

한국 청소년의 주관적 건강상태에 영향을 미치는 요인 분석: 가정환경, 건강행태, 심리적 요인 및 식습관

황성희*·계승희**†

*세명대학교 바이오식품산업학부, **가천대학교 교육대학원

Self-rated Health Status among Korean Adolescents: Differences in Home Environmental Factors, Health Behaviors, Psychological Factors, and Dietary Habits

Seonghee Hwang*·Seunghee Kye**†

*School of Food and Nutrition Science for Bioindustry, Semyung University,

**Graduate School of Education, Gachon University

ABSTRACT

목적: 본 연구는 한국 청소년의 가정환경, 건강행태, 심리적 요인 및 식습관 요인에 따른 주관적 건강상태의 차이를 분석하고, 주요 관련요인을 파악하고자 수행되었다.

방법: 분석자료로서 2015~2016년도 한국 청소년 건강행태 온라인조사 자료를 이용하였으며, 분석대상자 수는 중학생 53,791명, 고등학생 50,959명, 총 104,750명이었다. 학생들의 건강수준은 주관적 건강상태를 기준으로 건강집단과 비건강집단으로 구분하였다. 건강수준에 영향을 미치는 요인으로서 성별, 가정환경, 건강행태, 심리적 요인 및 식습관이 검토되었다. 이들 요인 간 건강집단과 비건강집단의 비율차이 검증을 위해 표본설계 정보를 반영한 Rao-scott 카이제곱검정을 실시하였다. 또한 주관적 건강수준에 영향을 주는 요인을 알아보고자 로지스틱회귀분석을 실시하였다.

결과 및 결론: 주관적 건강수준은 양친부모와 살지 않은 경우, 모의 교육수준이 낮을 때, 주관적 가정경제수준이 낮을수록 낮았다. 음주군, 고강도운동이나 근력운동을 실천하지 않는 군, 과체중이나 비만인군에서 주관적 건강수준이 낮았다. 또한 스트레스나 우울감 등 부정적인 감정이나 행복감을 느끼지 못할 때도 주관적 건강수준은 낮았다. 아침을 결식하거나 탄산음료, 고카페인음료, 패스트푸드 등의 비건강식품을 자주 섭취하는 군에서도 주관적 건강수준은 낮은 것으로 관찰되었다. 한국 청소년들에게서 건강 불평등(health inequalities)은 가정환경, 건강행태, 심리적 요인, 식습관 등 여러 요인들로부터 제기되는 것을 알 수 있었다. 이러한 요인들을 충분히 반영하여 청소년들이 건강해 질 수 있는 다각적 접근 방안이 모색되어야 할 것이다.

Keywords: Adolescents, Dietary habits, Health behaviors, Self-rated health status, Home environmental factors

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Corresponding Author: Seunghee Kye(1342 Seongnamdaero, Sujeong-gu, Seongnam-si, Gyeonggi 13120, Korea)

Tel: 82-31-750-5507, Fax: 82-31-750-8683, Email: shkye@gachon.ac.kr

I. INTRODUCTION

In 1946, the World Health Organization (WHO) defined health as “the state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.” Differences in health may appear from not only sociodemographic factors of individuals but also socioeconomic factors, meaning social status, poverty, income distribution, occupation, education, and social mobility (Macintyre & Hunt, 1997).

Health inequality refers to differences in health status with unequal distribution between social groups with certain characteristics, such as socioeconomic status, race, or ethnicity (House, 2001; Whitehead, 1992). In the past, major causes of health inequality were attributed to personal responsibilities, such as health behaviors or lifestyle (Ahn & Kim, 2013), but today, it is being reported that gaps in health levels exist not only according to personal biological factors but also by socioeconomic status, including education level, occupational strata, and income level. Such gaps can ultimately exacerbate health inequality, making it a social issue. Kim et al. (2012) reported that, since it is difficult for individuals to preserve and advance their own health in society from a “rights” perspective, it is necessary for countries, societies, and each individual to become party to a collective effort in approaching “health rights” as a fundamental right.

Adolescence is a period in which significant physiological changes occur, including physical growth, sexual change from hormone secretion, and cognitive development. Sudden physiological

development during adolescence brings changes in one’s psychological state while physical development, along with physiological changes, has a major impact on thinking, behavior, and emotion (Yang et al., 2006). Health during adolescence is known to be affected by not only physical conditions and health behaviors (Khang et al., 2004; Kim, 2008; Park, 2009) but also family structural environment and socio-environmental factors (Yoon et al., 2007; Park et al., 2011; Vander Lucht & Groothoff, 1995).

Lee and Lee (2009) reported that a higher percentage of primary school students from high-income families responded that they were happy compared to those from low-income families while Lee (2016) indicated that vulnerable health during this period was directly linked to poor academic achievement and had a negative effect on health and socioeconomic status in adulthood. Moreover, maintaining a proper dietary habit is a crucial health-related behavior for adolescents, and, since adolescence represents a period of rapid growth and development based on well-balanced nutrient supply, proper eating forms the basis of health. In a study using 2006 Korea Youth Risk Behavior Web-based Survey data (Park et al., 2010), adolescents with higher family affluence scores tended to belong to groups with healthy behaviors, such as eating breakfast and exercising regularly.

Generally, health inequality among adolescents has not received as much attention as that among adults or children (Diliberti, 2000; Macintyre & West, 1991; Marmot, 2005; West, 2004). Moreover, the age of subjects has varied at a

cross-national level, and the methods by which health indices and socioeconomic status were measured also varied; thus, it has been very difficult to draw a generalized conclusion on health inequality among adolescents(Chen et al., 2006; Starfield et al., 2002). Recently, health during childhood and adolescence has been emphasized from the standpoint that it is directly linked to positive school life experience and academic achievement as well as ultimately having a significant impact on health and socioeconomic status during adulthood. Meanwhile, the WHO also speculated that investing in the health of women, children, and adolescents as a global strategy for 2016-2030 would be the best investment for the future(WHO, 2017).

A number of studies have been conducted on adult subjects, but there is still a lack of research verifying the factors that determine the health level of adolescents and not that many studies have been conducted from the perspective of health inequality. Furthermore, unlike many studies in general that are conducted with a restricted number of study subjects with limited variables that have only attempted to identify factors affecting the health of adolescents, this study utilized data from the Korea Youth Risk Behavior Web-based Survey that was conducted at the national level among about 100,000 middle and high school students in Korea to analyze the difference in subjective health status by incorporating a broader range of variables, such as home environmental factors, health behaviors, psychological factors, and dietary habits, and to further identify the major related factors affecting health inequality.

II. METHODOLOGY

1. Study design and original data

A cross-sectional descriptive design with secondary analysis was used to examine data drawn from the 11th- and 12th Korea Youth Risk Behavior Web-based Survey(KYRBS) conducted annually by the Korea Centers for Disease Control and Prevention to construct healthcare indicators for health promotion and identification health behaviors among Korean adolescents. The present study used combined data from the 2015 and 2016 KYRBS.

2. Samples

The KYRBS conducted in 2015-2016 surveyed a total of 133,571 middle and high school students. Students who responded "so-so" to a question inquiring about their self-rated health status (n=28,821) were excluded, and the data for the remaining 104,750 students (53,791 middle school students, and 50,959 high school students) were analyzed.

3. Ethical considerations

The Korea Centers for Disease Control and Prevention provided the KYRBS data after reviewing this study's proposed data analysis plans; we received permission to use the data on April 21, 2017. This study was approved by the review board at the authors' institution (IRB 1044396-201709-HR-152-01).

4. Measurements

1) Dependent Variable

The self-rated health status was used as the dependent variable in this study. Participants responded to the question, “how would you rate your health status?” using one of the following responses: “Very healthy”, “healthy”, “so-so”, “unhealthy”, and “very unhealthy.” Self-rated health is a measurement commonly used in healthcare studies that is relatively easy to measure and most often used by researchers (Ahn & Kim, 2013; Kim, 2010; Ludberg & Manderbacka, 1996). To identify the health-influencing factors of adolescents, responses to questions on self-rated health were divided into 2 groups; “very healthy” and “healthy” were assigned to the healthy group, and “unhealthy” and “very unhealthy” were assigned to the unhealthy group.

2) Independent Variable

Independent variable in the present study are home environmental factors, health behaviors, psychological factors, dietary habits. Home environmental factors included paternal education level, maternal education level, family structure, subjective family economic status, and area of residence. For family structure, the question asked about family members living together with the subject. Health behaviors included current smoking status, current drinking status, moderate physical activity, vigorous physical activity, muscle-strengthening exercise, and weight status. Height and weight measurements were used to calculate BMI

(BMI: weight [kg] / height [m²]). Psychological factors included degree of perceived stress, experience of sadness or hopelessness, suicidal ideation, subjective happiness, and subjective academic achievement. Dietary habits included skipping breakfast and food frequency (fruits, soft drinks, high-caffeine beverages, fast food, vegetables, and milk).

3) Control Variable

To investigate differences in the self-rated health status according to home environmental factors, health behavior, psychological factors, and dietary habits, and to identify the influences of the contributing factors, a logistic regression analysis was performed. Model 1 was adjusted for gender and school grade (middle or high school). Model 2 was adjusted for home environmental factors in addition to these two factors. Model 3 was adjusted for home environmental factors and health behaviors. Model 4 was adjusted for home environmental factors, health behaviors, and psychological factors.

5. Statistical analysis

SAS Version 9.4 (SAS Institute Inc. Cary; NC) was the statistical analysis program used. Analysis was performed considering the complex sample design information (strata, clusters, and weighted values) by year of the combined data, and all analyzed results, except frequency, reflected weighted values by year. A Rao-Scott chi-square test considering the sampling design information was performed to

test the percent differences by self-rated health status among home environmental factors, health behaviors, psychological factors, and dietary habits. In addition, logistic regression analysis was performed to investigate the factors influencing health levels.

III. RESULTS

1. The general characteristics of the participants

The general characteristics of the participants are shown in Table 1. A total of 104,750

participants were included in our analysis. The distribution of the adolescents was 51.4% middle school students, and 48.6% high school students. The proportion of male students was 53.9%, and that of female students was 46.1%. Regarding the education level among fathers, 2.4% completed middle school or less, 35.0% completed high school, and 62.1% completed college or above. Regarding the education levels among mothers, 2.4% completed middle school or less, 42.5% completed high school, and 55.1% completed college or above. For the subjective family economic status, 14.9% constituted the upper class, 46.0% constituted the middle class, and 39.1% constituted the lower class.

Table 1. Characteristics of subjects

Characteristics	n(%)
Grade	
Middle school	53,791(51.4)
High school	50,959(48.6)
Total	104,750(100.0)
Gender	
Male	56,473(53.9)
Female	48,277(46.1)
Total	104,750(100.0)
Paternal education level	
Middle school graduate or below	2,412(2.9)
High school graduate	29,037(35.0)
College graduate or higher	51,587(62.1)
Total	83,036(100.0)
Maternal education level	
Middle school graduate or below	2,012(2.4)
High school graduate	35,696(42.5)
College graduate or higher	46,209(55.1)
Total	83,917(100.)
Subjective family economic status	
Upper	15,645(14.9)
Middle	48,122(46.0)
Lower	40,983(39.1)
Total	104,750(100.0)

2. Differences in the self-rated health status according to home environmental factors, health behaviors, psychological factors, and dietary habits

Differences in the self-rated health status according to home environmental factors, health behaviors, psychological factors, and dietary habits are shown in Table 2-5. In the healthy and unhealthy groups, 84.6% and 75.2% of participants lived with both biological parents,

respectively. The proportion of participants with parents who were educated to a college level or above was higher in the healthy group than in the unhealthy group. The proportion of participants who rated their family economic status as the upper class was 40.4% and 23.6% in the healthy and unhealthy groups, respectively. The proportion of participants residing in large cities was higher in the healthy group at 44.2% compared to 41.4% in the unhealthy group (Table 2).

Table 2. Relationship of home environmental factors to self-rated health status

Variables	Total	Healthy Group	Unhealthy Group	χ^2	P-value ¹⁾
	n(%)	n(%)	n(%)		
Family structure ²⁾					
2-biological-parent family	87,002(83.1)	81,090(84.6)	5,912(75.2)	384.6	<0.0001
Other family	17,748(16.9)	15,700(15.4)	2,048(24.8)		
Paternal education level					
Middle school graduate or below	2,412(2.9)	2,103(2.6)	309(4.5)	100.6	<0.0001
High school graduate	29,037(35.0)	26,681(33.4)	2,356(36.5)		
College graduate or higher	51,587(62.1)	48,004(64.0)	3,583(59.0)		
Maternal education level					
Middle school graduate or below	2,012(2.4)	1,752(2.2)	260(3.9)	109.3	<0.0001
High school graduate	35,696(42.5)	32,712(41.5)	2,984(45.2)		
College graduate or higher	46,209(55.1)	42,986(56.3)	3,223(50.9)		
Subjective family economic status					
Upper	40,983(39.1)	38,955(40.4)	2,028(26.3)	1491.2	<0.0001
Middle	48,122(46.0)	44,672(46.0)	3,450(43.0)		
Lower	15,645(14.9)	13,163(13.6)	2,482(30.7)		
Residential area					
Large city	46,820(44.7)	43,463(44.2)	3,357(41.4)	13.2	0.0014
Small city	49,636(47.4)	45,660(49.7)	3,976(52.5)		
Rural area	8,294(7.9)	7,667(6.1)	627(6.1)		

¹⁾ By Rao-Scott chi-square test

²⁾ 2-biological-parent family: living with both biological parents, Other family: not living with both biological parents

The proportion of participants who smoked and consumed alcohol was higher in the unhealthy group. The rate of performing moderate physical activities, vigorous physical activities, and muscle-strengthening exercise

was higher in the healthy group. The proportion of overweight or obese patients was higher in the unhealthy group, and the proportion of normal-weight participants was higher in the healthy group (Table 3).

Table 3. Relationship of health behaviors to self-rated health status

Variables	Total	Healthy Group	Unhealthy Group	χ^2	P-value ¹⁾
	n(%)	n(%)	n(%)		
Smoking ²⁾	7,081(6.8)	6,347(6.8)	734(9.2)	50.5	<0.0001
Non-Smoking	97,669(93.2)	90,443(93.2)	7,226(90.8)		
Drinking ³⁾	15,890(15.2)	14,238(15.3)	1,652(21.3)	168.7	<0.0001
Non-Drinking	88,860(84.8)	82,552(84.7)	6,308(78.7)		
Moderate physical activities ⁴⁾				200.3	<0.0001
≥5 days/wk	16,453(15.7)	15,719(15.8)	734(9.0)		
<5 days/wk	88,297(84.3)	81,071(84.2)	7,226(91.0)		
Vigorous physical activities ⁵⁾				873.2	<0.0001
≥3 days/wk	43,726(41.7)	41,719(42.4)	2,007(24.3)		
<3 days/wk	61,024(58.3)	55,071(57.6)	5,953(75.7)		
Muscle-strengthening exercise ⁶⁾				523.6	<0.0001
≥3 days/wk	24,836(23.7)	23,806(24.5)	1,030(12.5)		
<3 days/wk	79,914(76.3)	72,984(75.5)	6,930(87.5)		
Overweight or obese ⁷⁾	14,530(13.9)	13,009(13.5)	1,521(19.0)	435.2	<0.0001
Normal	82,487(78.7)	77,027(79.7)	5,460(68.9)		
Underweight	7,733(7.4)	6,754(6.8)	979(12.1)		

¹⁾ By Rao-Scott chi-square test

²⁾ Smoked at least once in the past 30 days

³⁾ Drank at least 1 shot of alcohol on one or more days in the past 30 days

⁴⁾ Performed physical activities that caused the heart rate to increase or the subject to be short-winded for at least 60 min a day during the past 7 days

⁵⁾ Performed strenuous physical activities that caused the subject to be completely short-winded or the body to sweat for at least 20 min a day during the past 7 days

⁶⁾ Performed muscle-strengthening exercise during the past 7 days

⁷⁾ Overweight or obese: ≥85th, Normal: 5~84th, Underweight : <5th(percentile)

Analysis of perceived levels of stress showed that the proportion of participants experiencing high levels of stress was 29.9% in the healthy group, and 69.3% in the unhealthy group, indicating that the unhealthy group was more

sensitive to stress. The rate of experiencing sadness or despair, and the proportion of participants who responded they had seriously considered committing suicide were higher in the unhealthy group. The proportion of

participants who responded that they were 'happy' to a question inquiring about their subjective levels of happiness was significantly higher in the healthy group (74.7%) than in the

unhealthy group (33.1%). The proportion of participants who subjectively rated their academic performance as 'high' was higher in the healthy group (Table 4).

Table 4. Relationship of psychological factors to self-rated health status

Variables	Total	Healthy Group	Unhealthy Group	χ^2	P-value ¹⁾
	n(%)	n(%)	n(%)		
Degree of perceived stress					
Very stressed	34,278(32.7)	28,779(29.9)	5,499(69.3)	4780.2	<0.0001
Somewhat stressed	46,056(44.0)	44,057(45.7)	1,999(25.0)		
Not stressed	24,416(23.3)	23,954(24.4)	462(5.7)		
Experience of sadness or hopelessness ²⁾					
Yes	23,346(22.3)	19,688(20.5)	3,658(46.0)	2479.6	<0.0001
No	81,404(77.7)	77,102(79.5)	4,302(54.0)		
Suicidal ideation ³⁾					
Yes	11,015(10.5)	8,668(9.0)	2,347(29.9)	3044.3	<0.0001
No	93,735(89.5)	88,122(91.0)	5,613(70.1)		
Subjective happiness					
Happy	75,429(72.3)	72,758(74.7)	2,671(33.1)	9709.9	<0.0001
Average	22,866(21.9)	20,080(21.1)	2,786(35.0)		
Unhappy	6,005(5.8)	3,952(4.2)	2,053(31.9)		
Subjective academic achievement					
Upper	41,567(39.7)	39,009(40.1)	2,558(32.0)	457.5	<0.0001
Middle	29,417(28.1)	27,530(28.6)	1,887(23.7)		
Lower	33,766(32.2)	30,251(31.3)	3,515(44.3)		

¹⁾ By Rao-Scott chi-square test

²⁾ Experienced sadness or hopelessness that interfered with daily living, which persisted for 2 weeks straight during the past 12 months

³⁾ Had serious thoughts of suicide in the past 12 months

The rate of skipping breakfast, which was defined as not having breakfast more than five days in the last seven days, was higher in the unhealthy group at 33.9% compared to the healthy group at 26.4%. The rate of consuming fruits (more than once per day), vegetables (at every meal), and milk (twice or more per day), all of which can be classified as healthy foods,

was higher in the healthy group than in the unhealthy group. In addition, the rate of consuming soft drinks, high-caffeine drinks, and fast food, which can be classified as unhealthy foods more than three times per week was higher in the unhealthy group than in the healthy group (Table 5).

Table 5. Relationship of dietary habits to self-rated health status

Variables	Total	Healthy Group	Unhealthy Group	χ^2	P-value ¹⁾
	n(%)	n(%)	n(%)		
Skipping breakfast					
≥5 days/wk	28,443(27.2)	25,755(26.4)	2,688(33.9)	171.1	<0.0001
<5 days/wk	76,307(72.8)	71,035(73.6)	5,272(66.1)		
Fruit consumption					
≥once/d	24,925(23.8)	23,407(24.6)	1,518(19.2)	100.1	<0.0001
<once/d	79,825(76.2)	73,383(75.4)	6,442(80.8)		
Soft drinks consumption					
≥3 times/wk	28,587(27.3)	26,082(27.1)	2,505(31.3)	50.8	<0.0001
<3 times/wk	76,163(72.7)	70,708(72.9)	5,455(68.7)		
High-caffeine beverage consumption					
≥3 times/wk	3,430(3.3)	2,895(3.1)	535(7.2)	302.5	<0.0001
<3 times/wk	101,320(96.7)	93,895(96.9)	7,425(92.8)		
Fast food consumption					
≥3 times/wk	15,709(15.0)	14,099(14.8)	1,610(20.7)	180.9	<0.0001
<3 times/wk	89,041(85.0)	82,691(85.2)	6,350(79.3)		
Vegetables consumption					
≥3 times/d	17,006(16.2)	15,981(16.2)	1,025(12.6)	65.6	<0.0001
<3 times/d	87,744(83.8)	80,809(83.8)	6,935(87.4)		
Milk consumption					
≥2 times/d	12,573(12.0)	11,920(12.0)	653(8.2)	85.5	<0.0001
<2 times/d	92,177(88.0)	84,870(88.0)	7,307(91.8)		

¹⁾ By Rao-Scott chi-square test

3. Factors affecting self-rated health status

Table 6 shows the results of a logistic regression analysis indicating the effects of home environmental factors, health behaviors, psychological factors, and dietary habits on the self-rated health status. Based on the goodness of fit model, and test results indicating the regression coefficient significance, all models (Model 1-4) had $H_0: \beta = 0$, and $p < 0.0001$, and therefore, they were well-fitting.

The effects of gender on the self-rated health status were also analyzed. The self-rated health status was higher among male students than among female students (OR=0.62, 95% CI=0.58-0.66, data not shown). In Model 1 adjusted for age and grade, the self-rated health status was higher among students who lived with both biological parents (OR=0.69, 95% CI=0.63-0.76). In addition, the higher subjective family economic status, the higher the self-rated health status ('Upper' OR=0.35, 95% CI=0.32-0.39, 'Middle' OR=0.47, 95% CI=0.43-0.51).

Significant differences in the self-rated health status were found among all factors except smoking status and the rate of performing moderate physical activities in Model 2 adjusted for home environment factors. The self-rated health status was higher in the non-drinking group compared to the drinking group. The group that engaged in vigorous physical activities (OR=0.59, 95% CI=0.55-0.65), or performed muscle-strengthening exercise more than three days a week (OR=0.57, 95% CI=0.52-0.63) had a higher self-rated health status than the group that did not.

In Model 3 adjusted for home environmental factors and health behaviors, significant differences in the self-rated health status were found according to all psychological factors. The group that experienced high levels of stress (OR=3.64, 95% CI=3.16-4.20) and the group that

experienced sadness and hopelessness (OR=1.30, 95% CI=1.20-1.41), or had considered committing suicide (OR=1.40, 95% CI=1.28-1.54) had a lower self-rated health status compared to the group that did not. Participants who rated themselves as 'happy' had high self-rated health status (OR=0.46, 95% CI=0.42-0.50).

In Model 4 adjusted for home environmental factors, health behaviors, and psychological factors, the self-rated health status was significantly higher in the group that skipped breakfast less than five days per week compared to the group that skipped breakfast more than five days per week. The self-rated health status was significantly higher in the group that consumed soft drinks, high-caffeine drinks, or fast food less than three times per week compared to the group that consumed them more than three times per week (Table 6).

Table 6. Logistic regression analysis of self-rated health status according to home environmental factors, health behaviors, psychological factors, and dietary habits among Korean adolescents

Model 1		Model 2			
Independent variables(Reference)	OR (95% CI)	p-value	Independent variables(Reference)	OR (95% CI)	p-value
Home environmental factors			Health behaviors		
Family structure (Other family)			Smoking (Non-smoking)	1.04(0.91-1.19)	0.4920
2- biological-parent family			Drinking (Non-drinking)	1.23(1.12-1.34)	< 0.0001
Paternal education level (≤Middle school)			Moderate physical activities (<5 days/wk)		
High school graduate	0.69(0.63-0.76)	< 0.0001	≥5 days/wk	1.01(0.89-1.15)	0.7846
College graduate or higher	0.89(0.75-1.07)	0.2436	Vigorous physical activities (<3 days/wk)		
Maternal educational level (≤Middle school)	0.96(0.80-1.16)	0.7349	≥3 days/wk	0.59(0.55-0.65)	< 0.0001
High school graduate	0.78(0.65-0.94)	0.0118	Muscle-strengthening exercise (<3 days/wk)	0.57(0.52-0.63)	< 0.0001
College graduate or higher	0.84(0.69-1.02)	0.0903	Weight status (Normal)		
Subjective family economic status (Lower)			Overweight or obese	2.61(2.33-2.92)	< 0.0001
Middle	0.47(0.43-0.51)	< 0.0001	Underweight	1.55(1.43-1.69)	< 0.0001
Upper	0.35(0.32-0.39)	< 0.0001			
Residential area (Rural area)					
Small city	1.11(0.96-1.28)	0.1439			
Large city	0.99(0.86-1.14)	0.9110			
Model 3			Model 4		
Independent variables(Reference)	OR (95% CI)	p-value	Independent variables(Reference)	OR (95% CI)	p-value
Psychological factors			Dietary habits		
Perceived stress (Not stressed)			Skipping breakfast (<5 days/wk)		
Somewhat stressed	1.74(1.50-2.01)	< 0.0001	≥5 days/wk	1.11(1.03-1.20)	0.0036
Much stressed	3.64(3.16-4.20)	< 0.0001	Fruits consumption (<once/d)		
Experience of sadness or hopelessness (No)			≥once/d	0.97(0.89-1.05)	0.4841
Yes			Soft drinks consumption (<3 times/wk)		
Suicidal ideation (No)			≥3 times/wk	1.10(1.01-1.19)	0.0205
Yes			High-caffeine beverage consumption (<3 times/wk)		
Subjective happiness (Average)			≥3 times/wk	1.42(1.22-1.65)	< 0.0001
Unhappy	2.89(2.62-3.18)	< 0.0001	Fast food consumption (<3 times/wk)		
Happy	0.46(0.42-0.50)	< 0.0001	≥3 times/wk	1.17(1.07-1.28)	0.0003
Subjective academic achievement (Lower)			Vegetables consumption (<3 times/d)		
Middle	0.79(0.72-0.86)	< 0.0001	≥3 times/d	0.93(0.85-1.03)	0.1798
Upper	0.87(0.80-0.94)	< 0.0001	Milk consumption (<2 times/d)		
			≥2 times/d	0.93(0.82-1.06)	0.3279

OR: odds ratio, CI: confidence interval
 Model 1: odds ratio were adjusted for age, grade. $R^2 = 0.7623$, $H_0 : \beta = 0$, $p < 0.0001$
 Model 2: odds ratio were adjusted for Model 1. $R^2 = 0.8739$, $H_0 : \beta = 0$, $p < 0.0001$
 Model 3: odds ratio were adjusted for Model 1 + Model 2. $R^2 = 0.9962$, $H_0 : \beta = 0$, $p < 0.0001$
 Model 4: odds ratio were adjusted for Model 1 + Model 2 + Model 3. $R^2 = 0.9964$, $H_0 : \beta = 0$, $p < 0.0001$

IV. DISCUSSION

Differences in self-rated health status according to home environmental factors, health behaviors, psychological factors, and dietary habits, as well as the main contributing factors of self-rated health status among Korean adolescents were investigated. Our results showed that in relation to the home environment factors, participants who lived with both biological parents, and participants with a high family economic status had a higher self-rated health status. In relation to the health behavior factors, the non-drinking group, and the group that performed vigorous physical activities and muscle-strengthening exercise had a higher health status than the non-drinking group, and non-exercise groups, respectively. The self-rated health status was low among participants who experienced high levels of stress, who experienced sadness or hopelessness, or who had suicidal ideation. In relation to dietary habits, the group that skipped breakfast more than five days in the last week, and the group that consumed soft drinks, high-caffeine beverages, or fast food more than three days per week had low self-rated health status.

Self-rated health is a valid and reliable measure to administer measure of general health among those without cognitive impairment (Bombak, 2013). Several studies using self-rated health involved assessing the relationship between self-rated health with sociodemographic, physical health, and psychosocial variables (Bombak, 2013; Chen et al., 2006; Due et al., 2003; Kim, 2000). Health during childhood and

adolescence is directly linked to positive school life experience and academic achievement as well as ultimately having a significant impact on health and socioeconomic status during adulthood (Lee, 2016) while health inequality may also cause inequalities in learning and competency of younger children (Jackson, 2015). There are differences in health status and health behaviors of adolescents based on gender—male students may be more vulnerable to poor health than female students (Ahn & Kim, 2013; Kim, 2000; Lee & Yi, 2015). This is contrary to the results of our study in which male students had a higher self-rated health status than female students.

Various studies in Korea and abroad most often used occupation, education level, and income level of parents to represent the socioeconomic environment of adolescents, and such socioeconomic environment has been identified on numerous occasions as the major factor of health inequality among children and adolescents (Yoon et al., 2007; Park et al., 2011; Ahn & Jung, 2007; Kim, 2012; Yoo et al., 2015; Lee, 2014; Olson et al., 2010; You et al., 2012; Rueden et al., 2006; Sepehri & Guliani, 2015). Due et al (2003) reported that adolescents from families of lower socioeconomic position showed more physical and psychological symptoms. Viner et al (2012) found that the strongest determinants of adolescent health are structural factors such as national wealth, income inequality, and access to education.

Lee (2016) defined health inequality attributed to home environment as difference in health created by material deprivation or physical and

emotional environment at home. Students from vulnerable home environments tend to have poor health and higher prevalence of chronic diseases, and the academic achievement and education gap due to such a difference among students can lead, again, to poverty. In the present study, students who responded that their family economic status was “middle” or “upper” had higher self-rated health status than those who responded that it was “lower.” Children who grow up in such home environments, including family economic status, receive greater investment from their parents for health, which is expected to have a positive influence on their health level.

Yoo et al.(2015) reported that children had a higher probability of belonging to a high-risk health behavior group if the education level of the primary caregiver was high school graduate or below and if the mother participated activity in labor. Generally, maternal education level had a significant influence on the health level of the child, more so than paternal education level, and, in particular, maternal education level may influence the health status of children and adolescents by mediating collection of health care information, formation of lifestyle habits, and managing daily activities of children(Lee & Yi, 2015). Lee(2014) indicated that the influence of maternal education level varied according to the age of the child: 14~18-year-old adolescents showed better health with higher maternal education level whereas 4~7-year-old preschool children showed an opposite pattern. It was suggested that the reason for this is that young children need much care from their

mothers, and relative lack of care would have a negative effect on the health of such children. In this reason, the self-rated health status was significantly higher among participants whose mothers completed high school than those whose mothers completed middle school or below.

Family structure is also associated with the health of children; it has been suggested that children from single-parent and grandparent-headed households may have lower health level(Kim, 2008), and a study by Lee and Lee(2009) also found that students who lived with both biological parents tended to perceive themselves to be healthier. The present study also found that students perceived their health level to be high when they lived with both biological parents. The family represents the most direct and fundamental social environment for an individual while also being an important factor in human growth and development and mental health(Oh, 1992). Moreover, scientific evidence that especially adolescents are influenced significantly by their parents and that formation of their emotional independence, control of feelings, and positive self-concept takes place through interaction with their health(Lee, 2003) supports the positive association between family structure and health.

Health related behaviors in self-rated health studies often include smoking status, dietary assessment, physical activity, body mass index or presence of obesity, and alcohol activity (Delpierre et al., 2009). Various studies have suggested that more time spend on physical activities by adolescents improved their health

status or reduced the risk of obesity(Vander Lucht & Groothoff, 1995; Lee & Yi, 2015; Gable & Lutz, 2000). It has also been reported that, as adolescents spent more time sweating while exercising during the physical education period at school, their perceived health level increased (Lee & Yi, 2015).

In this study, self-rated health status was higher among participants who performed vigorous physical activities or muscle-strengthening exercise more than three days per week.

Being overweight or obese during childhood and/or adolescence has been identified as a health indicator of negative effect on the overall development of adolescents with respect to not only health but also cognitive and non-cognitive domains(Blacksher, 2008; Burton & Van Heest, 2007; Taras & Potts-Datema, 2005). The present study also found that students belonging to the overweight or obese group perceived their health level to be lower than that of students belonging to the normal weight group. There is a recent trend in Korea, where high school students are spending less time on physical activities due to lack of time from heated efforts exhausted on college entrance preparations, and this can have a negative impact on health care. Meanwhile, other countries have reported on efficacy of school-related programs for student health care. A comprehensive school health program was effective in improving the health of students from low income households or households with low parental education level by increasing their level of physical activities(Vander Ploeg et al., 2014), and effective athletic activities and

physical education courses in school can have a positive impact by improving health and relieving health inequality(Blacksher, 2008; Veugelers & Fitzgerald, 2005). Lee(2016) suggested the need for establishing a “student health care and comprehensive support system” to address the problem of health inequality among children and adolescents. In other words, it is necessary to systematically establish operational and financial support methods for the long term that pertain to athletic activities, safety and health education, school meal that contribute to healthy start and growth of all students. Additionally, more specific measures should also be established to link the various human and material resources from the community. Futhermore, safe and supportive families, safe and supportive schools, together with positive and supportive peers, are crucial to helping young people develop to their full potential and attain the best health in the transition to adulthood(Viner et al., 2012).

Rapid physical development experienced by adolescents can bring about changes to their psychological state while also having a major impact on their thinking, behavior, and emotions. In particular, if adolescence is viewed as the period within the developmental stage when self-consciousness is formed and established, the issue of mental health is an important factor(An & Kim, 2013). Especially among emotional and socio-psychological factors, self-esteem, depression, and degree of perceived stress of adolescents are considered variables that significantly explain their health status. In other words, higher self-esteem and lower

depression and stress were associated with better health status in adolescents (An & Kim, 2013; Suk & Oh, 2002). The present study also found that degree of perceived stress and subjective happiness had significant influence on self-rated health status where students tended to perceive their health level to be higher when they were less stressed and felt that they were happy. An inverse relationship between socioeconomic status and mental health problems were found in children and adolescents. Socioeconomically disadvantaged children and adolescents were two to three times more likely to develop mental health problems (Reiss, 2013).

During adolescence, when much physical and physiological growth and development should take place, certain dietary habits, such as consuming high-caffeine beverages, soft drinks, or fast food, are associated with nutritional imbalance and health risks. Lee (2003) reported that dietary habits of children were correlated with responsibility, stability, activeness, sociability, depressive tendencies, and anxiety tendencies. It has been reported that drinking beverages containing caffeine can cause side effects such as heart palpitation, insomnia, and shaking or may even cause seizure, arrhythmia, visual hallucinations, and neurotoxicity (Gunja & Brown, 2012), but it has become much more prevalent recently among students who are under stress due to their studies or pursuit of employment (Poulos & Pasch, 2015). In a study by Moon et al. (2017) that analyzed the association between dietary habits of adolescents and their mental health, the group that consumed soft drinks, high-caffeine beverages, sweet drinks, or fast

foot at least 3 times a week showed significantly higher stress, sadness and hopelessness, suicidal ideation, and suicide attempts while also showing significantly lower happiness. Moreover, Moon et al. (2017) also reported that stress was significantly lower in those who consumed fruits, vegetables, or milk at least 3 times in the past 7 days while happiness was also significantly higher in the group that consumed fruits and vegetables. Likewise, in this study, the self-rated health status was significantly lower in the group that consumed soft drinks, high-caffeine beverages, or fast food more than three days per week. However, no significant difference in the self-rated health status was found for the group that consumed fruits more than once per day, had vegetables at each meal, or drank milk more than twice per day.

V. CONCLUSION

This study aimed to identify home environmental factors, health behaviors, psychological factors, and dietary habits affecting self-rated health status among Korean adolescents. The factors affecting self-rated health status were family structure, maternal educational level, and subjective family economic status in home environmental factors, drinking, vigorous physical activities, muscle-strengthening exercise, and weight status in health behaviors, perceived stress, experience of sadness or hopelessness, suicidal ideation, subjective happiness, and subjective academic achievement in psychological factors, skipping

breakfast, soft drinks consumption, high-caffeine beverage consumption, and fast food consumption in dietary habits. As shown by review of studies to date, health inequality among children and adolescents is clear, but it is also link to complex characteristics that cannot be simply summarized.

The limitations in the present study included the fact that it was a cross-sectional study that used secondary data from the KYRBS, and, thus, it was unable to include all of the variables that may affect health inequality among adolescents. Therefore, associations between each factor and health inequality could be identified, but a causal relationship could not be determined. In addition, although the national data used in this study were big data, it is difficult to identify it as a systematically developed tool to determine the factors affecting health inequality, as only single questions were used for some variables. Therefore, it would be necessary for future studies to use validated and reliable tools to measure and analyze influential factors related to health inequality.

Until now, existing adolescent-related policies have often lacked links between related ministries and their goals were different. Also, policies on environment and education that can affect the health of adolescents are often carried out with chaotic goals under disjointed conditions, which cannot solve the health inequality issues, and adding special programs whenever issues are raised has been found to be ineffective. Many studies have reported individual characteristics and home environmental factors that directly affect health equality as

difficult to improve. However, policies or health promotion programs that increase physical activity levels in schools not only provide knowledge and information that are beneficial to the health of students, but the role of the school can be considered to be significant in that it can lower the health risk behavior of students and improve their health status. Lee (2016) suggested the following to be done in order to resolve students' health inequality and promote physical activity at the school level. First, it is necessary to improve physical education and related classes that are currently conducted in schools. Second, it is necessary to regularly provide students with knowledge and information related to health. Third, adolescents of vulnerable social class or of dual-income families need self-check results to be managed at the school level so that students can self-manage their hygiene status and dietary habits. Fourth, as schools can better identify health risk environments around schools, they should cooperate with parents in order to collect relevant information to establish improvement plans.

Today, health promotion and improvement of quality of life among adolescents have taken on greater importance than any time in the past. Therefore, future studies should fully consider these factors with interest in the health of adolescents in exploring multi-faceted approaches at the levels of government, community, and schools in pursuing improvement in the health of adolescents. In addition, adolescents should be given broad opportunities to select education and programs based on a variety of methods so

that these adolescents can lead healthy and happy lives.

REFERENCES

1. Ahn BC, Joung HJ. Decomposition of health inequality in high school students. *J of Korean Soc. of School Health* 2007;20(1):63-75.
2. An JS, Kim HJ. A study on the determinants of children and adolescents' health inequality in Korea. *Studies on Korean Youth* 2013;24(2): 205-231.
3. Blacksher E. Children's health inequality: ethical and political challenges to seeking social justice. *Hastings Center Report* 2008;38(4):28-35.
4. Bombak AE. Self-rated health and public health: a critical perspective. *Frontiers in Public Health* 2013;1:1-4.
5. Burton LJ, Van Heest JL. The importance of physical activity in closing the achievement gap. *Nat Assoc Kinesiol Phys Educ High Educ* 2007;59:212-218.
6. Chen E, Martin AD, Matthews KA. Socioeconomic status and health: do gradients differ within childhood and adolescence? *Soc Sci Med* 2006;62:2161-2170.
7. Delpierre C, Lawwers-Cances V, Datta GD, Berkman L, Lang T. Impact of social position on the effect of cardiovascular risk factors on self-rated health. *Am J Public Health* 2009;99:1278-1284.
8. Diliberti JH. The relationship between social stratification and ill-cause mortality among children in the United States. *Pediatrics* 2000;105(1):1968-1992
9. Due P, Lynch J, Holstein B, Modvig J. Socioeconomic health inequalities among a nationally representative sample of Danish adolescents: the role of different types of social relations. *J Epidemiol Community Health* 2003;57:692-698.
10. Gable S, Lutz S. Household, parent, and child contributions to childhood obesity. *Family Relations* 2000;49(3):293-300.
11. Gunja N, Brown JA. Energy drinks: health risks and toxicity. *Med J Aust* 2012;196: 46-49.
12. House JS. Understanding social factors and inequalities in health: 20th-century progress and 21st-century prospects. *J Health Soc Behav* 2001;43:125-142.
13. Jackson MI. Cumulative inequality in child health and academic achievement. *J Health Social Behav* 2015;56(2):262-280.
14. Khang YH, Lee SI, Lee MS, Jo MW. Socioeconomic mortality inequalities in Korea labor & income panel study. *Korean J Health Policy Admin* 2004;14(4):1-20.
15. Kim HR. Obesity and underweight among children in low income families: status and policy options for childhood health equality. *Health and Welfare Policy Forum* 2012;6: 55-66.
16. Kim HY. Community inequalities in health: the contextual effect of social capital. *Korean J Sociol* 2010;44(2):59-92.
17. Kim JE. A comparison between elementary school children in grandparent - grandchild family and those in normal family in terms of health status and health behavior [master's thesis]. Kwangju: Chonbuk National University; 2008

18. Kim TH, Kwon SW, Lee YJ. Health inequality of Seoul citizens by individual effects and community effects. *Seoul Studies* 2012;13(3): 15-35.
19. Kim YH. The differences between gender and age in adolescents' health behaviors and health related psychological variables. *Korean J School Phys Educ* 2000;10:55-67.
20. Lee HS. A study on the relationship between based on the 6th grader's dietary habits and characters [dissertation]. Chuncheon: Chuncheon National University; 2003
21. Lee JS, Lee YG. The effect of family's social and economical position on adolescents' social exclusion. *Korean J Youth Studies* 2009;16(7):1-27.
22. Lee JH. Health inequalities in children and adolescents: a review with implications for the sociology of education. *Korean J of Sociol Educ* 2016;26(4):69-95.
23. Lee JH, Yi KH. An analysis of the determinants of adolescents' health inequality in Korea: a view from the students' self-rated health condition and obesity. *Korea Educ Rev* 2015;21(2):217-243.
24. Lee KJ. Psychological characteristics of high risk group in adolescent suicide [master's thesis]. Bucheon: Catholic University of Korea; 2003
25. Lee YW. Family income and child health gradient in Korea. *Health Social Welfare Rev* 2014;34(3):7-32.
26. Ludberg O, Manderbacka K. Assessing reliability of measure of self-rated health. *Scandinavian J Pub Health* 1996;24(3): 218-224.
27. Macintyre S, Hunt K. Socio-economic position, gender and health. *J of Health Psychology* 1997;2(3):315-334.
28. Macintyre S, West P. Lack of class variation in health in adolescence: an artifact of an occupational measure of social class? *Social Sci Med* 1991;32(4):395-402.
29. Marmot MG. Social determinants of health inequalities. *Lancet* 2005;365:1099-1104.
30. Moon SJ, Kim JW, Kim HJ, Lee DK. Association between dietary habits and mental health in Korean adolescents: a study based on the 10th (2014) adolescent health behavior online survey. *Korean J Fam Pract* 2017;7(1):66-71.
31. Oh WS. A study on the correlation between perception of family environment and mental health of boy's high school students [master's thesis]. Daegu: Kyungbook National University; 1992
32. Olson ME, Dielema D, Elliott BA, Renier CM. Impact of income and income inequality on infant health outcomes in the United States. *Pediatrics* 2010;126(6):1165-1173.
33. Park JH, Chun JS, Lee SH. The correlates analysis between parental socioeconomic factors and eye health of the primary school children. *Korean J Vision Sci* 2011;13(1):11-19.
34. Park SW. Health behaviors among adolescents in the rural area in Korea. *J Agri Med Commun Health* 2009;34(2):202-213.
35. Park Y, Patton L, Kim H. Clustering of oral and general health risk behaviors in Korea adolescents: a national representative sample. *J Adolesc Health* 2010;47(3):277-281.
36. Poulos NS, Pasch KE. Energy drinks consumption is associated with unhealthy dietary behaviours among college youth.

- Perspect Pub Health 2015;135:316-321.
37. Reiss F. Socioeconomic inequalities and mental health problems in children and adolescents: A systematic review. *Social Science & Medicine* 2013;90:24-31.
 38. Rueden U, Gosch A, Rajmil L, Bisegger C, Ravens-Sieberer U. Socioeconomic determinants of health-related quality of life in childhood and adolescence: results from a European study. *J Epidemiol Commun Health* 2006;60:130-135.
 39. Sepehri A, Guliani H. Socioeconomic status and children's health: evidence from a low-income country. *Soc Sci Med* 2015;130: 23-31.
 40. Starfield B, Riley AW, Witt WP, Robertson J. Social class gradients in health during adolescence. *J Epidemiol Commun Health* 2002;56:354-361.
 41. Suk MH, Oh WO. Determinants of health status in adolescents. *J of Korean Community Nursing* 2002;13 (3):493-502.
 42. Taras H, Potts-Datema W. Obesity and student performance at school. *J School Health* 2005;75(8):291-295.
 43. Vander Lucht F, Groothoff, J. Social inequalities and health among children aged 10 - 11 in the Netherlands: cause and consequence. *Soc Sci Med* 1995;40(9): 1305-1311.
 44. Vander Ploeg KA, Maximova K, McGavock J, Davis W, Veugelers P. Do school-based physical activity interventions increase or reduce inequalities in health? *Soc Sci Med* 2014;112:80-87.
 45. Veugelers PJ, Fitzgerald AL. Prevalence of and risk factors for childhood overweight and obesity. *CMAJ* 2005;173(6):607-613.
 46. Viner RM, Ozer EM, Denny S, Marmot M, Resnick M, Fatusi A, Currie C. Adolescence and the social determinants of health. *Lancet* 2012;379:1641-1652.
 47. West P. Health inequalities in the early years: is there equalization in youth? *Social Sci Med* 2004;44(6):833-858.
 48. Whitehead M. The concepts and principles of equity and health. *Int J Health Services* 1992;22(3):429-445.
 49. WHO. At a glance: the global strategy for women's children's and adolescents' health (2016 - 2030) [Internet]. [cited 2017 July 5]. Available from: <http://www.who.int/life-course/partners/global-strategy/en/>
 50. Yang MJ, Lee EK, Lee HW. A study on psychosocial characteristic, environmental variables and mental health variables of adolescent. *Korea J Youth Couns* 2006;14(1): 63-76
 51. Yoo JA, Chung GH, Lee SG. The association between the latent classes of household economic deprivation experience and parent-reported measures of child health. *Korean J Social Welfare Stud* 2015;46(1): 397-431.
 52. Yoon TH, Kim JY, Yu SH, Kim JM, Lee YH, Hong YS, Lee SY. The relationship between parental socioeconomic position and childhood mortality. *Health Soc Sci* 2007;20:29-46.
 53. You J, Slack J, Holl J. The impact of material hardship on children's physical health trajectories. *J Korean Society Child Welfare* 2012;37:103-137.