

Factors Affecting Emotional · Behavioral Problems in Early Adolescence: A Multilevel Model Study

Park, Hee Young¹ · Choi, Yeon Hee²

¹Daegu Chilsung Elementary School, Daegu

²College of Nursing · Institute of Nursing Science, Kyungpook National University, Daegu, Korea

Purpose: This study aims to investigate the individual and environmental factors related to emotional/behavioral problems to early adolescence in Korea by applying multilevel modeling. **Methods:** From the database of the 2014 Korean Child and Youth Panel Survey (KCYPs), the researchers selected 1,977 adolescents who are in the second year of middle school. Multilevel model analysis was performed to estimate the impact of relevant factors at the individual and environmental levels. **Results:** At the individual level, the significant factors associated with emotional/behavioral problems included BMI and study tendency in boys, and drinking, study tendency and economic levels in girls. At the environmental level, the significant factor associated with emotional/behavioral problems included relationship with the teacher. **Conclusion:** The emotional/behavioral problems of early adolescence are influenced not only by the individual factors but also by the environment factor. Therefore, the environment surrounding the adolescents should also be considered to prevent emotional/behavioral problems.

Key Words: Adolescent, Problem behavior, Multilevel analysis

INTRODUCTION

1. Background

Adolescence is a stage in which there is a conflict between the mind to grow up to be an adult and the mind to remain in childhood, and this period is fundamentally unstable [1]. Especially, the middle school years, which correspond to early adolescence, involve greater psychological conflicts. This is supported by the personality test performed by the Korea Educational Development Institute in 2014 for elementary, middle and high school students nationwide. Middle school students showed lower scores than elementary and high school students in all items of ten virtues such as self-regulation, self-esteem, responsibility, courtesy, and sincerity [2]. This instability of the middle school period reflected the characteristics of personality development in adolescence called a stormy peri-

od of puberty.

In addition to the physical and physiological changes of early adolescence, psychological changes are part of the normal development process that everyone undergoes, but when not controlled, they develop into emotional problems such as anxiety, depression, and somatic symptoms and behavioral problems such as aggression and social withdrawal [3-5]. Emotional · behavioral problems refer to cases in which emotional and behavioral responses at school are not in accordance with appropriate norms related to age, culture, and race and thus have a negative impact on educational performance. These problems persist despite interventions, and they occur consistently in two different environments, one of which is related to the school [6]. Especially, middle school years, which correspond to early adolescence, is a vulnerable period when these problems are likely to occur. This time is also a key period in which developmental patterns of emotional · be-

Corresponding author: Choi, Yeon Hee

College of Nursing, Kyungpook National University, 680 Gukchaebosang-ro, Jung-gu, Daegu 41944, Korea.
Tel: +82-53-420-4926, Fax: +82-53-421-2758, E-mail: yeonheechoi@naver.com

- This article is a revision of the first author's master's thesis from University.

Received: Jul 24, 2017 / Revised: Nov 7, 2017 / Accepted: Nov 14, 2017

This is an open access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>), which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

behavioral problems can be determined [5]. The results of the 'Student Emotional-Behavioral Trait Test' published by the Ministry of Education in 2013 showed that 11.0% of middle school students, 3.4% of elementary school students, and 9.0% of high school students were identified as students that were in need of counseling because of emotional and behavioral developmental problems. Even the proportion of students identified as the 'priority management group,' who have serious problems such as suicidal ideation and need to be referred to professional institutions, was highest in middle school students; 3.5% of middle school students were classified as the 'priority management group,' compared to 0.7% for elementary school students and 3.0% for high school students. According to one study, the proportion of the 'priority management group' among the students with emotional · behavioral problems decreased from 66.2% in 2013 to 59.6% in 2014 and 58.8% in 2015 and increased again to 61.9% in 2016[9]. As described above, early adolescence is the time when psychiatric problems begin to occur, and this period is important in emotional · behavioral problems in that if monitoring and treatment are not performed, such psychiatric problems can develop into antisocial behavior such as physical violence, criminal behavior, and spouse abuse as well as mental illness in adulthood [1, 10-12].

In addition, several factors influence emotional · behavioral problems in early adolescence. Individual factors include heredity, temperament, and behavioral pattern, and environmental factors also work together [6]. In particular, early adolescence is a stage in which the environment surrounding an individual is further expanded, including forming a closer relationship with friends going further from the relationship with the parents. In this period, the environment, that is, positive support from parents, friends, and teachers who are related to youth in early adolescence, has been reported to play a significant role in the occurrence of emotional · behavioral problems through the buffering effects [1]. From an ecological point of view, the environmental characteristics surrounding adolescents are largely divided into the family, culture, and school [6]. Among the family members, parents play the most important role. With respect to culture, adolescents are most influenced by friends, and at school, adolescents are most affected by teachers. In addition, the social support systems of adolescents can also be divided into the support of parents, friends, and teachers [1,10,13-16].

The results of previous studies on the effects of this environment on emotional · behavioral problems showed that depression and somatization increased with parents' negative parenting attitudes [13,17]. In addition, social

support of parents, friends, and teachers as well as depression was important as a predictor of somatization of adolescents [10]. In addition, the social support system of parents and friends has been reported to have a significant effect on school adaptation and problem behaviors [14].

However, although many studies have examined the factors at the individual level or environmental level that affect the emotional and behavioral problems of adolescents, but it is difficult to find studies considering students who belong to the school as a group and interact with each other. The multi-level model has a high utility value because it allows us to consider the environmental differences with few statistical errors to investigate the influence of the environmental level factors as well as the individual level factors on the dependent variable [7,18].

Therefore, this study aimed to investigate the effects of environmental factors surrounding youth in early adolescence on the level of emotional · behavioral problems of adolescents by using multilevel model analysis of factors affecting emotional · behavioral problems in early adolescence, and to provide basic data for improvement of mental health of adolescents.

METHODS

1. Study Design

This study is a descriptive study that investigates the effects of individual and environmental level factors on emotional · behavioral problems in early adolescence using multi-level model analysis (Figure 1).

2. Subjects

The subjects of this study were the second year students in middle school included in the fifth year survey (2014) of the Korean Children and Youth Panel Survey (KCYPs). Raw data was collected across the country by the National Youth Policy Institute. In the first step, the number of subjects to be surveyed was assigned to each city and province in proportion to the number of students nationwide. In the second step, sample schools were selected by probability proportional to size sampling. In the third step, information on the number of classes and the number of students per class was obtained, and then sample classes were randomly selected and the entire class was surveyed. Subsequently, surveys were conducted through group interviews through school visits. In this study, a total of 1,977 adolescents (1,031 males (52.1%) and 964 females (47.9%)) out of 2,378 students of 95 schools surveyed in 2014 were se-

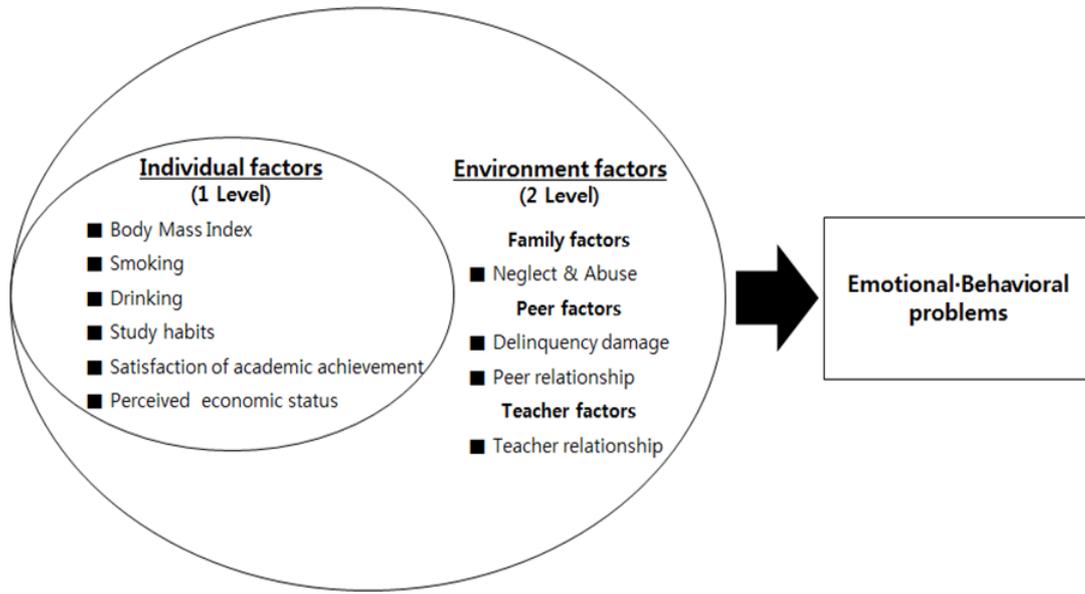


Figure 1. Study model design.

lected as the final subjects, excluding the respondents who replied that they did not know, those who did not complete the questionnaire, those with missing data, and those who were not currently enrolled in a school. This study was conducted after receiving the approval of Kyungpook National University's Institutional Review Board (IRB No.2017-0029). Based on the preceding studies, the subjects were divided into male and female groups to control for gender differences affecting the emotional · behavioral problems of adolescents.

3. Measures

1) Emotional · Behavioral Problems

Emotional · behavioral problems were measured by summing the scores of four subfactors, such as aggression, somatic symptoms, social withdrawal, and depression in the data of the fifth year survey (2014) of the Korea Children and Youth Panel Survey (KCYPs).

Emotional · behavioral problems were measured using a tool consisting of 6 items on aggression, 8 items on somatization symptoms, 5 items on social withdrawal, and 10 items on depression on a 4-point Likert scale (1 point=Strongly disagree; 4 points=Strongly agree). The total score ranged from 29 to 116 points, and a higher score indicated a more severe level of emotional · behavioral problems. Cronbach's α at the time of development was 0.88 for aggression, .85 for somatization symptoms, .87 for social withdrawal, and .91 for depression. In this study, Cronbach's α was .82 for aggression, .85 for somatization symptoms, .89

for social withdrawal and .90 for depression.

2) Individual Level Factors

- Obesity: The degree of obesity is determined by BMI, which is defined as body weight divided by height squared, and the unit is kg/m^2 . For body weight and height, participants were asked to write the measurements of the recent student health survey. The diagnostic criteria were the BMI percentiles for Korean children and adolescents of the 2007 Korean National Growth Charts published by the Korea Centers for Disease Control and Prevention in 2007. According to gender and age, overweight was defined as a BMI at or above the 85th percentile and below the 95th percentile, obesity was defined as a BMI at or above the 95th percentile or a BMI of $25 \text{ kg}/\text{m}^2$ or more, low body weight was defined as a BMI at less than the 5th percentile, and normal body weight was defined as a BMI at the 5th percentile to less than the 85th percentile.
- Smoking experience: This factor is about the presence or absence of experience of smoking in the past 1 year.
- Drinking experience: This factor is about the presence or absence of experience of drinking alcohol in the past 1 year.
- Study habits: The score for study habits was calculated by summing the scores of the subordinate factors, learning achievement value and mastery goal orientation, and the levels of study habits were expressed by divided them into quartiles. Learning achievement value and mastery goal orientation are the

variables related to learning motivation. Study habits were composed of a total of 9 items, including 7 items about learning achievement value, such as 'Studying in school has an important meaning to me' and 'Studying in school will play an important role in choosing my job in the future,' and 2 items about mastery goal orientation, such as 'I like to learn difficult things to acquire knowledge or new skills even if I make mistakes' and 'I like to learn something even if I need to make a lot of effort. The level of study habits was assessed on a 4-point Likert scale (1 point=Strongly agree; 4 points=Strongly disagree). The total score ranged from 8 to 36 points, and higher scores indicate worse study habits. Cronbach's α was .88 for learning achievement value and .89 for mastery goal orientation at the time of development. In this study, Cronbach's α , was .88 for learning achievement value and .67 for mastery goal orientation.

- Satisfaction with academic achievement: One item that measured the overall satisfaction with academic achievement was measured using one item on a 4-point Likert scale (1 point=Very satisfied; 4 points=Very dissatisfied) A higher measurement score indicates lower satisfaction with academic achievement.
- Economic status: Subjective economic status was assessed using one item on a 3-point scale (1 point=Wealthy; 3 points=Poor). Higher scores indicate lower levels of subjective economic status.

3) Environmental Level Factors

- Neglect · abuse: We used the values calculated by summing the scores of subfactors of neglect · abuse. The level of neglect · abuse was assessed using eight items consisting of four items about neglect, such as 'My parents have interest in how I live in school and ask me about it,' and 'My parents get me treated appropriately when I am sick,' and four items about abuse, such as 'My parents have often used abusive words or swear words against me,' and 'My parents try to hit me regardless of the reason if I do anything wrong.' The degree of neglect · abuse was measured on a 4-point Likert scale (1 point=Strongly agree (Usually); 4 points=Strongly disagree (Not at all)). The total scores ranged from 8 to 32 points. A higher score indicates more severe neglect · abuse. At the time of development, the reliability of the instrument, Cronbach's α was .87 for neglect and .89 for abuse. Cronbach's α in this study was .73 for neglect and .84 for abuse.
- Delinquency victimization: it was assessed using the values calculated by summing up the experiences of

delinquency victimization among school adjustment scales. Delinquency victimization was measured by assigning 0 point to No and 1 point to Yes in 7 items such as severe teasing, bullying or ostracizing, assault, intimidation, extortion, rape or sexual harassment, and profanity within the past 1 year.

- Peer relation: We used the peer relationship scale among school adjustment scales. Peer relation was measured using four items, such as 'I interfere with what my friend does' and 'I apologize first when I quarrel with a friend,' on a 4-point Likert scale(1 point= Usually; 4 points=Not at all). Total scores ranged from 4 to 20 points, and higher scores indicate worse peer relations. Cronbach's α was .80 at the time of development, and Cronbach's α was .78 in this study.
- Teacher-student relationship: The teacher-student relationship scale among the school adjustment scales was used, and it was assessed using 5 items, such as 'My teacher is kind to me.' and 'My teacher gives me a friendly greeting,' on a 4-point Likert scale(Strongly agree'=1 point; 'Strongly disagree'=4 points). The total scores ranged from 4 to 20 points, and higher scores indicate poorer teacher-student relationships. At the time of development, Cronbach's α was .88, and in this study, Cronbach's α was .84.

4. Statistical Analysis

The collected data were analyzed using the SPSS 23.0 program, and the significance level of statistical analysis was defined as $p < .05$. The descriptive statistics and frequency analysis were conducted to identify individual level factors and environmental level factors. The independent t-test and ANOVA were conducted to examine the differences in emotional · behavioral problems according to individual level factors. Among the mixed model analysis methods, the Hierarchical Linear Model (HLM) was used in the SPSS analysis function to apply the multi-level model analysis technique to individual level factors and environmental level factors. the intra-class correlation coefficient was calculated by the formula, $ICC = \text{Level } 2 \sigma^2 / (\text{Level } 1 \sigma^2 + \text{Level } 2 \sigma^2)$ with the individual level factor variance (Level 1 σ^2) and environmental level factor variance (Level 2 σ^2), and in order to identify the socio-ecological factors affecting the emotional · behavioral problems regarding the significance of them, sequential analysis was performed using the Null model, model of individual level factors (Model 1), model of environmental level factors (Model 2), and model of individual level factors and environmental level factors (Model 3).

RESULTS

1. Characteristics of Individual Level Factors of the Subjects

In the degree of obesity among the individual level factors, for males students, 79.0% were normal weight, 9.8% were overweight, and 7.3% were obese. For female students, 85.5% were normal weight, 8.0% were overweight, and 2.9% were obese. Regarding smoking experience, 6.9% of male students reported they had smoking experience while 1.4% of female students reported they had smoking experience. For experience of drinking alcohol, 5.0% of male students had drinking experience and 2.2% of female students did. In the case of study habits, for male students, the level of study habits was high in 24.0%, and low in 27.6%, while it was high in 28.4% of female students, and low in 21.2% of them. In the degree of satisfaction with academic achievement, for male students, 12.1% were very satisfied, and 7.4% were very dissatisfied, and for female students, 7.8% were very satisfied and 8.1% were very dissatisfied. Regarding perceived household income, for male students, 37.1% rated themselves as wealthy, and 6.4% assessed themselves as poor, and for female students, 29.8% assessed themselves as wealthy, and 6.7% rated themselves as poor (Table 1).

2. Characteristics of Environmental Level Factors of the Subjects

With respect to the environmental level factors of the subjects, in male students, in the case of neglect · abuse among the family factors, the mean score were 17.65 ± 0.90 points (skewness=-.19, kurtosis=.36). Regarding the peer factors, the mean score for delinquency victimization was 0.07 ± 0.36 points (skewness=.12, kurtosis=.85). The mean score for the peer relation was 10.29 ± 1.93 points, (skewness=-.21, kurtosis=.45). In terms of the teacher factors, the mean score for the teacher-student relationship was 10.26 ± 3.12 points, (skewness=.28, kurtosis=.09). In female students, for neglect · abuse among the family factors, the mean score was 17.69 ± 0.90 points (skewness=-.22, kurtosis=.41). Regarding the peer factors, the mean score for delinquency victimization was $.06 \pm 0.32$ points (skewness=.57, kurtosis=.92). The mean score for the peer relation was 10.61 ± 1.66 points (skewness=-.01, kurtosis=1.68.) With respect to the teacher factors, the mean score for the teacher-student relationship was 10.46 ± 3.05 points (skewness=.25 kurtosis=.24). The skewness of each of the variables was found to be 1 or less and the absolute values of the kurtosis were all less than 3, satisfying the normal distribution (Table 2).

Table 1. Characteristic of Individual Level Factors

(N=1,977)

Characteristics	Categories	Boy (n=1,031)	Girl (n=946)
		n (%)	n (%)
Body mass index	Underweight	40 (3.9)	34 (3.6)
	Normal weight	815 (79.0)	809 (85.5)
	Overweight	101 (9.8)	76 (8.0)
	Obesity	75 (7.3)	27 (2.9)
Smoking	Yes	71 (6.9)	13 (1.4)
	No	960 (93.1)	933 (98.6)
Drinking	Yes	52 (5.0)	21 (2.2)
	No	979 (95.0)	925 (97.8)
Study habits	High	247 (24.0)	269 (28.4)
	Middle-high	292 (28.3)	299 (31.6)
	Middle-low	207 (20.1)	177 (18.7)
	Low	285 (27.6)	201 (21.2)
Satisfaction of academic achievement	Very good	125 (12.1)	74 (7.8)
	Good	448 (43.5)	408 (43.1)
	Bad	382 (37.1)	387 (40.9)
	Very bad	76 (7.4)	77 (8.1)
Perceived economic status	Rich	381 (37.0)	282 (29.8)
	Moderate	584 (56.6)	601 (63.5)
	Poor	66 (6.4)	63 (6.7)

Table 2. Characteristic of Environmental Level Factors

(N=1,977)

Variables	Boy			Girl		
	Min	Max	M±SD	Min	Max	M±SD
Family factors						
Neglect&Abuse	14.60	19.74	17.65±0.90	14.60	19.74	17.69±0.90
Peer factors						
Delinquency damage	0.00	4.00	0.07±0.36	0.00	4.00	0.06±0.32
Peer relationship	5.00	17.00	10.29±1.93	5.00	20.00	10.61±1.66
Teacher factors						
Teacher relationship	5.00	20.00	10.26±3.12	5.00	20.00	10.46±3.05

Table 3. Characteristic of Emotional · Behavioral Problems

(N=1,977)

Variable	Boy (n=1,031)			Girl (n=946)		
	Min	Max	M±SD	Min	Max	M±SD
Emotional · Behavioral problems	66.00	113.00	89.17±6.46	66.00	114.00	89.01±6.06
Aggression	12.00	30.00	17.61±3.34	12.00	30.00	17.79±3.35
Body symptoms	16.00	37.00	22.65±4.50	16.00	38.00	23.46±4.76
Social withdrawal	10.00	25.00	15.93±3.74	10.00	25.00	16.25±3.53
Depression	11.00	40.00	32.96±5.48	10.00	40.00	31.50±5.90

3. Characteristics of Emotional · Behavioral Problems of the Subjects

With respect to the characteristics of emotional · behavioral problems, in male students, the mean scores were found to be 89.17±6.46 points (skewness=.05, kurtosis=.11) for emotional · behavioral problems, 17.61±3.34 points (skewness=.14, kurtosis=-.18) for aggression, 22.65±4.50 points (skewness=.24, kurtosis=-.58) for somatization symptoms, 15.93±3.74 points (skewness=.11, kurtosis=-.55) for social withdrawal, 32.96±5.48 points (skewness=-.56, kurtosis=.02) for depression. In female students, the mean scores were found to be 89.01±6.06 points (skewness=.00, kurtosis=.21) for emotional · behavioral problems, 17.79±3.35 points (skewness=.15, kurtosis=-.31) for aggression, 23.46±4.76 points (skewness=.19, kurtosis=-.69) for somatization symptoms, 16.25±3.53 points (skewness=.12, kurtosis=-.51) for social withdrawal, 31.50±5.90 points (skewness=-.37, kurtosis=.19) for depression.

The skewness of dependent variables and that of subordinate variables of dependent variables were all less than 1 and they were in normal distribution and the absolute values of the kurtosis were all less than 3, satisfying the normal distribution (Table 3).

4. Differences in Emotional · Behavioral Problems according to Individual Level and Environmental Level Factors

For the scores of emotional · behavioral problems according to the degree of obesity of male students, the scores were 74.27 points for normal weight students and 75.99 points for obese students, so the level of emotional · behavioral problems were higher in obese students compared with normal weight students ($p=.024$). As for the scores of emotional · behavioral problems according to the presence of smoking experience, the scores were 75.90 points for students with smoking experience, and 74.38 points for those without smoking experience, so the level of emotional · behavioral problems was higher in adolescents with smoking experience ($p<.020$). As for the scores of emotional · behavioral problems according to the presence of experience of drinking alcohol, the scores were 76.09 points for students with drinking experience and 74.40 points for those without drinking experience ($p=.024$). The scores of emotional · behavioral problems according to study habits were 72.87 points for the students with a high level of study habits, 74.48 points for the upper-middle level students, 75.19 points for the lower-mid-

dle level students, and 75.51 points for the low level students, respectively. The lower the score of study habits, the higher the level of emotional · behavioral problems ($p < .001$). The scores according to satisfaction with academic achievement were 74.03 points for the 'very satisfied' group and 76.18 points for the 'very dissatisfied' group, showing that the lower the level of satisfaction with academic achievement, the higher the level of emotional · behavioral problems ($p = .021$).

In female students, the scores of emotional · behavioral problems depending on the presence of drinking experience were 77.09 points for students with drinking experience and 74.21 points for those without drinking experience, so the level of emotional · behavioral problems was higher in the students with drinking experience ($p = .008$). The scores of emotional · behavioral problems according to the study habits were 72.96 points in the group with a high level of study habits, 74.31 points in the upper-middle level group, 74.39 points in the lower-middle level group, and 75.12 points in the low level group, showing that the higher the level of study habits, the lower the level of emotional · behavioral problems ($p < .001$). The scores of emotional · behavioral problems according to the perceived economic status were 73.60 points in the wealthy group, 74.51 points in the modest group, and 75.08 points in the poor group, showing that the lower the perceived

economic status, the higher the level of emotional · behavioral problems ($p = .015$)(Table 4).

5. Factors Affecting the Emotional · Behavioral Problems of the Subjects

Regarding the random effect of Null Model, in male students, the variance of the environmental level factors (Level 2 σ^2), which indicates the difference in emotional · behavioral problems, was 1.986 ($p = .022$) and for the ICC, $r = .05$. In female students, Level 2 σ^2 was 1.711 ($p = .033$), showing a significant variance in the environmental level, with the ICC of $r = .05$. The ICC, which is a correlation between individual levels within the group level, can be calculated as the ratio of the group level variance to the total variance of the dependent variable, and it makes it possible to determine how much influence environmental factors have.

As a result of examining the variables of Model 1, in male students, as the obesity level increased ($B = 0.69$, $p = .025$) and as the level of study habits decreased ($B = 0.18$, $p < .001$), the level of emotional · behavioral problems was increased. In Model 1 of male students where only individual level factors were entered as described above, the variance of environmental level factors (Level 2 σ^2) was 1.620 ($p = .041$) and the ICC for environmental level factors

Table 4. Difference of Emotional·Behavioral Problems according to Individual Level Factors

(N=1,977)

Variables	Categories	Boy (n=1,031)				Girl (n=946)			
		M±SD	t of F	p	Scheffé	M±SD	t of F	p	Scheffé
Body mass index	Underweight	74.16±4.84	3.17	.024	-	75.08±4.80	0.39	.760	-
	Normal weight	74.27±5.27				74.23±4.89			
	Overweight	75.21±5.20				74.29±5.36			
	Obesity	75.99±5.84				74.71±5.92			
Smoking	Yes	75.90±4.57	2.34	.020	-	75.33±4.61	0.77	.440	-
	No	74.38±5.35				74.26±4.96			
Drinking	Yes	76.09±5.26	2.25	.024	-	77.09±4.73	2.65	.008	-
	No	74.40±5.30				74.21±4.94			
Study habits	High ^a	72.87±6.02	14.06	< .001	a, b, c > d	72.96±4.97	7.55	< .001	a, b, c > d
	Middle-high ^b	74.48±4.56				74.31±5.00			
	Middle-low ^c	75.19±5.24				74.39±4.83			
	Low ^d	75.51±4.65				75.12±4.85			
Satisfaction of academic achievement	Very good	74.03±5.85	3.24	.021	-	73.47±5.74	1.31	.269	-
	Good	74.25±5.18				74.11±4.60			
	Bad	74.57±5.26				74.59±4.93			
	Very bad	76.18±5.15				74.35±5.88			
Perceived economic status	Rich	74.16±5.56	2.11	.122	-	73.60±5.21	14.20	.015	-
	Moderate	74.57±5.09				74.51±4.82			
	Poor	75.54±5.65				75.08±4.74			

was $r=.041$, which showed that there was variance of environmental level factors in emotional · behavioral problems. In female students, when the subjects had drinking experience ($B=3.747, p=.013$), as study habits became lower ($B=0.15, p<.001$), and as economic status became lower ($B=0.72, p=.042$), the level of emotional · behavioral problems was increased. In Model 1 of female students into which only the individual level factors were entered, the variance of the environmental level factor (Level 2 σ^2) was 1.463 ($p=.049$) and the ICC for the environmental level factor was $r=.041$. In emotional · behavioral problems, even when the variables of the individual level factor were entered, there was variance of environmental level factors.

As a result of examining the variables of Model 2, in male students, the poorer the peer relation ($B=1.40, p=.013$) and the poorer the teacher-student relationship ($B=0.33, p<.001$), the higher the level of emotional · behavioral problems. The variance of environmental level factors (Level 2 σ^2) was 1.657 ($p=.038$) in Model 2 of male students where only environmental level factors were entered. The ICC for environmental level factors was $r=.04$, showing that for emotional · behavioral problems, even though the variables of environmental level factors were entered, the level 2 variance representing the difference in the environmental level was significant. This means that entering the variables of environmental level factors was significant.

In female students, as the peer relation among environmental level factors became poorer ($B=1.35, p=.034$), and as the teacher-student relationship become poorer ($B=0.28, p<.001$), the level of emotional · behavioral problems was increased. In Model 2 of the female students where only the variables of the environmental level factors were entered, the variance of the environmental level factors (Level 2 σ^2) was 1.657 ($p=.038$) and the ICC for the environmental level factors was $r=.042$. Regarding the emotional · behavioral problems, there was variance of the environmental level factors even when variables of the environmental level factor were entered.

As a result of examining the effects of environmental level factors on the emotional · behavioral problems after controlling for the variables of the individual level factors, in male students, the higher the degree of obesity among the individual level factors ($B=0.65, p=.034$), and the poorer the teacher-student relationship among the environmental level factors ($B=0.27, p=.001$), the more negative effects they had on emotional · behavioral problems. In the Model 3 where both the individual level and environmental level factors were entered and the individual level factors were controlled, the variance of the environmental level factors (Level 2 σ^2) was 1.79 ($p<.052$), and ICC for

the environmental level factors was $r=.038$, but the effects of the environmental level factors were not significant because there was no variance of the environmental level factors in emotional · behavioral problems.

In the case of female students, when the subject had drinking experience in terms of individual level factors ($B=3.96, p=.008$), and as the teacher-student relationship among the environmental level factors became poorer ($B=0.23, p=.001$), the levels of emotional · behavioral problems were increased. In Model 3, in which both the individual level and environmental level factors were entered and the individual level factors were controlled, the variance of environmental level factors (Level 2 σ^2) was 1.47 ($p=.048$), and ICC for the environmental level factors was $r=.04$. In female students, unlike male students, the effects of environmental factors were significant in view of the fact there was variance of the environmental level factors (Table 5).

DISCUSSION

The aim of this study was to identify the factors affecting emotional · behavioral problems in early adolescence. For this purpose, multi-level model analysis was applied to perform estimation that reflects the characteristics of the data with a hierarchical structure at individual and environmental levels.

Univariate analysis showed that emotional · behavioral problems differed according to the degree of body mass index, smoking, drinking, study habits, and satisfaction with school grades in male students. In female students, there were differences in emotional · behavioral problems according to drinking, study habits, and economic status. The results showed that there were differences between male and female students in the levels of influence on emotional · behavioral problems at the individual level. Therefore, the approach to emotional · behavioral problems means that the mediation of boys and girls should be different at the individual level. As the characteristics of the specific items of emotional · behavioral problems differ according to gender [7, 11, 19], there are also gender differences in influencing factors, so a careful approach is required [11]. In addition, in a randomized study of youth across Greece, smoking students had a 1.14 times more emotional problems than non-smokers, and gender differences were present as in this study [20].

In the analysis of the multi-level model, the significant results of the individual level factors of Model 2 were as follows. As the level of obesity became higher, emotional · behavioral problems were increased in males, but there

Table 5. Ecological Factors affecting Adolescent's Emotional-Behavioral Problems

Variables	Null Model			Model 1			Model 2			Model 3			
	Estimate	SE	<i>p</i>	Estimate	SE	<i>p</i>	Estimate	SE	<i>p</i>	Estimate	SE	<i>p</i>	
Boy	Fixed effects variable												
(intercept)	89.01	0.25	<.001	81.85	1.63	<.001	76.25	4.64	<.001	74.98	4.71	<.001	
Level 1	Body mass index												
				.68	0.31	.025				.65	0.30	.034	
	Smoking												
				.79	0.86	.362				.93	0.86	.284	
	Drinking												
				1.48	0.99	.135				1.50	0.98	.128	
	Study habits												
				.18	0.03	<.001				-.29	0.21	.166	
	Satisfaction of academic achievement												
				.18	0.26	.518				.10	0.04	.091	
	Perceived economic status												
				.14	0.35	.690				.10	0.35	.782	
Level 2	Neglect & Abuse												
							.38	0.26	.150	.31	0.26	.227	
	Delinquency damage												
							-.20	0.87	.822	-.64	0.88	.465	
	Peer relationship												
							1.40	0.56	.013	.83	0.58	.151	
	Teacher relationship												
							.33	0.07	<.001	.27	0.07	<.001	
	Random effects variable												
Level 1	$\sigma\tau^2$	39.75	1.84	<.001	38.23	1.77	<.001	38.15	1.77	<.001	37.46	1.74	<.001
Level 2	$\sigma\epsilon^2$	1.99	0.07	.022	1.62	0.79	.041	1.66	0.80	.038	1.49	0.77	0.052
	ICC		.048			.041		.042			.038		
Girl	Fixed effects variable												
(intercept)	88.98	0.24	<.001	82.87	1.76	<.001	80.15	4.60	<.001	80.86	4.81	<.001	
Level 1	Body mass index												
				-.02	0.39	.970				.02	0.39	.962	
	Smoking												
				-1.20	1.89	.526				-2.21	1.92	.250	
	Drinking												
				3.75	1.50	.013				3.96	1.49	.008	
	Study habits												
				.15	0.03	<.001				-.31	0.20	.120	
	Satisfaction of academic achievement												
				-.07	0.27	.792				.08	0.03	.061	
	Perceived economic status												
				.72	0.35	.042				.55	0.36	.123	
Level 2	Neglect & Abuse												
							.17	0.26	.517	.07	0.26	.789	
	Delinquency damage												
							.92	1.01	.364	.66	1.04	.523	
	Peer relationship												
							1.35	0.64	.034	.70	0.65	.284	
	Teacher relationship												
							.28	0.07	<.001	.23	0.07	.001	
	Random effects variable												
Level 1	$\sigma\tau^2$	35.08	1.70	<.001	33.95	1.65	<.001	33.91	1.65	<.001	33.41	1.63	<.001
Level 2	$\sigma\epsilon^2$	1.71	0.80	.033	1.46	0.75	.049	1.66	0.78	.034	1.47	0.75	.048
	ICC		.047			.041		.047			.042		

Model 1: Individual level factors; Model 2: Environmental level factors; Model 3: Individual level factors & Environmental level factors; Level 1: Individual level factors; Level 2: Environmental level factors; ICC=Intra-class correlation coefficient. SE=Standard error.

were not statistically significant differences in emotional · behavioral problems in females. The obesity rates among adolescents in other countries have a similar pattern in males and females, but in Korea, the obesity rate of female students is about half that of male students, showing a marked difference in obesity rates between male and female students. Female students have been used to dieting since childhood, and the relationship between obesity and emotional · behavioral problems may not be observed in girls who control their weight [21]. Rather, there are mediators such as subjective perception of the body and self-esteem rather than a direct relationship between obesity and emotional · behavioral problems. A number of foreign and domestic studies have reported that subjective perception of the body is more closely related to emotional · behavioral problems than obesity [22,23]. In addition, there is a need for further study in view of the fact that male students are more likely to have suicidal ideation than female students in the group with dissatisfaction related to the body regardless of obesity in Korean middle and high school students.[23].

Drinking was found to be a factor affecting female students' emotional · behavioral problems not only in univariate analysis but also in multi-level model analysis. The findings of this study are consistent with the study which reported that aggression and depression had a positive effect on drinking experiences in female students [24]. Among the emotional · behavioral problems, especially, aggression was associated with drinking in the results of the follow-up study of the US youth of 8th, 10th, and 12th graders as well as in Korean studies [25]. However, the emotional · behavioral problems in this study refer to the sum of aggression, somatization, social withdrawal, and depression, so further research is necessary to determine which factors have a higher connection with drinking

Study habits were important for both male and female students not only in univariate analysis but also in multi-level model analysis. In the study of middle school students, the higher the level of study habits, the higher academic achievement and life satisfaction [26], and there was a significant difference in the level of emotional · behavioral problems according to the academic achievement level in middle school students [11]. In addition, it was found that as parents had more affectionate parenting attitudes, as the level of attention-concentration was increased, and as life goals became clearer, middle school students formed better study habits [27]. In short, study habits are thought to affect emotional · behavioral problems because study habits are directly related to learning motivation, learning motivation is directly related to academic

achievement, and higher academic achievement are likely to result in higher self-confidence and school adjustment.

Economic status was found to have a more significant influence on emotional · behavioral problems in females than in males. In a study of 13~15 year-olds in Scotland, it was found that students with lower levels of subjective economic status (family wealth and housing) showed higher levels of emotional problems than those with higher levels of the economic status, and that there was a greater difference in emotional problems depending on the level of subjective economic status in female students than in male students although the difference was not statistically significant [28]. On the other hand, studies on the influencing factors of somatization symptoms among the sub-factors of emotional · behavioral problems showed that somatization was significantly higher in the group with high subjective economic status than in the other groups [10]. However, since the finding about somatization symptoms cannot be generalized to the entire emotional · behavioral problems, further research on subjective economic status is needed.

Next, there have been various studies on the effect of environmental factors on emotional · behavioral problems of early adolescents have been conducted. In Yune et al.[14] conducted with second year students in middle school, among the social supports of parents, teachers, and friends, friend factors were reported to influence problem behaviors. Kim and Choi [15], a study of middle school students in all grades, reported that parents, teachers, and friends all had direct and indirect influences on behavioral problems. On the other hand, Kim and Lee [1], a study of third-year middle school students, reported that internal behavior problems were influenced by family and friends factors, and external behavior problems were affected by teacher factors. In addition, Kim [12] showed that teacher factors and friend factors had moderating effects in the influence of parental conflict and family bond on emotional · behavioral problems.

On the other hand, as a result of examining environmental level factors after controlling for individual level factors with the multi-level model, the results of Model 3 showed that the teacher-student relationship was the most influential factor in the emotional · behavioral problems of boys and girls in early adolescence. Especially, the value of Level-2 variance according to environmental level factors was significant in female students rather than male students. In other words, in relation to the emotional · behavioral problems of female students, this finding suggests that the degree of emotional · behavioral problems may be different among schools due to differences in the teach-

er-student relationship. On the other hand, it is predicted that the individual level factors will have a greater influence on the emotional · behavioral problems than the environmental level factors in male students. The result of the present study showed a tendency consistent with the previous study using multilevel model analysis which reported that social support from teachers had an effect on the level of depression in adolescents [29], although the prior study did not deal with emotional · behavioral problems. Teacher support is important for prevention and treatment of emotional · behavioral problems, given that most of the daytime hours of adolescents are spent at home and at school.

Especially in adolescent girls, teacher support has a significant effect on the degree of depression. In a longitudinal study of early adolescent students in Norway, teacher support was associated with depression cross-sectionally only in female students, and it was a predictor of depression longitudinally [30]. In addition, even in the present study, in which the effects on emotional · behavioral problems were examined by dividing adolescents into male and female groups, there was a difference in the degree of the influence of social support according to gender [16].

This study has some limitations. First, this study did not consider various environmental level factors systematically. In particular, since environmental level factors did not include variables for school characteristics such as school facility infrastructure, school environment requirements for improvement of emotional · behavioral problems cannot be presented.

Second, in relation to the limitation of the cross-sectional survey, it was difficult to clearly understand the sequential relationship between the dependent variables and influencing factors as this study was conducted with the 1 year data of the Korean Children-Youth Panel Survey. Therefore, further studies using latitudinal, multi-level model analysis or additional in-depth studies are needed.

Third, in environmental level factors as the factors affecting the emotional · behavioral problems, there were not significant results and the explanatory power was rather low, and this is thought to require further analysis.

CONCLUSION

In this study, we conducted a multi-level model analysis to examine the effects of individual level and environmental level factors on emotional · behavioral problems in early adolescents, using the data of the 5th Korean Child-

ren-Youth Panel Survey (2014, second year students in middle school). Among the individual level factors, BMI and study habits had an influence on emotional · behavioral problems in male students, while drinking, study habits, and economic status influenced emotional · behavioral problems in female students. After controlling for individual level factors, the teacher-student relationship was found to have the greatest influence on the emotional · behavioral problems of male and female students, and the differences according to schools were significant only in female students. Therefore, in order to prevent and manage emotional · behavioral problems, different approaches are needed depending on gender. Especially, the closeness or familiarity between the teacher and students is important as an intervention at the environmental level for female students.

The significance of the present study can be found in the fact that we applied a multi-level model in an effort to minimize ecological errors in conventional regression analysis. The results of this study may be used as the basic data to establish various strategies for reducing various emotional · behavioral problems at school. In this regard, further studies are needed to develop specific programs that can reduce emotional · behavioral problems and to demonstrate their effects.

REFERENCES

1. Kim YE, Lee GN. The relationship among social support, self-esteem and problem behaviors in middle-school students. *Elementary School Education Research*. 2013;18:133-145.
2. Ministry of Education. Korean Educational Development Institute. Development of standardized personality test for elementary and secondary students [Internet]. Seoul: Korean Educational Development Institute. 2014 [cited 2017 April 13]. Available from: http://www.kdi.re.kr/policy/ep_view.jsp?idx=134891
3. Lee HL, Hong SW, Chae SH, Lee JM, Kim SW. Juvenile delinquency and counseling. 2nd ed. Pa-ju: Kyoyookbook; 2015. 376 p.
4. Baek SY, Lee SH. Differences in the degree and clinical risk of emotional and behavioral problems in children and adolescents according to school levels and gender. *Journal of Emotional & Behavioral Disorders*. 2014;30(2):207-231.
5. Park HG, Heo JH. The effect child abuse has the emotional and behavioral problems in the youth: Focusing on the mediation effect of peer relationship. *Journal of School Social Work*. 2016; 36:23-46.
6. Kauffman JM, Landrum TJ. Characteristics of emotional and behavioral disorders of children and youth. 9th ed. New York:

- Pearson Education; 2008. 569 p.
7. Kang SJ. Multilevel models. 1st ed. Seoul: Hakjisa; 2016. 478 p.
 8. Jang MJ, Sim HO. The change of the internal world in middle school girls having emotional and behavioral difficulties by exploring their sand play. *Korean Journal of Child Studies*. 2017;38(1):95-116. <https://doi.org/10.5723/kjcs.2017.38.1.95>
 9. Hwang HG. 60,000 elementary, junior and high school students need psychological counseling. *The Yonhapnews*. 2016 September 21.
 10. Lee HJ, Seo MA. Factors influencing somatization in adolescents. *The Journal of the Korean society of school Health*. 2010; 23(1):79-87.
 11. Baek, SY. Variance analysis on the children · youth emotional behavior problems in gender and academic achievement level. *The Journal of Humanities and Social Science*. 2016;7(5):659-675. <https://doi.org/10.22143/HSS21.7.5.34>
 12. Kim SS. The influence of family relationship perceived by adolescents upon depression/anxiety, withdrawn behavior, and aggression: Moderating effect of teacher support and friend support. *The Korea Journal of Youth Counseling*. 2013;21(2): 343-364.
 13. Kim JM, Jang YH. Effects of adolescent stress on somatic symptoms: The moderating effects of social support. *The Korean Journal of Stress Research*. 2015;23(4):187-196. <https://doi.org/10.17547/kjsr.2015.23.4.187>
 14. Yune SJ, Ju JH, Lee EY. Relationships among perceived social support systems, class cohesiveness, and school adaptation in adolescence. *The Journal of Yeolin Education*. 2013;21(2):185-207.
 15. Kim JU, Choi MS. Analysis of the structural relationship among family strength, social support, ego-resilience, hope, peer relational skills and problem behavior or adolescents. *The Korea Journal of Youth Counseling*. 2014;22(1):201-226.
 16. Cho YM, Lee S. The effects of child temperament maternal child-rearing attitudes and social support on internalizing disorders and externalizing disorders. *Korean Journal of Child Psychotherapy*. 2015;10(3):21-39.
 17. Kim EY. Parental child rearing attitudes and adolescence' somatic symptoms: On the mediating effects of depression. *Journal of Learner-Centered Curriculum and Instruction*. 2016;16(8):457-473.
 18. Ahn YH, Ham OK, Kim SH, Park CG. Multilevel analysis of health care service utilization among medical aid beneficiaries in Korea. *Journal of Korean Academy of Nursing*. 2012;42(7): 928-935. <https://doi.org/10.4040/jkan.2012.42.7.928>
 19. Kim YH. The effects of individual, family, and peer factors on the internalizing and externalizing problem behavior of adolescents. *Family and Environment Research*. 2014;52(4):371-382. <https://doi.org/10.6115/fer.2014.032>
 20. Giannakopoulos G, Tzavara C, Dimitrakaki C, Kolaitis G, Rotsika V, Tountas Y. Emotional, behavioural problems and cigarette smoking in adolescence: Findings of a Greek cross-sectional study. *BioMed Central Public Health*. 2010;10:57-63. <https://doi.org/10.1186/1471-2458-10-57>
 21. Jung SM, Park CH, Kim TH, Gegal YS. Investigation of the physical activity participation time, the level of physical fitness and health status among children and adolescents at diet clinic. *Journal of Wellness*. 2016;11(2):429-440. <https://doi.org/10.21097/ksw.2016.05.11.2.429>
 22. Huang L, Tao FB, Wan YH, Xing C, Hao J, Su PU, Xing XY. Self-reported weight status rather than BMI may be closely related to psychopathological symptoms among Mainland Chinese adolescents. *Journal of Tropical Pediatrics*. 2011;57(4):307-311. <https://doi.org/10.1093/tropej/fmp097>
 23. Kim DS, Kim HS. Body-image dissatisfaction as a predictor of suicidal ideation among Korean boys and girls in different stages of adolescence: A two-year longitudinal study. *Journal of Adolescent Health*. 2009;45(1):47-54. <https://doi.org/10.1016/j.jadohealth.2008.11.017>
 24. Shin KL. Gender difference analysis for status offenses of middle school students: Leisure types, attachments, and negative affection oriented approach. *Journal of Leisure Studies*. 2015; 13(2):179-205.
 25. Patrick ME, Schulenberg JE. Prevalence and predictors of adolescent alcohol use and binge drinking in the United States. *Alcohol Research: Current Reviews*. 2013;35(2):193-200.
 26. Lee YR, Park EJ, Lee SH. A study on the variation of academic achievement and life satisfaction of middle school students contrasted by study habit type. *Journal of Learner-Centered Curriculum and Instruction*. 2015;15(11):621-641.
 27. Bae JS. The effect of parenting behavior, emotion control, future goal on study habits of adolescents. *Journal of Brain Education*. 2017;19(0):51-71.
 28. Sweeting H, Hunt K. Adolescent socio-economic and school-based social status, health and well-being. *Social science & medicine*. 2014;121:39-47. <https://doi.org/10.1016/j.socscimed.2014.09.037>
 29. Joyce HD, Early TJ. The impact of school connectedness and teacher support on depressive symptoms in adolescents: A multilevel analysis. *Children and Youth Services Review*. 2014; 39:101-107. <https://doi.org/10.1016/j.chilcyouth.2014.02.005>
 30. Undheim AM, Sund AM. School factors and the emergence of depressive symptoms among young Norwegian adolescents. *Europe Child Adolescent Psychiatry*. 2005;14(8):446-453. <https://doi.org/10.1007/s00787-005-0496-1>