

# **The Mediating Effects of Subjective Health Perception on the Relationship between Physical Activity, Eating Habits and Mental Health in Gangwon-do Youth**

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## **Abstract**

*The purpose of this study was to investigate the structural relationship between eating habits, physical activity, and subjective health perception, which can affect the mental health status of adolescents, and to examine whether subjective health perception has a mediating effect in these relationships. In this study, raw data from the “17th 2021 Youth Health Behavior Online Survey” were used, and a total of 1,998 people were used for the analysis of Gangwon-do adolescents, except for data with missing values. For analysis, SPSS 25.0 and AMOS 25.0 programs were used to analyze descriptive statistics, t-test, and structural equation models(SEM). Physical activity was found to have a positive and significant effect on mental health status, and subjective health cognition showed the effect of physical activity mediating mental health status.*

**Keywords:** *Youth, Subjective Health Perception, Eating Habits, Physical Activity, Mental Health*

## **1. Introduction**

These days, when the COVID-19 pandemic comes to an end, the state of mental health in adolescence will look different before and after going through the COVID-19 period. Adolescents experience identity confusion and various challenges as they stay as marginal people transitioning from childhood to adulthood. Adolescents who have to live an independent life with a specially protected childhood experience mental difficulties such as identity confusion, and various studies are being conducted that reflect the seriousness of mental health conditions [1]. Mental health conditions in adolescence include stress, depression, and anxiety, which may lead to suicidal thoughts [2, 3].

The Korea Youth Counseling and Welfare Development Institute announced the results of the ‘Corona 1 Year, Youth Mental Health Survey’ conducted for youth across the country [4]. This survey was conducted when the need to understand the mental health status of adolescents in Korea was raised in consideration of the situation in which COVID-19 had passed one year since 2020. The results of the survey showed that negative emotions due to COVID-19 became commonplace for adolescents, anxiety about an uncontrollable

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and unpredictable infectious disease, accumulated stress, and a sense of alienation and isolation due to disconnection from interpersonal relationships. It was found that 53.2% of the total respondents felt anxiety and worry, followed by irritation (39.32%) and depression (30.27%).

One of the factors contributing to mental health problems among adolescents is the subjective way they evaluate themselves, which can be changed in a positive way through education. Adolescents need to be aware of their diet and physical activity, which can be a destabilizing factor for their physical and mental development [5]. The adolescent period, when adolescents' eating habits and physical activity become important and health-related behaviors are being formed, is a very important time when subjective health perceptions can be the foundation of lifelong health for the formation of correct lifestyle habits and health promotion [6]. In addition, adolescence should maintain good health in adulthood by forming proper eating habits. Nutritional imbalance due to high-calorie food intake and irregular eating habits, which can be emotionally vulnerable, are harmful to mental health.

The U.S. National Institutes of Health (NIH) announced the results of a study in a women's health observational study that found that women who enjoy eating foods with a high glycemic index had a significantly higher incidence of depression, a factor in mental health conditions, than other comparison groups [7]. In foreign cases, the results of eating habits and mental health are reported, but in Korea, research related to this is still insufficient. In addition, foreign studies on physical activity and mental health status of adolescents include the results of studies by [8] and [9] that participation in physical activities such as sports and exercise improve the mental health status of adolescents. There is also a research result by [10] that regular physical activity promotes emotional stability as well as physical strength of an individual, thereby making positive changes to mental health. However, research on suicide prevention through physical activity is still insufficient.

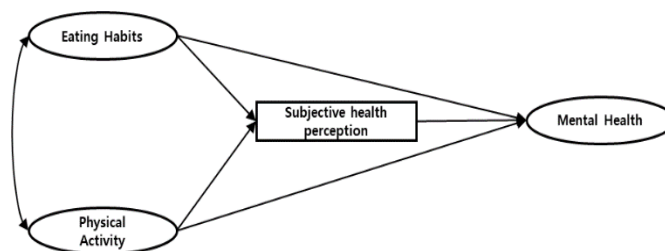
As the eating habits and physical activities of adolescents become important, the adolescent period when health-related behaviors are being formed is a very important point in time when the formation of correct lifestyle habits and subjective health awareness for health promotion can be the basis of lifelong health. Although there are studies reporting the relationship between physical activity and health of adolescents, there are almost no results of studies targeting adolescents in Gangwon-do, which has more special characteristics than other urban areas. Therefore, a more in-depth study is needed for the mental health of adolescents in Gangwon-do, who will represent the Gangwon-do community.

This study aims to identify the structural relationships between dietary habits, physical activity, and subjective health perceptions that influence mental health status among adolescents in Gangwon Province, and to examine whether subjective health perceptions have a mediating effect on the relationship between dietary habits, physical activity, and mental health status among adolescents. Thus, this study aims to understand the mental health status of adolescents in Gangwon Province and provide basic data for prevention and response.

## **2. Methods**

### **2.1. Research design and model**

It designed a model, as shown in <Fig 1>, to examine subjective health perceptions have a mediating effect on the relationship between dietary habits, physical activity, and mental health status among adolescents.



**Figure 1. Research design and model**

## 2.2 Subjects

This study was provided with raw data collected from the 17th Youth Health Behavior Online Survey conducted by the Korea Centers for Disease Control and Prevention targeting middle and high schools nationwide in 2021, and extracted only adolescents in Gangwon-do as the research subjects. It is a cross-sectional survey study analyzed. This study went through a sampling process, and the stratified colony sampling method was used for sampling. The number of subjects used in the study was 1,998.

## 2.3. Research Tools

The variable of subjective health perception was measured on a Likert 5-point scale with the question "How do you feel about your health on a normal day?", which is a subjective judgment of your health, ranging from "Very healthy" (1) to "Very unhealthy" (5), with higher scores indicating higher health status on a normal day.

The dietary variables were fruit consumption, sweetened beverage consumption, breakfast skipping, soda consumption, fast food consumption, and experience with nutrition and dietary education. With the exception of fruit consumption, the higher the rate of dietary intake, the more difficult it is to develop healthy eating habits.

For physical activity, we used the following variables: vigorous exercise practice, strength training practice, gym class exercise practice, and 60 minutes or more of exercise per day. Higher scores on the physical activity practice scale indicate more physical activity.

For mental health, we used the variables depression experience and perceived stress. Higher scores indicate more severe mental health problems.

## 2.4. Analysis methods

The statistical analysis of this study was conducted using SPSS and AMOS programs for descriptive statistics, and t-test was used for mean differences in each group. In addition, the full information maximum likelihood (FIML) method was used for missing data and non-normality in the structural equation model to examine the mediation effect. The fit of the research model was examined using the normative fit index (NFI), relative fit index (TLI), comparative fit index (CFI), root mean square error of approximation (RMSEA), and path coefficient, and the mediation effect was analyzed using the bootstrapping method. The fitness of a model was tested by using structural equation modeling (SEM).

### **3. Results**

#### **3.1. Sociodemographic characteristics of research subjects**

According to the results of descriptive statistical analysis of the sociodemographic characteristics of the research subjects, male students accounted for 51.5% of the subjects, outnumbering female students. By grade, there were more middle school students than high school students, and the middle school students had the highest academic performance. The economic level was the highest in the middle class, and most of them lived with their families.

#### **3.2. Descriptive statistics and mean difference analysis of measured variables**

Descriptive statistics were conducted to find out whether the measured variables in this study were suitable for normal distribution conditions. As a result, the absolute value of the skewness did not exceed 3 and the absolute value of the kurtosis did not exceed 10, thus satisfying the normal distribution condition of the measured variables. As a result of a t-test to find out the difference in measured variables according to gender, subjective health perception( $p<.001$ ), carbonated beverage intake rate( $p<.001$ ), sweet beverage intake rate( $p<.001$ ), fast food intake rate( $p<.05$ ), vigorous exercise practice rate( $p<.001$ ), muscle strengthening exercise practice rate( $p<.001$ ), and exercise practice rate of more than 60 minutes a day( $p<.001$ ), practice rate of PE class( $p<.001$ ), and suicide ideation rate( $p<.001$ ) showed significant differences. While the rate of suicidal ideation was higher in female students than in male students, subjective health awareness, carbonated beverage intake rate, sweet beverage intake rate, fast food intake rate, vigorous exercise practice rate, muscle strengthening exercise practice rate, exercise practice rate of 60 minutes or more a day, and physical exercise practice rate using physical education time was higher in male students than in female students, showing a statistically significant difference.

#### **3.3. Structural equation model analysis**

Confirmatory factor analysis examines the relationship between latent variables and measurement variables that measure them, and verifies whether the empirical data of this study are well reflected. To verify the goodness of fit of the data,  $X^2$ , NFI, TLI, CFI, and RMSEA values were used, and the estimation coefficient (B), standardization coefficient ( $\beta$ ), standard error (S.E), and test statistic (C.R.) was analyzed.

As a result, the goodness of fit of measurement variables for each latent variable showed that the values of NFI, TLI, and CFI were all above .90, and the value of RMSEA was below .05, so the goodness of fit for the measurement model of this study was verified [Table 1].

Eating habits did not have a significant effect on subjective health perception( $p<.001$ ), but physical activity appeared to have a positive effect on subjective health perception. Subjective health perception was found to have a negative effect on mental health status( $p<.001$ ), and eating habits and physical activity did not affect mental health status[Figure 2].

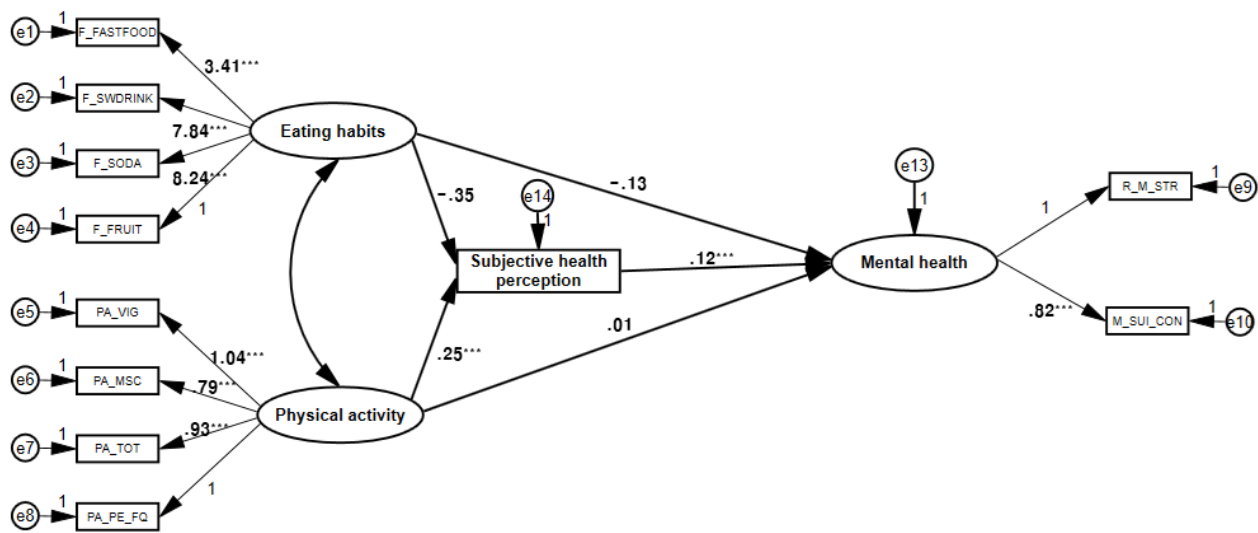


Figure 2. Structural equation model analysis

Table 1. Analysis of confirmatory factors of measured variables

variable	$\chi^2$	df	p	NFI	TLI	CFI	RMSEA
Eating habits	15.365	2	.001	.988	.964	.989	.049
Physical activity	16.578	2	.000	.992	.971	.992	.043
Mental health	11.196	2	.001	.994	.978	.991	.045

### 3.4. Mediating effect analysis

The results of analyzing the total effects and direct/indirect effects of variables are shown in <Table 2>. The bootstrapping method was used for indirect effects, and significance was verified through path coefficient difference verification.

Table 2. Decomposition of structural model effects(N=1,998)

Paths	Total Effect	Direct Effects	Indirect Effects
Subjective health perception ← Eating habits	-.05*	-.05	
Mental health ← Eating habits	.10*	.08	.03
Subjective health perception ← Physical activity	.21**	.22**	
Mental health ← Physical activity	-.10*	-.01	-.09**
Mental health ← Subjective health perception	-.41**	-.41**	

\*p<.05, \*\*p<.01, \*\*\*p<.001

Subjective health perception had a direct negative effect on mental health status (p<.01), and physical activity had a direct positive effect on subjective health perception (p<.01). Subjective health perception mediated the effect of physical activity practice on mental health status, but not the effect of diet on mental

health status.

#### **4. Discussion**

There were significant differences in subjective health perception, eating habits, physical activity, and mental health according to gender. Regarding subjective health perception, male students perceived themselves to be healthy more than female students, and a statistically significant difference was found. This means that male students have a lower probability of becoming a health vulnerable group compared to female students, and in previous studies [11, 12], the phenomenon of female students perceiving their health evaluation as lower than that of male students is observed not only in Korea but also in Korea. This is a common pattern that appears in various cultures. All eating habits were higher for male students than for female students, except for fruit consumption. While this was similar to the results of a previous study on health behavior by gender [13], [14] reported that female students consumed sweet beverages at a higher rate than male students, which is different from the results of this study. Research subjects should pay attention to research results showing that consuming foods with relatively high calories and caffeine content increases the risk of caffeine addiction and health hazards due to excessive intake. The eating habits of adolescence will become the basis for maintaining good health as one reaches adulthood. Since insufficient or unbalanced nutritional supply due to inadequate nutritional problems harms or threatens health, physical nutritional supply during adolescence must be sufficient to maintain mental health. It is believed that efforts will be needed to maintain it correctly.

There was a statistically significant difference in suicidal thoughts, a mental health condition factor, according to gender. Suicidal thoughts were found to be higher in female students than male students, and this was in line with the results of a study by [15], which analyzed suicidal thoughts by gender in relation to suicidal thoughts over the past 12 months. In addition, it supported the study of [16], which showed that female students' suicidal thoughts were higher than male students. This suggests that female students are more at risk of suicidal behavior than male students, and education through improved self-esteem and differentiated suicide prevention programs is believed to be necessary.

In the path between eating habits, physical activity, subjective health perception, and mental health status, physical activity was found to have a positive effect on subjective health perception. Additionally, subjective health perception was found to have a negative effect on mental health status. As such, health inequality among adolescents has been raised from various factors such as health cognition, psychological factors, and eating habits [17]. This means that a multifaceted approach is needed to help young people become mentally healthy by analyzing these factors in depth and sufficiently reflecting them.

Physical activity was found to have a negative effect on mental health status mediated by subjective health perception. In other words, this result supports previous research [18] that found that adolescents in Gangwon-do who are physically active increase their awareness of their health, thereby reducing suicidal thoughts. The significance of this study is not only to investigate the impact of eating habits and physical activity on mental health status among teenagers in Gangwon-do, but also to verify the role of subjective health perception as a mediator. Eating habits did not affect suicidal thoughts, and subjective health perception played a mediating role in the positive effect of physical activity on reducing suicidal thoughts.

Through this study, the need for education for the formation of correct eating habits and healthy physical activity among teenagers in Gangwon-do can be deeply enhanced and their subjective health awareness in adolescence. In addition, the need for qualitative improvement and follow-up research to improve mental health can be seen.

## 5. Conclusion

This study was conducted to investigate the relationship between eating habits, physical activity, mental health, and subjective health perceptions among youths in Gangwon Province, and to identify the path weights of the effects of eating habits and physical activity on mental health through the mediation of subjective health perceptions. We found that physical activity had a positive and significant effect on mental health among youths in Gangwon Province, while eating habits had no significant effect. Eating habits had no effect on mental health mediated by subjective health perception, but physical activity had a negative effect on mental health mediated by subjective health perception. This study was a cross-sectional study and given the variety of items that can be used to diagnose mental health conditions, longitudinal studies should be conducted to test the effects of all factors, not just diet and physical activity. Therefore, in addition to this study, it is necessary to develop a systematic intervention program by including all factors related to mental health conditions and identifying the interaction effects between factors to test the effectiveness.

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