost every day).

Body image distress was measured with the item, "How dissatisfied are you with your current body image?" Responses were rated on a 4-point Likert scale ranging from 1=not at all dissatisfied to 4=very dissatisfied.

Participants also reported their height (cm) and weight (kg). BMI was calculated as weight in kilograms divided by height in meters squared, based on these self-reported measures.

Social network assessment

The social network survey used in this study was adapted from the instrument originally developed by Burt²⁵ to assess interpersonal discussion networks, and it was modified for use among adolescents. This instrument, designed to measure respondents' core discussion networks (individuals with

whom they discuss important matters), has been incorporated into the General Social Survey in the United States and has been widely used in large scale studies of social networks and health, including the National Social Life, Health, and Aging Project²⁶ and its Korean counterpart, the Korean Social Life, Health, and Aging Project.²⁷

Participants in the KSAH study were first asked how many individuals they had discussed important matters with during the past year. They were then instructed to list up to seven individuals, in order of frequency of discussion, by full name. Because parent-child relationships were assessed separately within the KSAH survey, participants were explicitly instructed not to include their parents in the network assessment.

Note that the average number of individuals with whom students reported discussing important matters during the past year was 4.45, although the school-based socio-centric network used in the present study was restricted to discussion ties involving schoolmates.

After listing their discussion partners, participants completed a "Social Network Card 1," which collected detailed information on each named individual, including gender, age, duration of acquaintance, relationship to the participant, frequency of interaction (e.g., conversations, meetings, leisure activities), perceived closeness, whether the person was known to the participant's parents or homeroom teacher, and the likelihood of discussing career decisions with that person.

Participants then completed a "Social Network Card 2," which captured the interrelationships among the individuals they had listed as discussion partners. For example, if a student listed A, B, and C, she was asked to indicate the degree of acquaintance or closeness for each pair (A-B, B-C, and C-A). These data represent ego-centric networks, as each participant reported on the social relationships surrounding herself.

Because the KSAH study surveyed all students within a single school across grade levels, it was possible to construct socio-centric networks by extracting ties among students within the same school. Unlike ego-centric networks, socio-centric network data includes all members within a defined group, allowing for the assessment not only of self-reported ties but also of reciprocal nominations and peer perceptions. This enables more comprehensive applications of SNA.

Among various network metrics, this study focused on two indicators of centrality: in-degree centrality and out-degree centrality.

In-degree centrality was defined as the number of peers within the same school who nominated the respondent as someone with whom they discussed important matters. This indicator reflects peer acceptance, social visibility, and perceived popularity within the network.

Out-degree centrality was defined as the number of peers

the respondent nominated as discussion partners, representing social exploration, approachability, and interpersonal initiative.²⁸

Psychological variables

In this study, psychological distress was operationalized using three indicators: depressive symptoms, anxiety symptoms, and perceived stress. Depressive symptoms were assessed with the Patient Health Questionnaire-9 (PHQ-9).²⁹ The Korean version of the PHQ-9,³⁰ which has been validated for use in both clinical and community populations, was employed. The PHQ-9 consists of nine items that evaluate depressive experiences during the previous 2 weeks. Each item is rated on a 4-point scale ranging from 0 ("not at all") to 3 ("nearly every day"), yielding a total score between 0 and 27. Higher scores reflect greater severity of depressive symptoms.

Anxiety symptoms were measured using the Korean adolescent version of the Generalized Anxiety Disorder-7 scale.³¹ This 7-item instrument assesses the extent to which anxiety and tension-related symptoms have interfered with daily functioning over the past 2 weeks. Each item is rated on a 4-point scale: 0 ("not at all"), 1 ("several days"), 2 ("more than half the days"), and 3 ("nearly every day"). Higher scores indicate greater severity of anxiety symptoms.

Perceived stress was assessed using the Korean version of the Perceived Stress Scale.³² This 10-item measure evaluates the degree to which individuals perceive their lives as unpredictable, uncontrollable, or overloaded during the past month. Items are rated on a 5-point Likert scale from 0 ("never") to 4 ("very often"), with higher scores indicating greater perceived stress. Negatively worded items (e.g., items 4, 5, 7, 8, and 10) were reverse coded prior to scoring. Total scores range from 0 to 40.

Personality traits

Personality traits were assessed using the Ten-Item Personality Inventory (TIPI).³³ This brief measure evaluates the five major personality dimensions: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. The inventory consists of 10 items (two items per trait), each rated on a 7-point Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). Higher scores indicate stronger expression of each personality dimension. For each trait, the mean of the two corresponding items was calculated to generate a composite score.

Statistical analysis

When body image distress was used as the dependent variable, ordinal logistic regression analysis was conducted because the variable was measured on a 4-point Likert scale

(ranging from 1 to 4). To assess whether the proportional odds assumption required for ordinal logistic regression was met, the Brant test was performed.³⁴ The results indicated that the key independent variables representing social network measures satisfied the assumption (in-degree centrality: $\chi^2=0.29$, $p=0.866$; out-degree centrality: $\chi^2=0.73$, $p=0.695$). Therefore, the ordinal logistic regression model was retained.

For dependent variables representing binge eating, purging, and dieting, binary logistic regression analyses were conducted. All statistical analyses were carried out using Stata version 18 (StataCorp LLC).

RESULTS

Descriptive statistics

Table 1 presents the descriptive statistics for the 315 participants included in the analysis. Of these, 141 (44.76%) were from Cohort 22 and 174 (55.24%) were from Cohort 23. The mean age of participants was 15.79 ± 0.32 years.

Regarding social network characteristics, the mean in-degree centrality was 1.03 ± 1.01 and the mean out-degree centrality was 1.47 ± 1.39 among survey respondents. In the full school network, including both respondents and non-respondents, the mean in-degree and mean out-degree were both 1.10, as expected from the directed network structure. Figure 1 presents a visualization of the school-based discussion network to facilitate interpretation of the social network findings. Each node represents a student, and each edge represents a discussion tie. Node color represents body image distress on a 4-point Likert scale, ranging from white for lower distress to darker red for higher distress; students included in the school roster but without survey data are displayed in gray.

The distribution of BMI categories was as follows: underweight, 93 participants (29.52%); normal weight, 174 (55.24%); overweight, 26 (8.25%); and obese, 22 (6.98%).

For the big five personality dimensions, the mean scores were extraversion= 4.21 ± 1.68 , agreeableness= 4.30 ± 1.39 , conscientiousness= 4.29 ± 1.32 , neuroticism= 3.75 ± 1.25 , and openness to experience= 4.42 ± 1.36 . These mean values suggest that participants generally showed higher levels of agreeableness, conscientiousness, and openness to experience, reflecting tendencies toward cooperativeness, organization, goal-directed behavior, and receptiveness to new ideas. In contrast, neuroticism scores were comparatively lower, indicating fewer tendencies toward emotional instability, such as anxiety or mood fluctuations. Extraversion levels were moderate, suggesting a balanced disposition between sociability and introversion.

The mean scores for mental health indicators were 6.72 ± 5.43 for depression, 4.81 ± 4.63 for anxiety, and 18.88 ± 6.50 for perceived stress. These values indicate that, on average, partici-

Table 1. Descriptive statistics of analytical sample (N=315)

Variables	Value
Cohort	
Cohort 22 (reference)	141 (44.76)
Cohort 23	174 (55.24)
Age (yr)	15.79±0.32
Social network characteristics	
In-degree centrality	1.03±1.01
Out-degree centrality	1.47±1.39
Body mass index (kg/m ²)	
Underweight (<18.5)	93 (29.52)
Normal (18.5–23, reference)	174 (55.24)
Overweight (23–25)	26 (8.25)
Obesity (≥25)	22 (6.98)
Big five personality traits	
Extraversion	4.21±1.68
Agreeableness	4.30±1.39
Conscientiousness	4.29±1.32
Neuroticism	3.75±1.25
Openness to experience	4.42±1.36
Mental health	
Depression	6.72±5.43
Anxiety	4.81±4.63
Perceived stress	18.88±6.50
Body image distress	
Not at all	48 (15.24)
A little	111 (35.24)
A medium amount	89 (28.25)
A great deal	67 (21.27)
Eating behaviors	
Binge eating	101 (32.06)
Purging	19 (6.03)
Dieting	144 (45.71)

Data are presented as mean±standard deviation or number (%).

pants reported mild levels of depressive and anxiety symptoms and a moderate level of perceived stress.

Body image distress

Table 2 summarizes the results of the ordinal logistic regression analyses conducted to examine the predictors of body image distress among adolescents. Model 1 included cohort, age, and social network variables. In Model 2, BMI was included to control for its established influence on body image outcomes.³⁵ Model 3 further incorporated personality traits and mental health indicators to determine whether the associations between SNA variables and body image distress re-

mained significant after adjusting for individual psychological characteristics.^{36,37}

Effects of cohort and age

Cohort was a significant predictor across all models. Students in Cohort 23 reported significantly lower levels of body image distress compared with those in Cohort 22 (Model 1: odds ratio [OR]=0.59, $p<0.05$; Model 2: OR=0.55, $p<0.01$; Model 3: OR=0.59, $p<0.05$). In contrast, age was not significantly associated with body image distress in any model.

Social network characteristics

Among the social network variables, in-degree centrality was consistently associated with lower body image distress across all three models (Model 1: OR=0.78, 95% [confidence interval, CI] 0.63, 0.97, $p<0.05$; Model 2: OR=0.80, 95% CI 0.64, 1.00, $p<0.05$; Model 3: OR=0.76, 95% CI 0.60, 0.95, $p<0.05$). In contrast, out-degree centrality was positively associated with body image distress all three models (Model 1: OR=1.18, 95% CI 1.01, 1.39, $p<0.05$; Model 2: OR=1.18, 95% CI 1.00, 1.38, $p<0.05$; Model 3: OR=1.27, 95% CI 1.07, 1.50, $p<0.01$).

BMI

BMI was a strong predictor of body image distress. Adolescents classified as underweight (BMI <18.5) exhibited significantly lower body image distress compared with those in the normal weight group (Model 2: OR=0.29, 95% CI 0.18, 0.47, $p<0.001$; Model 3: OR=0.27, 95% CI 0.16, 0.46, $p<0.001$).

On the other hand, adolescents classified as obese demonstrated higher body image distress in Model 2 (OR=2.93, 95% CI 1.20, 7.21, $p<0.05$) and Model 3 (OR=2.62, 95% CI 1.04, 6.60, $p<0.05$).

Personality traits and psychological variables

In Model 3, which included the big five personality traits and psychological factors (depression, anxiety, and perceived stress), none of these variables were statistically significant predictors of body image distress ($p>0.05$).

Binge eating, purging, and dieting

Table 3 presents the results of logistic regression analyses predicting three subtypes of DEBs: binge eating, purging, and dieting. Independent variables included cohort, social network characteristics, BMI, personality traits, and psychological factors.

Binge eating

Students in Cohort 23 were significantly less likely to engage in binge eating compared with those in Cohort 22 (OR=

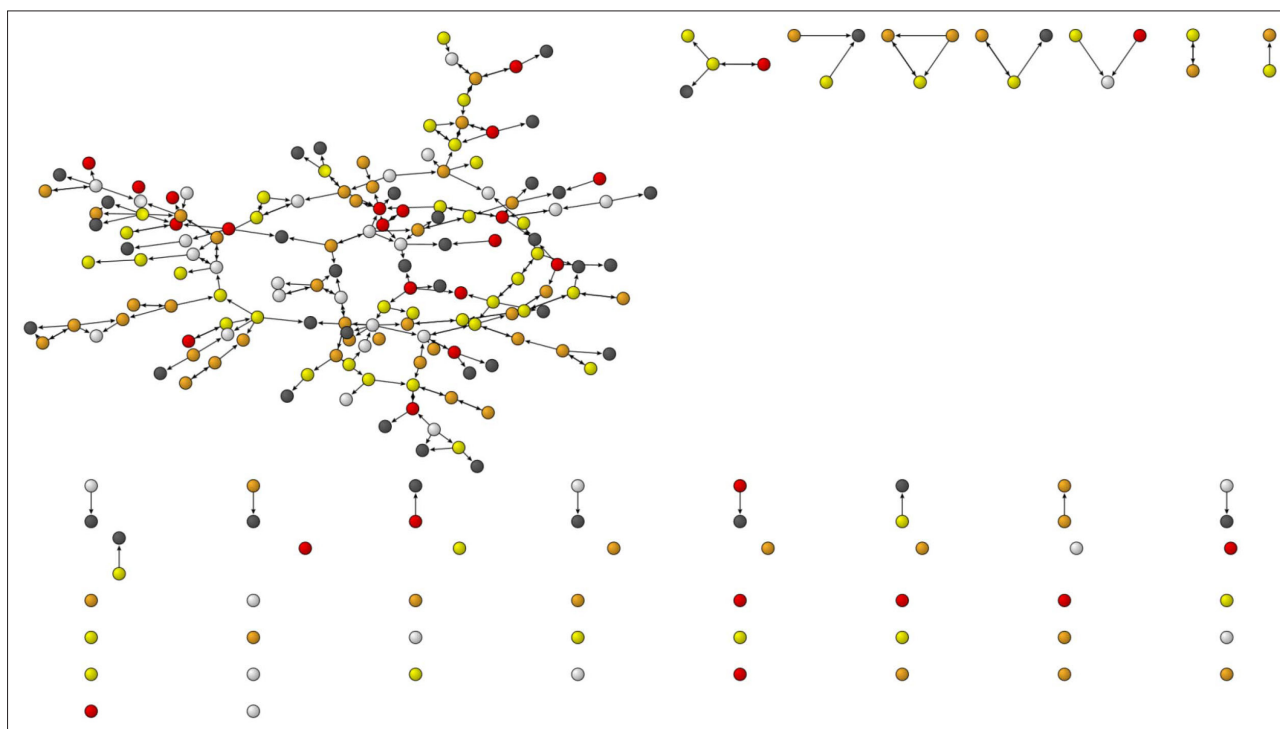


Figure 1. Social network visualization of school-level discussion network with nodes colored by body image distress. Node colors represent body image distress; white=not at all (satisfied), yellow=a little, orange=a medium amount, red=a great deal (dissatisfied), gray=non-respondents.

0.51, 95% CI 0.30, 0.86, $p < 0.05$). Similarly, participants classified as underweight (BMI < 18.5) demonstrated a lower likelihood of binge eating compared with those in the normal weight group (OR=0.39, 95% CI 0.20, 0.77, $p < 0.01$). Openness to experience showed a significant positive correlation with binge eating, indicating that higher levels of openness were associated with an increased likelihood of binge eating (OR=1.26, 95% CI 1.02, 1.57, $p < 0.05$). Depressive symptoms were positively associated with binge eating. Higher depression scores were linked to an increased likelihood of binge eating episodes (OR=1.14, 95% CI 1.05, 1.24, $p < 0.01$).

Purging behavior

No variables were significantly associated with purging behaviors (laxative use) at the $p < 0.05$ level.

Dieting

Higher out-degree centrality was significantly associated with a lower likelihood of engaging in dieting (OR=0.73, 95% CI 0.60, 0.90, $p < 0.01$).

Conversely, depressive symptoms were strongly and positively associated with dieting. Participants with higher depression scores were more likely to report restrictive eating behaviors (OR=1.17, 95% CI 1.07, 1.27, $p < 0.001$).

DISCUSSION

BMI exerted a direct influence on body image. Being underweight was associated with lower levels of body image distress and a reduced likelihood of binge eating, whereas obesity was linked to higher body image distress but showed no significant association with DEBs. Depressive symptoms increased the likelihood of both binge eating and restrictive eating. With respect to social network characteristics, in-degree centrality functioned as a protective factor by reducing body image distress, whereas out-degree centrality emerged as a risk factor associated with greater body image distress.

Differences between cohorts

The findings indicated that students in Cohort 23 reported significantly lower levels of body image distress and binge eating compared with those in Cohort 22. This suggests that even among adolescents of the same age, gender, and regional background, perceptions of body image may vary across cohorts due to differences in sociocultural environments and peer norms.

The 2022 academic year coincided with the height of the COVID-19 pandemic, during which social distancing was widely practiced, whereas by 2023 such restrictions had been lifted. During the pandemic, social isolation and reduced opportunities for physical activity have been shown to exacerbate depression and anxiety among adolescents, which may

Table 2. Ordered logistic regression models predicting body image distress

	Model 1		Model 2		Model 3	
	OR	95% CI	OR	95% CI	OR	95% CI
Cohort						
Cohort 22 (reference)	-	-	-	-	-	-
Cohort 23	0.59*	0.40, 0.89	0.55**	0.36, 0.84	0.59*	0.38, 0.91
Age (yr)	0.99	0.51, 1.89	0.98	0.51, 1.90	0.91	0.46, 1.80
Social network characteristics						
In-degree centrality	0.78*	0.63, 0.97	0.80*	0.64, 1.00	0.76*	0.60, 0.95
Out-degree centrality	1.18*	1.01, 1.39	1.18*	1.00, 1.38	1.27**	1.07, 1.50
Body mass index (kg/m ²)						
Underweight (<18.5)			0.29***	0.18, 0.47	0.27***	0.16, 0.46
Normal (18.5–<23, reference)			-	-	-	-
Overweight (23–<25)			2.25*	1.02, 4.98	2.25*	1.00, 5.04
Obesity (≥25)			2.93*	1.20, 7.21	2.62*	1.04, 6.60
Big five personality traits						
Extraversion					1.02	0.89, 1.18
Agreeableness					0.96	0.82, 1.12
Conscientiousness					0.87	0.73, 1.05
Neuroticism					1.01	0.81, 1.28
Openness to experience					1.01	0.85, 1.20
Mental health						
Depression					1.07 [†]	1.00, 1.14
Anxiety					1.02	0.94, 1.11
Perceived stress					1.03	0.97, 1.09
Observation			315			

[†]p<0.10; *p<0.05; **p<0.01; ***p<0.001. OR, odds ratio; CI, confidence interval.

subsequently contribute to increased body image distress. Prior research has reported that adolescents' mental health deteriorated due to increased fast-food consumption and decreased physical activity.³⁸ Moreover, insufficient physical activity has been linked to heightened depressive symptoms,³⁹ and irregular eating patterns combined with increased intake of processed foods such as fast food have contributed to weight gain and obesity.⁴⁰ These factors likely influenced the higher level of body image distress observed among students in Cohort 22.

These contextual differences highlight how temporal and sociocultural shifts including changes in media exposure, prevailing body ideals, and school atmosphere can meaningfully shape adolescents' attitudes toward appearance. The findings underscore the importance of considering group-level sociocultural contexts when examining body image and eating-related behaviors.

Effects of BMI

BMI emerged as a key determinant of both body image distress and eating behaviors. Being underweight (BMI <18.5)

was associated with significantly lower body image distress and a reduced likelihood of binge eating (p<0.001; p<0.01). This finding aligns with the sociocultural influence model,⁴¹ which posits that thinness is idealized in many cultural contexts, particularly among Korean adolescents.

However, such satisfaction may reflect a socially reinforced distortion of body image rather than genuine physical well-being. This interpretation is consistent with previous study which described cognitive distortions characteristic of the early stages of eating pathology.⁴²

In contrast, participants classified as obese (BMI ≥25) reported higher body image distress in both Model 2 (OR=2.93, p<0.05) and Model 3 (OR=2.62, p<0.05), with the effect slightly attenuated but remaining significant after controlling for personality and emotional variables. Moreover, obesity was not significantly associated with DEBs. These findings suggest that although obesity may contribute to negative body perceptions, it does not necessarily lead to restrictive or compensatory eating patterns.

Prior research generally supports the notion that BMI in-

Table 3. Logistic regression models predicting disordered eating

	Binge eating		Purging		Dieting	
	OR	95% CI	OR	95% CI	OR	95% CI
Cohort						
Cohort 22 (reference)	-	-	-	-	-	-
Cohort 23	0.51*	0.30, 0.86	0.34 [†]	0.12, 1.00	0.84	0.51, 1.37
Age (yr)	0.93	0.39, 2.22	0.34	0.07, 1.63	0.93	0.42, 2.06
Social network characteristics						
In-degree centrality	0.81	0.61, 1.08	0.71	0.41, 1.24	1.22	0.94, 1.57
Out-degree centrality	1.06	0.87, 1.29	1.29	0.92, 1.82	0.73**	0.60, 0.90
Body mass index (kg/m ²)						
Underweight (<18.5)	0.39**	0.20, 0.77	0.43	0.10, 1.75	0.72	0.41, 1.27
Normal (18.5–<23, reference)	-	-	-	-	-	-
Overweight (23–<25)	1.68	0.66, 4.29	1.77	0.32, 9.85	0.88	0.35, 2.21
Obesity (≥25)	1.61	0.59, 4.40	1.86	0.40, 8.73	0.89	0.34, 2.35
Big five personality traits						
Extraversion	1.08	0.91, 1.28	1.07	0.77, 1.48	1.05	0.89, 1.23
Agreeableness	0.95	0.78, 1.16	0.85	0.59, 1.24	0.91	0.76, 1.09
Conscientiousness	1.04	0.83, 1.30	1.23	0.81, 1.88	0.91	0.74, 1.12
Neuroticism	1.18	0.88, 1.58	1.21	0.70, 2.11	1.02	0.78, 1.33
Openness to experience	1.26*	1.02, 1.57	1.19	0.80, 1.77	0.87	0.72, 1.06
Mental health						
Depression	1.14**	1.05, 1.24	1.01	0.87, 1.17	1.17***	1.07, 1.27
Anxiety	0.96	0.87, 1.06	1.09	0.92, 1.30	0.97	0.88, 1.06
Perceived stress	1.01	0.94, 1.09	0.98	0.84, 1.13	0.98	0.91, 1.04
Observation				315		

[†]p<0.10; *p<0.05; **p<0.01; ***p<0.001. OR, odds ratio; CI, confidence interval.

fluences disordered eating indirectly, mediated by body image distress, emotional states, and sociocultural pressures. For example, higher BMI has been associated with increased body image distress, which subsequently predicts eating pathology.⁴³ Another study similarly argued that eating disorders and obesity share common risk and maintenance factors, including sociocultural influences, emotion regulation difficulties, and dieting culture and that these mediating mechanisms, rather than BMI alone, drive DEBs.⁴⁴ Previous study demonstrated that weight stigma, rather than body weight itself, plays a central role in the onset of DEBs.⁴⁵

Taken together, these findings indicate that although individuals with higher BMI may experience greater body image distress, this does not automatically lead to restrictive eating. Rather, the relationship appears to be moderated by emotional regulation capacity, self-efficacy, and sensitivity to social stigma.

Influence of depression and personality traits

Depressive symptoms were not significantly associated with

body image distress but were positively related to both binge eating and restrictive eating behaviors. This finding supports the affect regulation model of DEBs, which posits that maladaptive eating patterns may function as temporary strategies for managing emotional distress.⁴⁶ Adolescents with higher levels of depressive symptoms may engage in binge eating or restrictive eating as attempts to alleviate or control negative emotions. These two seemingly opposite behaviors may therefore share a common emotional vulnerability.

Consistent with previous research, this finding underscores the importance of enhancing emotion regulation and self-compassion, rather than focusing solely on correcting eating behaviors, in interventions for eating-related problems.⁴⁷

The positive association between openness to experience and binge eating observed in this study should be interpreted considering the mixed results reported in prior literature. A recent systematic review concluded that openness shows weak or inconsistent associations with DEBs at the broad trait level and that correlations vary across specific facets within the domain.⁴⁸ Thus, the positive relationship identified in the pres-

ent study should be interpreted cautiously, given the multidimensional structure of openness and the inconsistency of previous findings. Future research should examine openness at facet level and investigate whether particular facets are differentially associated with specific eating behaviors, such as binge eating or dieting.

Degree centrality in social networks

Among the social network characteristics examined in this study, in-degree centrality functioned as a protective factor against body image distress, whereas out-degree centrality served as a risk factor. High in-degree centrality reflects being frequently nominated by peers as a discussion partner, indicating social acceptance and visibility. Such perceived support from peers may enhance self-esteem and foster a more positive perception of one's body.^{28,49} Peer recognition may therefore buffer against body image distress by reinforcing feelings of social belonging and self-worth.

Conversely, higher out-degree centrality was associated with greater body image distress. This may indicate that adolescents who actively form numerous social connections are more frequently exposed to social comparison and appearance-related evaluation. Prior research has shown that increased teasing from peers regarding weight and appearance is associated with higher levels of body image distress.¹⁵ Additionally, a study conducted in China reported that peers' weight-related evaluations and weight-loss behaviors can promote the internalization of an idealized thin body image, contributing to more negative body perceptions among adolescents.⁵⁰ Thus, adolescents who engage broadly within peer networks may encounter more frequent social comparisons, which may exacerbate body image distress.

Interestingly, however, higher out-degree centrality was also associated with lower levels of restrictive eating. In this study, out-degree centrality may be interpreted as an index reflecting extraverted, socially active characteristics within the peer group. This interpretation is partly consistent with previous findings. In a study of middle school students, one study found that students with more extroverted personality traits reported higher dietary self-efficacy and overall healthier eating habits compared with their introverted peers.⁵¹ These findings suggest that adolescents with higher out-degree centrality are not only more extraverted and socially open but may also be predisposed to healthier eating behaviors, providing context for understanding the associations observed between network indices and eating behaviors.

Taken together, these findings suggest that adolescents with higher out-degree centrality may rely on social engagement and positive self-expression as emotional coping strategies rather than resorting to pathological dieting.

Limitation

The present study has several limitations. First, the sample consisted of first-year students from a single girls' high school in Seoul, which limits the generalizability of the findings to female adolescents and to youth in other regions or school contexts. Second, although the data were drawn from a longitudinal cohort, only the first-wave assessments were used, and the analyses were cross-sectional; thus, the causal directions among BMI, depressive symptoms, network indices, and body image or eating behaviors cannot be determined. Third, all variables were assessed by self-report, body image was measured with a single item, and personality was evaluated using a brief measure (TIPI), which may have reduced measurement precision. Additionally, the discussion network was restricted to a maximum of seven nominated alters and was based on a relatively narrow name generator focused on schoolmates with whom participants discussed important matters. As a result, this network may not fully capture broader friendship ties, peers outside of school, or relationships most directly involved in appearance-related comparison and eating-related influence. Finally, potential confounding factors such as family environment, socioeconomic status, pubertal development, and media or social media exposure were not measured or controlled for, and these factors should be considered when interpreting the findings.

To address these limitations, the KSAH study has expanded its network survey since 2024 to include friendship nominations alongside discussion nominations, which will allow future work to compare whether friendship and discussion networks show different associations with eating-related outcomes. Future research may benefit from incorporating network exposure measures to examine whether adolescents' body image distress and eating-related outcomes are associated not only with their own network positions but also with the characteristics of the peers to whom they are connected. In addition, network-structural approaches such as exponential random graph models may help clarify whether these associations reflect broader tie-formation processes, including similarity-based selection and other structural dependencies within adolescent peer networks.

Conclusion and implication

We conducted a study to examine the associations between eating behaviors and body image distress among Korean female high school students. The findings indicate that, in addition to established factors such as BMI and depressive symptoms, social network centrality indices represent important correlates of body image distress (in-degree and out-degree centrality) and dieting (out-degree centrality). These results suggest that efforts to promote healthy body image and adap-

tive eating behaviors in adolescence should focus not only on enhancing emotional regulation but also on fostering supportive and health-promoting peer networks.

Availability of Data and Material

The data that support the findings of this study are available upon request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Conflicts of Interest

Min-Hyeon Park, a contributing editor of the *Psychiatry Investigation*, was not involved in the editorial evaluation or decision to publish this article. All remaining authors have declared no conflicts of interest.

Author Contributions

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REFERENCES

- Bodega P, de Cos-Gandoy A, Fernández-Alvira JM, Fernández-Jiménez R, Moreno LA, Santos-Beneit G. Body image and dietary habits in adolescents: a systematic review. *Nutr Rev* 2024;82:104-127.
- Smolak L. Body image in children and adolescents: where do we go from here? *Body Image* 2004;1:15-28.
- Stice E, Shaw HE. Role of body dissatisfaction in the onset and maintenance of eating pathology: a synthesis of research findings. *J Psychosom Res* 2002;53:985-993.
- Shriver LH, Dollar JM, Calkins SD, Keane SP, Shanahan L, Wideman L. Emotional eating in adolescence: effects of emotion regulation, weight status and negative body image. *Nutrients* 2021;13:79.
- Yang SJ, Kim JM, Yoon JS. Disturbed eating attitudes and behaviors in South Korean boys and girls: a school-based cross-sectional study. *Yonsei Med J* 2010;51:302-309.
- Otsuka Y, Kaneita Y, Itani O, Jike M, Osaki Y, Higuchi S, et al. Gender differences in dietary behaviors among Japanese adolescents. *Prev Med Rep* 2020;20:101203.
- Brown BB, Eicher SA, Petrie S. The importance of peer group ("crowd") affiliation in adolescence. *J Adolesc* 1986;9:73-96.
- French DC, Cheung HS. Peer relationships. In: Lansford JE, Banati P, editors. *Handbook of adolescent development research and its impact on global policy*. New York: Oxford University Press, 2018, p.130-149.
- Harter S. Causes and consequences of low self-esteem in children and adolescents. In: Baumeister RF, editor. *Self-esteem: the puzzle of low self-regard*. New York: Plenum Press, 1993, p.87-116.
- Simons-Morton BG. Prospective analysis of peer and parent influences on smoking initiation among early adolescents. *Prev Sci* 2002;3:275-283.
- Kenny U, O'Malley-Keighran MP, Molcho M, Kelly C. Peer influences on adolescent body image: friends or foes? *Journal of Adolescent Research* 2017;32:768-799.
- Kim HL. [The effects of sociocultural effects, BMI, body image, and self-esteem on body dissatisfaction in adolescents]. *Korean J Hum Dev* 2012;19:1-19. Korean
- Lee SE, Lee SJ. [The effect of social media use on body image among adolescents]. *Korean J Commun Stud* 2019;27:57-84. Korean
- Voelker DK, Reel JJ, Greenleaf C. Weight status and body image perceptions in adolescents: current perspectives. *Adolesc Health Med Ther* 2015;6:149-158.
- Webb HJ, Zimmer-Gembeck MJ. The role of friends and peers in adolescent body dissatisfaction: a review and critique of 15 years of research. *J Res Adolesc* 2014;24:564-590.
- Bruening M, Eisenberg M, MacLehose R, Nanney MS, Story M, Neumark-Sztainer D. Relationship between adolescents' and their friends' eating behaviors: breakfast, fruit, vegetable, whole-grain, and dairy intake. *J Acad Nutr Diet* 2012;112:1608-1613.
- Kalavana TV, Maes S, De Gucht V. Interpersonal and self-regulation determinants of healthy and unhealthy eating behavior in adolescents. *J Health Psychol* 2010;15:44-52.
- Stok FM, de Vet E, de Wit JB, Luszczynska A, Safron M, de Ridder DT. The proof is in the eating: subjective peer norms are associated with adolescents' eating behaviour. *Public Health Nutr* 2015;18:1044-1051.
- Salvy SJ, Miles JN, Shih RA, Tucker JS, D'Amico EJ. Neighborhood, family and peer-level predictors of obesity-related health behaviors among young adolescents. *J Pediatr Psychol* 2017;42:153-161.
- Haas SA, Schaefer DR, Kornienko O. Health and the structure of adolescent social networks. *J Health Soc Behav* 2010;51:424-439.
- Wasserman S, Faust K. *Social network analysis: methods and applications*. Cambridge: Cambridge University Press; 1994.
- Goodman R, Ford T, Richards H, Gatward R, Meltzer H. The Development and Well-Being Assessment: description and initial validation of an integrated assessment of child and adolescent psychopathology. *J Child Psychol Psychiatry* 2000;41:645-655.
- Moya T, Fleitlich-Bilyk B, Goodman R, Nogueira FC, Focchi PS, Nicoletti M, et al. The Eating Disorders Section of the Development and Well-Being Assessment (DAWBA): development and validation. *Braz J Psychiatry* 2005;27:25-31.
- Robinson L, Zhang Z, Jia T, Bobou M, Roach A, Campbell I, et al. Association of genetic and phenotypic assessments with onset of disordered eating behaviors and comorbid mental health problems among adolescents. *JAMA Netw Open* 2020;3:e2026874.
- Burt RS. Network items and the General Social Survey. *Soc Networks* 1984;6:293-339.
- Cornwell B, Schumm LP, Laumann EO, Graber J. Social Networks in the NSHAP Study: rationale, measurement, and preliminary findings. *J Gerontol B Psychol Sci Soc Sci* 2009;64B(Suppl 1):i47-i55.
- Baek J, Baldina E, Sung K, Lee SH, Christakis NA, Bearman P, et al. A prospective sociocentric study of 2 entire traditional Korean villages: the Korean Social Life, Health, and Aging Project (KSHAP). *Am J Epidemiol* 2024;193:241-255.
- Freeman LC. Centrality in social networks conceptual clarification. *Soc Networks* 1978-1979;1:215-239.
- Kroenke K, Spitzer RL, Williams JBW. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med* 2001;16:606-613.
- Park SJ, Choi HR, Choi JH, Kim K, Hong JP. [Reliability and validity of

- the Korean version of the patient health questionnaire-9 (PHQ-9)]. *Anxiety Mood* 2010;6:119-124. Korean
31. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med* 2006;166:1092-1097.
 32. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav* 1983;24:385-396.
 33. Gosling SD, Rentfrow PJ, Swann WB. A very brief measure of the Big-Five personality domains. *J Res Pers* 2003;37:504-528.
 34. Brant R. Assessing proportionality in the proportional odds model for ordinal logistic regression. *Biometrics* 1990;46:1171-1178.
 35. Grano C, Vacca M, Lombardo C. The relationship between body mass index, body dissatisfaction and mood symptoms in pregnant women. *J Clin Med* 2024;13:2424.
 36. Allen MS, Robson DA. Personality and body dissatisfaction: an updated systematic review with meta-analysis. *Body Image* 2020;33:77-89.
 37. MacNeill LP, Best LA, Davis LL. The role of personality in body image dissatisfaction and disordered eating: discrepancies between men and women. *J Eat Disord* 2017;5:44.
 38. Lee JY, Moon S, Cho SH, Kim H, Kang HJ, Kim SY, et al. The relationship between fast food consumption and daily lifestyle changes during school closures following the COVID-19 pandemic: a cross-sectional study among adolescents in Korea. *Psychiatry Investig* 2024;21:610-617.
 39. Xiang M, Liu Y, Yamamoto S, Mizoue T, Kuwahara K. Association of changes of lifestyle behaviors before and during the COVID-19 pandemic with mental health: a longitudinal study in children and adolescents. *Int J Behav Nutr Phys Act* 2022;19:92.
 40. Martín-Rodríguez A, Tornero-Aguilera JF, López-Pérez PJ, Clemente-Suárez VJ. Dietary patterns of adolescent students during the COVID-19 pandemic lockdown. *Physiol Behav* 2022;249:113764.
 41. Thompson JK, Heinberg LJ, Altabe M, Tantleff-Dunn S. *Exacting beauty: theory, assessment, and treatment of body image disturbance*. Washington, DC: American Psychological Association; 1999.
 42. Eisenberg ME, Neumark-Sztainer D, Story M, Perry C. The role of social norms and friends' influences on unhealthy weight-control behaviors among adolescent girls. *Soc Sci Med* 2005;60:1165-1173.
 43. Lynch WC, Heil DP, Wagner E, Havens MD. Body dissatisfaction mediates the association between body mass index and risky weight control behaviors among White and Native American adolescent girls. *Appetite* 2008;51:210-213.
 44. Obeid N, Flament ME, Buchholz A, Henderson KA, Schubert N, Tasca G, et al. Examining shared pathways for eating disorders and obesity in a community sample of adolescents: the REAL study. *Front Psychol* 2022;13:805596.
 45. Levinson JA, Kinkel-Ram S, Myers B, Hunger JM. A systematic review of weight stigma and disordered eating cognitions and behaviors. *Body Image* 2024;48:101678.
 46. Haedt-Matt AA, Keel PK. Revisiting the affect regulation model of binge eating: a meta-analysis of studies using ecological momentary assessment. *Psychol Bull* 2011;137:660-681.
 47. Kelly AC, Carter JC, Zuroff DC, Borairi S. Self-compassion and fear of self-compassion interact to predict response to eating disorders treatment: a preliminary investigation. *Psychother Res* 2013;23:252-264.
 48. Gilmartin T, Gurvich C, Sharp G. The relationship between disordered eating behaviour and the five factor model personality dimensions: a systematic review. *J Clin Psychol* 2022;78:1657-1670.
 49. Liu X, Liu L. The mediating role of college students' body image and self-esteem in the impact of physical activity on life satisfaction and mental health. *Acta Psychol* 2025;257:105103.
 50. Shen J, Chen J, Tang X, Bao S. The effects of media and peers on negative body image among Chinese college students: a chained indirect influence model of appearance comparison and internalization of the thin ideal. *J Eat Disord* 2022;10:49.
 51. Kim HS, Kim HY. [Relationships among personality preferences, psychosocial factors and dietary habits of middle school students]. *Korean J Community Nutr* 2007;12:511-518. Korean