

# A study of factors affecting the physical activity of youth: analysis of data from the 13th youth health behavior online survey in 2017

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This study was intended to provide basic data to promote youth participation in physical activity by determining the factors that affect the physical activities of Korean youth. To achieve the purpose of this study, data obtained from the 13th Youth Health Behavior Online Survey in 2017 was used as raw data and data on 62,276 youths were analyzed by frequency analysis, chi-square test, and logistic regression analysis using IBM SPSS Statistics ver. 22.0. The results suggested gender ( $P < 0.001$ ), school grade ( $P < 0.001$ ), and residential type ( $P < 0.001$ ) in general characteristics; subjective health status ( $P < 0.001$ ), stress perception ( $P < 0.001$ ), and sleep satisfaction ( $P < 0.001$ ); and finally drinking experience ( $P < 0.004$ ), smoking experience ( $P < 0.009$ ), and skipping breakfast in the morning ( $P < 0.009$ ) as factors affecting Korean youth's participation in

physical activity. These results indicate that: male students participated in physical activities more than female students, and middle school students participated in physical activities more than high school students; students with a higher economic status and academic performance participated more in physical activities; and students with higher subjective health status, higher happiness, and higher sleep satisfaction, students who did not drink or smoke, and students who had breakfast participated more in physical activities.

**Keywords:** Physical activity, Health behavior, Health-related behavior factors, Adolescence, Youth health behavior, Online survey


## INTRODUCTION

Adolescence is an important period for physical and mental growth, such as the development of secondary sexual characteristics, sexual maturity and cognitive function, emotional independence development, and self-identity formation (Currie and Alemán-Díaz, 2015). In particular, since identity is not fully established in this period, health risk behaviors experienced at this time are easily learned, and as the acquired lifestyle leads to adulthood, the lifestyle and health promotion behaviors acquired during this period are very important (Viner et al., 2015).

In general, regular physical activity in adolescence is critical to health development. Physical activity during this period has been found to be highly correlated with physical, mental, social, and

lifestyle development (Bailey, 2006; Strong et al., 2005). However, it was found that Korean youth had the shortest time of participating in physical activities (Ministry for Health and Welfare, 2009), compared with those in the United States, the United Kingdom, Germany, Sweden, and Finland.

Despite the results of studies that found that long-term sedentary living, resulting in a lack of physical activity, is harmful to health (Bélanger et al., 2015) and sleep satisfaction is required for normal development and growth (Carson et al., 2015; Saunders et al., 2016), Korean youth's participation in physical activity is declining. According to the results of an online survey youth health behaviors conducted by the Ministry of Health and Welfare every year, the percentage of students who did not attend physical education classes per week increased to 18% and 27.4% for male and

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female middle-high school students, respectively, in 2012 from 12.1% and 15.9% in 2005 (Korea Centers for Disease Control and Prevention, 2012).

The decrease in youth participation in physical activity has been reported to have various effects on mental health. In particular, Korean youth have been reported to have very low satisfaction and low happiness in life as they experience academic stress and a lack of leisure culture (Park et al., 2018). In fact, among Organization for Economic Co-operation and Development (OECD) member countries in 2015, the subjective happiness of Korean youth has been reported to be at the lowest level (OECD, 2018). Physical activity affects physical and mental health status such as subjective health, depression, and stress (Asare and Danquah, 2015), and also affects health behaviors such as smoking, drinking, eating habits, and drug use acquired during this period (Larson et al., 2014; Marques et al., 2018). In particular, the lifestyle established in this period affects the lifestyle in adulthood (Currie and Alemán-Díaz, 2015), having a great influence on life as a complementary concept to health and quality of life in the future. The results of these studies show that the factors that affect participation in physical activities are closely related to the lifestyle of youth in a diverse and complex manner, suggesting that it is necessary to obtain representative data for establishing and evaluating youth policies at the national level.

Thus, this study was intended to examine the factors affecting Korean youth's participation in physical activity based on the data from an online survey on Korean youth behavior first conducted in 2005 by the Korea Centers for Disease Control & Prevention for middle and high school students nationwide with the aim of improving the health of the youth who will lead the future. For this purpose, this study was intended to analyze the factors that affect youth participation in physical activities using the data obtained from the 13th Youth Health Behavior Online Survey in 2017 as raw data. To analyze the factors that affect participation in physical activities, the factors were categorized into health status factors including the general characteristics of the subjects, subjective happiness, stress perception, sleep satisfaction and experience of depression, and health-related behavior factors including drinking, smoking, drugs and diet. The results of this study are expected to provide basic data that can be used to study specific strategies to promote youth participation in physical activities for the health of the youth.

## MATERIALS AND METHODS

To analyze the effects of mental health characteristics of Korean

youth on physical activity, this study analyzed data obtained from the 13th Youth Health Behavior Online Survey in 2017.

### Study subjects

The subjects of this study were middle and high school students nationwide as of April 2017. For the sampling process, one class per grade was sampled at random from 400 middle schools and 400 high schools, and all students in the classes were investigated. Students who were on long-term absence, special students and students with letter decoding disability were excluded from the sample. As a result, 30,885 middle school students and 31,391 high school students were selected as subjects.

### Study tool

The 13th Youth Health Behavior Online Survey in 2017 consists of a total of 123 questions in 15 areas: smoking, drinking, physical activity, dietary life, obesity and weight control, mental health, damage and safety awareness, oral health, personal hygiene, drugs, sexual behavior, atopy, Internet addiction, health equity, etc. This study used the variables presented in the raw data to manipulate the mental health-related items, physical activity and personal characteristics of youth as factors.

### Physical activity

Physical activity was categorized into “whether there was a day in which the heart rate increased compared to normal time over the last 7 days” and “whether there was a day in which the subject participated in physical activity for more than 60 min.”

### General characteristics

For the general characteristics of the subjects, gender, school grade, subjective academic performance, residential type, and subjective economic status of the subjects were analyzed. The school grade was categorized into middle school and high school, and the subjective academic performance and the subjective economic status were reconstructed into a three-level category from a five-level category. For residential type, the raw data that was categorized into living with the family, living with relatives, boarding houses, living alone, dormitories, caring facilities (orphanages, social welfare facilities, nurseries) was used as it was.

### Health status factors

Health status factors consisted of subjective health perception, subjective happiness, stress perception, subjective sleep satisfaction, and depression. Subjective health perception, subjective hap-

piness, stress perception, and subjective sleep satisfaction were reconstructed into three categories from five categories. For depression, it was categorized into “whether the subject had a feeling of sadness or despair to stop daily life for 2 weeks in the last 12 months.”

**Health-related behavior factors**

The health-related behavior factors were about drinking experience, smoking experience, drug use experience, and skipping breakfast in the raw data. And they were reconstructed by categorizing them into whether the subject had such experiences.

**Data processing**

The data collected was analyzed using the IBM SPSS Statistics ver. 22.0 (IBM Co., Armonk, NY, USA). The frequency and percentage of the subjects’ general characteristics, health status, health-related behaviors, and physical activity experiences were calculated. The relationship between general characteristics and health status, health-related behaviors and physical activities was analyzed by chi-square test. To determine the effect of the general characteristics, health status and health-related behaviors on the physical activity, composite sample logistic regression analysis was conducted to calculate the odds ratio (OR) and the 95% confidence interval (CI) was calculated. The significance level of all statistical analyses was set at  $P < 0.05$ .

**RESULTS**

**General characteristics of the study subject**

The general characteristics of subjects are summarized in Table 1. The gender of the subjects was 50.8% for males, 49.2% for females, 49.6% for middle school students and 50.4% for high school students. For residential type, living with family accounted for the largest percentage (95.0%) followed by boarding house, living along, and dormitories (3.7%), living with relatives (0.8%) and caring facilities (0.5%). The subjective economic status was in the order of middle (45.9%), high (39.8%), and low (14.3%), and the subjective academic performance was in the order of high (39.4%), low (32.0%), and middle (28.6%).

For health status and subjective happiness in the health-related factors, 72.1% and 67.6% replied they were healthy and they were happy, respectively, whereas 25.1% replied that they experienced depression. For stress perception, 79.5% replied that subjective sleep satisfaction was “normal” or “much,” while 74.1% replied “not normal” and “insufficient.”

**Table 1.** Characteristics of the study subjects (n = 62,276)

Variable	No. (%)
Sex	
Male	31,624 (50.8)
Female	30,652 (49.2)
Education	
Middle school	30,885 (49.6)
High school	31,391 (50.4)
Living type	
With family	59,162 (95.0)
With relatives	496 (0.8)
Lodging or self-lodging	2,301 (3.7)
Childcare facilities	317 (0.5)
Economic status	
High	24,802 (39.8)
Middle	28,582 (45.9)
Low	8,892 (14.3)
Subjective school record	
High	24,524 (39.4)
Middle	17,810 (28.6)
Low	19,942 (32.0)
Subjective health status	
High	44,913 (72.1)
Middle	13,417 (21.6)
Low	3,946 (6.3)
Depression	
No	46,664 (74.9)
Yes	15,612 (25.1)
Subjective happiness	
Happy	42,137 (67.6)
Moderate	15,309 (24.6)
Unhappy	4,830 (7.8)
Perceived stress	
High	23,259 (37.3)
Moderate	26,271 (42.2)
Enough	12,746 (20.5)
Sufficiency of sleep	
Enough	16,148 (25.9)
Moderate	20,052 (32.2)
Not enough	26,076 (41.9)
Physical activity	
No	22,397 (36.0)
Yes	39,879 (64.0)
Alcohol use	
No	37,859 (60.8)
Yes	24,417 (39.2)
Smoking	
No	54,126 (86.9)
Yes	8,150 (13.1)
Drug use	
No	61,927 (99.4)
Yes	349 (0.6)
Breakfast	
No	8,712 (14.0)
Yes	53,564 (86.0)

For the experience of physical activity in the health-related behavior factors, 64.0% of all youth participated in physical activity more than 60 min a week, 39.2% experienced drinking, and 13.1% had smoked. For drug use, 349 respondents (0.6%) experienced drugs, and 86.0% had breakfast at least once a week.

### Physical activity according to general characteristics, health status factor, and health-related behavior

Differences between general characteristics and physical activity experiences according to health status are listed in Table 2. There were significant differences in gender ( $P < 0.001$ ), school grade ( $P < 0.001$ ), residential type ( $P < 0.001$ ), subjective economic status ( $P < 0.001$ ), and subjective academic performance ( $P < 0.001$ ) in the experience of physical activity. In the health-related status factor, there were significant differences in subjective health status ( $P < 0.001$ ), subjective happiness ( $P < 0.001$ ), stress perception ( $P < 0.001$ ) and sleep satisfaction ( $P < 0.001$ ). And there was no significant difference in participation in physical activity and the experience of distress. Finally, for the difference of physical activity experience in health-related behavior, there was a significant difference in skipping breakfast and ( $P < 0.001$ ) and drinking experience ( $P < 0.026$ ).

### Factors affecting physical activity of youth

To examine the effect of the general characteristics, health-related factors, and health-related behavior factors on participation in physical activity, logistic regression analysis was conducted (Table 3). The results are as follows: First, male students participated in physical activities more than female students ( $P < 0.001$ ), and high school students showed a lower physical activity participation rate than middle school students ( $P < 0.001$ ). Participation in physical activity was higher among students living in boarding houses, living alone, and living in dormitories than students living with family ( $P < 0.001$ ). In the health-related factors, students with higher subjective health status ( $P < 0.001$ ) and subjective happiness participated more in physical activity, and in sleep satisfaction factor, students who were satisfied with their sleep participated more in physical activity, while students with a high level of stress participated more than those with lower levels of stress. In the health-related behavior factor, students who did not drink ( $P < 0.004$ ), students who did not smoke ( $P < 0.009$ ), and those who had breakfast participated more in physical activity ( $P < 0.001$ ).

**Table 2.** Differences in subjective physical activity to health status, and health related behavior factor

Variable	Physical activity		$\chi^2$ (P-value)
	No	Yes	
Sex			
Male	8,756 (39.1)	22,868 (57.3)	1,910.973 (0.001)***
Female	13,641 (60.9)	17,011 (42.7)	
School			
Middle school	10,580 (47.2)	20,305 (50.9)	77.641 (0.001)***
High school	11,817 (52.8)	19,574 (49.1)	
Living type			
With family	21,381 (95.5)	37,781 (94.7)	16.455 (0.001)***
With relatives	155 (0.7)	341 (0.9)	
Lodging or self-lodging	754 (3.4)	1,547 (3.9)	
Childcare facilities	107 (0.5)	210 (0.5)	
Economic status			
High	8,458 (37.8)	16,344 (41.0)	63.952 (0.001)***
Middle	10,577 (47.2)	18,005 (45.1)	
Low	3,362 (15.0)	5,530 (13.9)	
Subjective school record			
High	8,254 (36.9)	16,270 (40.8)	112.003 (0.001)***
Middle	6,472 (28.9)	11,338 (28.4)	
Low	7,671 (34.3)	12,271 (30.8)	
Subjective health status			
High	15,003 (67.0)	29,910 (75.0)	469.927 (0.001)***
Middle	5,623 (25.1)	7,794 (19.5)	
Low	1,771 (7.9)	2,175 (5.5)	
Subjective happiness			
Happy	14,207 (63.4)	27,930 (70.0)	292.861 (0.001)***
Moderate	6,149 (27.5)	9,160 (23.0)	
Unhappy	2,041 (9.1)	2,789 (7.0)	
Perceived stress			
High	8,889 (39.7)	14,370 (36.0)	94.128 (0.001)***
Moderate	9,251 (41.3)	17,020 (42.7)	
Low	4,257 (19.0)	8,489 (21.3)	
Sufficiency of sleep			
Enough	5,521 (24.7)	10,627 (26.6)	92.644 (0.001)***
Moderate	6,931 (30.9)	13,121 (32.9)	
Not enough	9,945 (16.0)	16,131 (40.4)	
Depression			
No	16,875 (75.3)	29,789 (74.7)	3.191 (0.075)
Yes	5,522 (24.7)	10,090 (25.3)	
Alcohol use			
No	11,779 (60.1)	26,080 (61.1)	4.958 (0.026)*
Yes	7,804 (39.9)	16,613 (38.9)	
Smoking			
No	17,087 (87.3)	37,039 (86.8)	2.923 (0.089)
Yes	2,496 (12.7)	5,654 (13.2)	
Drug use			
No	19,486 (99.5)	42,441 (99.4)	2.171 (0.141)
Yes	97 (0.5)	252 (0.6)	
Breakfast			
No	2,951 (15.1)	5,761 (13.5)	27.684 (0.001)***
Yes	16,632 (84.9)	36,932 (86.5)	

\* $P < 0.05$ . \*\*\* $P < 0.001$ .

**Table 3.** Factors affecting physical activity of youth

Variable	$\beta$	SE	OR	95% CI	P-value
Sex (ref: female)					
Male	0.739	0.017	2.094	2.026–2.165	0.001***
School (ref: middle school)					
High school	-0.147	0.017	0.863	0.835–0.892	0.001***
Living type (ref: with family)					
With relatives	0.219	0.097	1.029	1.029–1.206	0.024
Lodging or self-lodging	0.149	0.045	1.161	1.063–1.269	0.001***
Childcare facilities	0.105	0.119	1.111	0.879–1.403	0.378
Economic status (ref: high)					
Middle	-0.094	0.019	0.910	0.878–0.944	0.001***
Low	-0.110	0.026	0.896	0.851–0.943	0.001***
Subjective school record (ref: high)					
Middle	-0.100	0.210	0.905	0.869–0.943	0.001***
Low	-0.182	0.020	0.834	0.801–0.868	0.001***
Subjective health status (ref: low)					
High	0.438	0.034	1.550	1.448–1.658	0.001***
Middle	0.098	0.037	1.103	1.026–1.185	0.008**
Subjective happiness (ref: unhappy)					
Happy	0.364	0.031	1.439	1.354–1.528	0.001***
Moderate	0.086	0.033	1.090	1.021–1.164	0.010**
Perceived stress (ref: high)					
Low	0.129	0.019	1.138	1.097–1.181	0.001***
Moderate	0.210	0.023	1.234	1.179–1.291	0.001***
Sufficiency of sleep (ref: no enough)					
Enough	0.074	0.022	1.076	1.030–1.124	0.001***
Moderate	0.103	0.020	1.108	1.066–1.153	0.001***
Depression (ref: yes)					
No	0.034	0.019	1.035	0.997–1.075	0.074
Health related behavior					
Alcohol use, no	0.055	0.019	1.057	1.018–1.097	0.004**
Smoking, no	-0.073	0.028	0.930	0.880–0.982	0.009**
Drug use, no	-0.159	0.121	0.853	0.673–0.982	0.188
Breakfast, yes	0.128	0.025	1.137	1.083–1.192	0.001***

SE, standard error; OR, odds ratio; CI, confidence interval.

\*\* $P < 0.01$ . \*\*\* $P < 0.001$ .

## DISCUSSION

This study was intended to examine the factors affecting youth participation in physical activity according to general characteristics, health status, and health-related behavior factors, and to suggest strategies for promoting the health of youth.

First, in the general characteristics of the subjects, gender, school grade, subjective economic status, living alone, living in a dormitory, and subjective academic performance were suggested as factors affecting the physical activity participation of youth. In

other words, male students participated more in physical activities than female students, and the higher the economic status and subjective academic performance, the higher the participation in physical activity. Lee et al. (2016) reported in their study that participation in physical activity decreased after puberty, and Park (2014) reported that male students and students in lower grades participated more in physical activities than female students and students in higher grades, while students with higher economic status and higher subjective academic performance participated more in physical activity. In addition, the results of this study show that middle school students participated more in physical activity than high school students. These results are supported by the results of prior studies reporting that the higher the school grade, the lower the participation in physical activity due to stress from study and daily tasks (Park, 2014).

Second, health status factors including subjective health status, subjective happiness, depression, sleep, and stress affected youth participation in physical activity. In other words, the higher the subjective health status, the lesser the distress, and the higher the sleep satisfaction and the lower the stress, the higher the participation in physical activity. In prior studies, participation in physical activity was associated with higher subjective health, and low participation in physical activity was associated with lower subjective health (Abu-Omar et al., 2004). Biddle and Asare (2011) reported that physical activity can relieve the depression and anxiety of children and youth. The study of Carson et al. (2016) on Canadian youth reported significant differences in health index between sleep, sitting time and physical activity time. The results of this study were supported by the results of prior studies reporting that regular physical activity was associated with better subjective health perception (Tsai et al., 2010), whereas those who participate less in physical activity maintained a lower health perception status (Han et al., 2009).

Third, in health-related behaviors, drinking, smoking experience, and skipping breakfast affected youth participation in physical activity. In other words, those who did not drink and smoke, and those who had breakfast participated more in physical activity. Improper behaviors such as drinking, smoking, and drug use are the factors that make the physical health as well as mental health of the youth vulnerable. López Villalba et al. (2016) reported that physical activity positively correlates with low alcohol consumption for boys and girls in adolescence, and the result was higher in male youth than female youth. In addition, physical activity is also used to control smoking. Blank et al. (2017) reported positive effects of interventions using physical activity to reduce

smoking among youth. In addition, skipping breakfast is a major negative factor affecting health, resulting in negative effects on food intake and body mass index (Rampersaud et al., 2005) and skipping breakfast may affect long-term health (Smith et al., 2010), thus, proper health behaviors of youth are important. Smith et al. (2017) reported that when students, especially those in the upper grades, were not satisfied with their sleep, they participated less in physical activity, and skipped breakfast, which was also affected by lower household income and single parent families.

The results of prior studies showed that physical activity decreased significantly between 11 and 15 years of age in adolescence, and health-related behaviors also linearly decreased (Marques et al., 2018). This phenomenon is not occurring only in Korea, but it is important to recognize and solve the physical activity participation factors for the health of the youth, since Korean youth's physical activity participation time is the shortest in the world. As a result of this study, it was found that health status and health-related activities other than general characteristics affecting physical activity are closely correlated with each other, and physical activity has a moderating effect, thus, education on its importance and support are important.

This study is meaningful in that it provides empirical basic data to promote the participation of youth in physical activity by determining the factors that affect their participation in physical activity. However, this study has some limitations in that it does not include various factors affecting the physical activities of youth by proceeding through secondary data analysis, and there might be errors in measurement as this study measured variables with single questions. In addition, there is a limit to mention the results as causal relationships as they are the results of a cross-sectional study.

## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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