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# Influence of Late School-age Children and Their Mothers' Health Beliefs, Children's Self-esteem, and Social Support on Health Behaviors of Children

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**Purpose:** This study aimed to investigate the predictors of late school-age children's health behaviors in children and their mothers' health beliefs, children's self-esteem, and social support. **Methods:** A descriptive correlational study was conducted with 152 late school-age children from the 4th to 6th grades and their mothers in Korea. Data were collected from February 19 to March 5, 2020. The collected data were analyzed using t-test, ANOVA, Pearson's correlation coefficient, and hierarchical multiple linear regression. **Results:** The average score for health behaviors was 3.35 out of 4.00. The highest subscale of health behavior was mental health, whereas the lowest was eating habits. After adjusting for the influences of the general characteristics of children and their mothers, children's perceived benefits (β=.17, *p*=.005), perceived barriers (β=-.20, *p*=.001), self-efficacy (β=.19, *p*=.005), and mothers' perceived severity (β=.18, *p*=.001) were significant predictors of health behaviors among late school-age children, accounting for 24.0% of the variance ($R^2$ change=.24, F=11.59, *p*<.001). The total explanatory power of the final regression model was 72.0% (adjusted $R^2$=.72, F=24.98, *p*<.001). **Conclusion:** Children's health beliefs were more important than mothers' health beliefs in explaining the health behaviors of late school-age children. Nursing interventions should focus on perceived barriers, self-efficacy, and perceived benefits to improve health behaviors of late school-age children.

**Key Words:** Child health; Mothers; Health behavior; Health belief model

## INTRODUCTION

Recently, the body appearance of Korean school-age children was improved, but physical health decreased [1]. High levels of academic stress in the Korean society threatened mental health and gave rise to unhealthy lifestyle, such as inadequate eating habits and insufficient physical activity (PA), which could lead to various health problems [2]. Teenagers who have consumed excessive energy and fat and have been in school without breakfast, increased 5.0 and 9.6 percentage points between 2008 and 2019, respectively [3,4]. Among Korean late school-age children, 20.1% were overweight or obese [5], and they reported low levels of health-promoting behaviors such as PA and eating habits [2]. Additionally, only 35.4% of them reported having a regular dental attendance [6].

Since late school-age children are able to establish their own health habits and have an ability to advance desirable health behaviors [1], a practical approach towards establishing desirable health behaviors is essential during childhood. The lower grades engaged in health behaviors better than the upper grades, and the girls had higher scores on dietary-related and overall health behaviors, while boys had higher exercise-related health behaviors [7,8]. Higher perceived health status, health concern, self-esteem, social support and self-efficacy were related to higher health be-

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havior of children [7-9]. Maternal factors also affected children's health behaviors. For example, low maternal education and lower household finance were associated with higher unhealthy snacking pattern of children [10]. In the group where mothers were unemployed and had low economic status, the proportion of overweight or obese children was high [5]. The higher the mothers' education level, the more harmonious the family atmosphere, the greater the parents' concern in health, and the better parenting behaviors in the children's health education, the children's health behavior level was higher [2,6,8]. Therefore, factors related to children and their mothers should be considered simultaneously to understand and modify children's health behaviors.

The health belief model has provided a theoretical background to improve health and prevent the occurrence of diseases among people [11,12]. Health beliefs underlined attitudes toward health in explaining the variance in health behaviors [6,11,13,14]. Children with high health beliefs exhibited high levels of health behaviors [6,12,15]. High levels of perceived seriousness, sensitivity, and self-efficacy of mothers were significantly related to children's health behaviors [11,13]. Even though the health beliefs of children and their mothers significantly influenced health behaviors and play a crucial role in late school-age children practicing health behaviors [5,11], there was limited information concerning the relative importance of the health beliefs of children and their mothers in explaining children's health behaviors.

As the constructs of late school-age children and their mothers' health belief have not yet been well tested simultaneously for children's health behaviors, we aimed to explore the determinants of health behaviors among late school-age children and their mothers' health beliefs. The specific aims of this study were to investigate health behaviors of late school-age children, to analyze the association between children's health behaviors and children and their mothers' health beliefs, children's self-esteem, and social support, and to identify significant factors that affect children's health behaviors. Identification of influencing factors for children's health behaviors would provide important insights for future interventional studies.

## METHODS

### 1. Study Design

This descriptive correlational study was conducted to identify the factors that affect children's health behaviors.

### 2. Study Sample

The participants of this study were recruited by pairing mothers and children from the 4th grade to 6th grade enrolled in four conveniently selected elementary schools in Busan, Korea. The inclusion criteria for the study were late school-age children and their mothers who did not have congenital disorders or chronic diseases; were able to read, understand, and answer the questionnaires; could understand the purpose of this study; and agreed to participate in this study. The sample size of this study was calculated using the G-Power 3.1.9.4 program. The calculated sample was 139 participants, based on linear multiple regression analysis, considering 15 predictors, a medium effect size of 0.15, a Type I error of 0.05, and a power of 0.8. To account for the possibility of noncompliance and incomplete data, we considered a 10.0% increase in the calculated sample size. Questionnaires were completed from 155 pairs of late school-age children and their mothers. Three pairs were excluded due to insufficient responses, and a total of 152 pairs of questionnaires were included in the analysis.

### 3. Data Collection

Data were collected from February 19 to March 5, 2020 after receiving ethical approval from Institutional Review Boards (IRB) (PNU IRB/2019_145_HR). The study followed all procedures in accordance with the ethical standards of the institutional research committee. The principal investigator visited four elementary schools conveniently selected from Busan, Korea and explained the purpose of the study to the principals of the schools. The principal investigator subsequently obtained permission to attach a recruitment notice in the classroom of after-school classes. Some participants were recruited into the study on the recommendation of other participants. After the purpose of the study, anonymity of the information, and freedom of withdrawal without imposition of any penalty were explained, written consent was obtained from late school-age children and their mothers.

We assigned the same number for the late school-age children and their mothers, and the survey was conducted with children and mothers separately in different rooms so that their responses were not exposed to each other. The time required to complete the questionnaire was 30~40 minutes for children and 10 minutes for mothers. After completion of the questionnaires, a small gift certificate (₩5,000) was provided as a token of appreciation for participating.

## 4. Measurements

A structured questionnaire was used to measure the general characteristics of the participants and variables related to children's health behavior. All measurements were obtained with the permission of the author who developed the tool. The developed tools to measure the health behavior and health beliefs were not appropriate for application to children and their mothers in this study, so the authors modified the tools with the assistance of an expert panel. The expert panel consisted of a person with more than 10 years of nursing experience in children and adolescents and a nurse researcher who conducted a number of studies related to children's health problems and obtained a Ph.D. The modification process was composed of two stages. In the first stage, questions with overlapping or redundant meanings were deleted, and the sentences were corrected using vocabulary suitable for late school-age children. As a result, the first modified tool was reduced to 25 items on the health belief scale and 30 items in the measure of children's health behavior. In the second stage, the Content Validity Index (CVI) was verified by an expert panel consisting of two professors specialized in child nursing, three professors with extensive research experience related to health behavior, and two elementary school health teachers. All modified tools had a I-CVI of 0.86 or higher, S-CVI/UA of 0.80 or higher, and S-CVI/Ave of 0.97 or higher. The pilot survey was conducted on three children who were in the 4th, 5th, and 6th grades, respectively, and their mothers who had the same qualifications as the selection criteria for this study. The appropriateness of the vocabulary, difficulty of the questions, and ease of response were evaluated, and it was confirmed that there were no particular problems. Subjects who participated in the pilot survey were excluded from the study.

### 1) Measurements for children

General characteristics. The general characteristics of the late school-age children included were grade, gender, body mass index (BMI), subjective health status, and health concerns based on previous studies. In order to evaluate the degree of obesity in children, 2017 Korean National Growth Charts for children and adolescents [16] was used to classify the levels of BMI adjusted for age and sex: ≥95 percentiles as 'obesity', ≥85 and <95 percentiles as 'overweight', ≥5 percentiles and <85 percentiles as 'normal weight', and <5 percentiles as 'underweight'. Subjective evaluation of health status [7] and the level of health concern [8] were rated from 1 to 5.

Self-esteem. Self-esteem is one's attitude toward oneself and one's evaluation of one's own thoughts and feelings in relation to oneself [17]. The self-esteem of late school-age children was measured using a tool developed by Rosenberg [17] and modified by Kim and Lee [9], which is appropriate for school-age children. This tool consists of eight items, and each item is rated on a Likert scale ranging from 1 to 5. The higher the score, the higher the self-esteem. The internal consistency coefficient Cronbach's α in the study of Kim and Lee [9] was 0.88, and Cronbach's α in this study was 0.89.

Social support. Social support is regarded as tangible or intangible resources provided by others [18]. Late school-age children's social support was measured by Korean translated tool of the Interpersonal Support Evaluation List (ISEL)-12 [19]. The ISEL-12 was translated and modified by Jeon and Kim [18] and appropriate for school-age children. The items of the ISEL-12 are rated on a Likert scale ranging from 1 to 4 and summated to create an overall social support score, which consists of three sub-components representing appraisal, belonging, and tangible social support. The higher the score, the higher the social support. At the time of development of the tool, Cronbach's α was 0.88, Cronbach's α in the study of Jeon and Kim [18] was 0.80, and Cronbach's α in this study was 0.85.

Health beliefs. Health beliefs are what people believe their health such as beliefs about the likelihood of getting diseases (perceived susceptibility), the seriousness of contracting diseases (perceived severity), the positive aspects of adopting health behaviors (perceived benefits), the obstacles to performing health behaviors and the negative aspects of adopting health behaviors (perceived barriers), and beliefs that one can perform the recommended health behaviors (self-efficacy) [20]. Because there was no single tool available to measure all sub-components of children's health beliefs, several tools were reviewed and modified for the study. The tools to measure perceived susceptibility (five items) and severity (four items) were modified using the health belief tool developed by Park [12] and Jeong [21], which measure health belief related to specific health conditions. The words and sentences were revised to represent general health conditions; for example, the terms used for specific health conditions such as 'herpes zoster' or 'oral disease' have been replaced with 'disease'. To measure the perceived benefits (six items) and barriers (five items), the tool developed by Jeon and Kim [18] was revised. For example, an item of 'A poor tooth condition can adversely affect the general health status' was revised to 'A disease can adversely affect growth and development'. Self-efficacy was measured using five items selected

from ten items of the Korean version of the General Self-Efficacy Tool [22]. Items suitable for school-age children were selected and modified to ensure that children can understand them. A total of 25 items were rated on a Likert scale ranging from 1 to 5. The higher the score on all health beliefs constructs except perceived barriers, the higher the health belief. In this study, the internal consistency coefficient Cronbach's αs of total health belief, perceived susceptibility, severity, benefits, barriers, and self-efficacy were 0.73, 0.83, 0.85, 0.85, 0.76, and 0.81, respectively.

Health behavior. Health behavior is a lifestyle that affects the maintenance and promotion of health [23]. The health behavior of late school-age children was measured by selecting and revising 30 questions suitable for late school-age children. The health behavior tool developed by Kim et al. [24] and disease prevention and accident prevention factors of health behavior tool were reviewed by an expert group and modified. The modified tool consisted of four sub-components: personal hygiene and eating habits, mental health, exercise, and healthy lifestyle. Among the items in exercise, the items 'pre-exercise warm-up' and 'post-exercise clean-up' were deleted, and 'PA for more than 30 minutes per day, three or more times a week' was added. The healthy lifestyle consisted of items related to 'vaccination', 'eye health', 'respiratory etiquette', 'check food expiration date', 'sleep time', and 'rest'. Each item was rated on a Likert scale ranging from 1 to 4. The higher the score, the higher the late school-age children's level of health behavior. At the time of development of the tool, Cronbach's α was 0.93 [24], and Cronbach's α in this study was 0.86. The reliabilities of the sub-domain measured by Cronbach's α for personal hygiene, eating habits, PA, mental health, and healthy lifestyle were 0.64, 0.66, 0.73, 0.78, and, 0.61, respectively.

**2) Measurements for mothers**

General characteristics. The general characteristics of mothers included in this study were age, educational level, job status, economic status, family closeness, and health concerns. Subjective evaluation of mothers' family closeness and the level of mothers' concern for her own personal health were rated from 1 to 5.

Health beliefs. The tools used for children were used to measure their mothers' beliefs about their children's health. The items were revised as 'I believe that my child~' instead of 'I believe that~'. A total of 25 items were rated on a Likert scale, ranging from 1 to 5. The higher the score, the higher the mothers' belief in the health of their children. The reliability of the tool as a whole, measured by Cronbach's α, was 0.72. The reliabilities of the sub-domain measured by Cronbach's α for perceived sensitivity, severity, benefit, disability, and self-efficacy were 0.90, 0.85, 0.89, 0.72, and 0.83, respectively.

### 5. Data Analysis

Data were analyzed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to explore frequencies, percentages, means, and standard deviations of the participants' characteristics, the extent of children's health behaviors, and related factors. The differences in health behaviors by the general characteristics of late school-age children and their mothers were analyzed by t-test and ANOVA with Scheffé post-hoc test. Nonparametric tests were used when variables did not meet the normality assumption. Pearson's correlation coefficient analysis was conducted to examine the relationship between children's health behavior and the other variables, such as self-esteem, social support, health belief, and their mothers' health belief.

Hierarchical multiple linear regression analysis was conducted to identify the relative contribution of each factor in explaining the variance of children's health behavior. Prior to the multiple regression analysis, normal predicted probability plots were used to assess the assumption of normality of residuals in regression models and the variance inflation factor and tolerance value were performed to check for multicollinearity among independent variables. Durbin-Watson statistics were calculated to detect autocorrelation between the residuals. For regression analyses, subjective health status, health concerns, economic status, family closeness were dummy-coded. A $p$- value less than 0.05 was considered statistically significant.

## RESULTS

### 1. Health Behaviors of Children according to the General Characteristics of Children and Their Mothers

Table 1 shows the late school-age children's health behaviors according to the general characteristics of the children and their mothers. According to the subjective health status perceived by the children, there was a statistically significant difference in the health behaviors of the children ($F=21.57$, $p<.001$). The post-hoc test (Scheffé) indicated that the group with moderate or good subjective health had higher levels of health behaviors than the group with poor subjective health. There were statistically significant differences in late school-age children's health behaviors ($F=35.39$, $p<.001$) by the children's health con-

**Table 1.** Children's Health Behaviors by the General Characteristics of the Children and Their Mothers (*N*=152)

| Characteristics | | Categories | n (%) or M±SD | Children's health behaviors | |
|---|---|---|---|---|---|
| | | | | M±SD or Median (Min~Max) | t or F (*p*) Scheffé |
| General characteristics of the children | School grade | Fourth | 61 (40.1) | 3.32±0.37 | 1.33 (.267) |
| | | Fifth | 51 (33.6) | 3.42±0.32 | |
| | | Sixth | 40 (26.3) | 3.32±0.35 | |
| | Gender | Male | 71 (46.7) | 3.37±0.36 | 0.73 (.467) |
| | | Female | 81 (53.3) | 3.33±0.34 | |
| | Body mass index ($kg/m^2$) (percentile) | Obesity (≥95) | 4 (2.6) | 3.38 (3.10~3.65) | 2.33 (.507)* |
| | | Overweight (≥85 & <95) | 11 (7.2) | 3.22 (2.65~3.67) | |
| | | Normal (≥5 & <85) | 126 (82.9) | 3.42 (2.31~3.94) | |
| | | Underweight (<5) | 11 (7.2) | 3.40 (3.01~3.92) | |
| | | | 19.11±2.65 | | |
| | Subjective health status (points) | Poor (≤2)[a] | 13 (8.6) | 2.82±0.36 | 21.57 (<.001) |
| | | Average (3)[b] | 55 (36.2) | 3.36±0.29 | a<b, c |
| | | Good (≥4)[c] | 84 (55.3) | 3.43±0.31 | |
| | Health concern (points) | Low (≤2)[a] | 21 (13.8) | 2.89±0.27 | 35.39 (<.001) |
| | | Moderate (3)[b] | 38 (25.0) | 3.30±0.33 | a<b<c |
| | | High (≥4)[c] | 93 (61.2) | 3.47±0.27 | |
| General characteristics of their mothers | Age (year) | ≤39.9 | 26 (17.1) | 3.29±0.39 | 0.52 (.597) |
| | | 40.0~44.9 | 81 (53.3) | 3.37±0.33 | |
| | | ≥45 | 45 (29.6) | 3.35±0.36 | |
| | | | 42.6±3.6 | | |
| | Educational level | ≤High school | 21 (13.8) | 3.28±0.46 | -0.83 (.416) |
| | | ≥University | 131 (86.2) | 3.36±0.33 | |
| | Job status | No | 73 (48.0) | 3.36±0.32 | 0.22 (.826) |
| | | Yes | 79 (52.0) | 3.34±0.37 | |
| | Economic status (10,000 won) | Low (<300)[a] | 26 (17.1) | 3.16±0.43 | 5.55 (.005) |
| | | Moderate (300~499)[b] | 58 (38.2) | 3.37±0.35 | a<b, c |
| | | High (≥500)[c] | 68 (44.7) | 3.41±0.29 | |
| | Family closeness (points) | Bad (≤2)[a] | 17 (11.2) | 2.93±0.41 | 19.08 (<.001) |
| | | Average (3)[b] | 42 (27.6) | 3.32±0.32 | a<b, c |
| | | Good (≥4)[c] | 93 (61.2) | 3.44±0.29 | |
| | Health concern (points) | Low (≤2)[a] | 13 (8.6) | 2.89±0.36 | 17.70 (<.001) |
| | | Moderate (3)[b] | 36 (23.7) | 3.29±0.35 | a<b, c |
| | | High (≥4)[c] | 103 (67.8) | 3.43±0.30 | |

*Kruskal-Wallis Rank test.

cerns, and the higher the health concerns, the higher the level of the children's health behaviors. There were no statistically significant differences in children's health behaviors by their grade, gender, and BMI.

There were statistically significant differences in the health behaviors of late school-age children by economic status, family closeness, and health concern. The higher the economic status (F=5.55, $p$=.005), the closer the family (F=19.08, $p$<.001), the higher the health concern (F=17.70, $p$<.001), the higher the level of children's health behaviors. No significant differences were observed in the children's health behaviors by age, educational level, and job status of their mothers.

## 2. Children's Self-esteem, Social Support, Health BeLiefs of the Children and Their Mothers, and Children's Health Behavior

Table 2 shows the extent of late school-age children's self-esteem, social support, health beliefs of children and their mothers, and children's health behavior. The average self-esteem of the children was 35.38±5.25 out of 40 points

**Table 2.** Levels of Self-esteem, Social Support, Health Beliefs of Children and Their Mothers, and Children's Health Behaviors (*N*=152)

| Characteristics | M±SD | Min | Max |
|---|---|---|---|
| Children's self-esteem | 35.38±5.25 | 18.00 | 40.00 |
| Children's social support | 41.80±5.23 | 17.00 | 48.00 |
| Children's health beliefs | | 1.00 | 5.00 |
| Perceived susceptibility | 1.97±0.80 | 1.00 | 5.00 |
| Perceived severity | 2.57±1.03 | 2.67 | 5.00 |
| Perceived benefits | 4.55±0.54 | 1.00 | 4.20 |
| Perceived barriers | 1.62±0.66 | 1.40 | 5.00 |
| Self-efficacy | 3.90±0.71 | | |
| Mothers' health beliefs | | 1.00 | 5.00 |
| Perceived susceptibility | 2.55±0.95 | 1.00 | 5.00 |
| Perceived severity | 2.84±1.01 | 3.00 | 5.00 |
| Perceived benefits | 4.68±0.42 | 1.00 | 3.20 |
| Perceived barriers | 1.40±0.48 | 1.60 | 5.00 |
| Self-efficacy | 4.01±0.65 | | |
| Children's health behaviors | 3.35±0.35 | 2.31 | 3.94 |
| Personal hygiene | 3.38±0.40 | 1.71 | 4.00 |
| Eating habits | 3.04±0.46 | 1.71 | 4.00 |
| Physical activity | 3.27±0.68 | 1.00 | 4.00 |
| Healthy lifestyle | 3.45±0.44 | 2.17 | 4.00 |
| Mental health | 3.62±0.43 | 2.00 | 4.00 |

and average social support was 41.80±5.23 out of 48. Among the sub-dimensions of children's health beliefs, perceived benefits (4.55±0.54) were the highest, and perceived barriers (1.62±0.66) were the lowest. Similar to those of children, in the sub-dimensions of mothers' health beliefs, perceived benefits (4.68±0.54) were the highest, and perceived barriers (1.40±0.48) were the lowest. The mean health behaviors of children were 3.35±0.35, with the highest being mental health (3.62±0.43), and the lowest being eating habits (3.04±0.46).

### 3. Relationship between children's self-esteem, social support, health beliefs of children and mothers, and health behaviors of children

Table 3 shows the correlation between late school-age children's self-esteem, social support, children's and mothers' health beliefs, and children's health behavior. Children's self-esteem (r=.59, $p$<.001), social support (r=.53, $p$<.001), and children's perceived benefits (r=.57, $p$<.001) and self-efficacy (r=.60, $p$<.001) had a significant positive correlation with children's health behaviors. Children's perceived susceptibility (r=-.30, $p$<.001) and barriers (r=-.62, $p$<.001) were significantly negatively correlated with children's health behaviors. Mothers' perceived susceptibility (r=.23, $p$=.004), severity (r=.28, $p$=.001), benefits (r=.28, $p$=.001), and self-efficacy (r=.34, $p$<.001) were significantly positively correlated with children's health behaviors. Perceived barriers (r=-.24, $p$=.003) were significantly negatively correlated with children's health behaviors.

**Table 3.** Correlation of Self-esteem, Social Support, and Health Beliefs of Children and Their Mothers with Children's Health Behaviors (*N*=152)

| Characteristics | Children's health behaviors |
|---|---|
| | r (*p*) |
| Children's self-esteem | .59 (<.001) |
| Children's social support | .53 (<.001) |
| Children's health beliefs | |
| Perceived susceptibility | -.30 (<.001) |
| Perceived severity | -.01 (.917) |
| Perceived benefits | .57 (<.001) |
| Perceived barriers | -.62 (<.001) |
| Self-efficacy | .60 (<.001) |
| Mothers' health beliefs | |
| Perceived susceptibility | .23 (.004) |
| Perceived severity | .28 (.001) |
| Perceived benefits | .28 (.001) |
| Perceived barriers | -.24 (.003) |
| Self-efficacy | .34 (<.001) |

## 4. Factors Influencing Health Behaviors of Late School-age Children

To identify factors affecting the health behaviors of late school-age children, multiple regression analysis was performed using the hierarchical method (Table 4). Factors that was significant in the previous univariate analyses were included as control or independent variables. The tolerance limit between the independent variables was 0.25 to 0.94 and the variance inflation factor ranged from 1.07 to 4.02, which indicates no multicollinearity. The Durbin-Watson value was 2.06, indicating no autocorrelation between the residuals.

In the first model of the regression, children's subjective health status and health concern, mothers' economic status, health concern, and family closeness were included in the analysis as control variables. Children's moderate health concern (β=.47, $p$<.001), high health concern (β=.63, $p$<.001), mothers' economic status (β=.13, $p$=.034), family closeness (β=.22, $p$=.002), and mothers' health con-

**Table 4.** Factors Affecting Children's Health Behaviors (*N*=152)

| Variables | Model 1 | | | | | Model 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | B | SE | β | t | $p$ | B | SE | β | t | $p$ |
| (Constant) | 2.30 | .10 | | 23.26 | <.001 | 1.34 | .34 | | 3.97 | <.001 |
| Control variables | | | | | | | | | | |
| Children's characteristics | | | | | | | | | | |
| ≥Average subjective health status* | 0.12 | .09 | .10 | 1.38 | .170 | 0.08 | .07 | .07 | 1.16 | .247 |
| Moderate health concern* | 0.38 | .07 | .47 | 5.06 | <.001 | 0.20 | .06 | .25 | 3.28 | .001 |
| High health concern* | 0.45 | .07 | .63 | 6.37 | <.001 | 0.21 | .06 | .30 | 3.49 | .001 |
| Mothers' characteristics | | | | | | | | | | |
| ≥Moderate economic status* | 0.12 | .06 | .13 | 2.14 | .034 | -0.03 | .05 | -.03 | -0.54 | .590 |
| ≥Average family closeness* | 0.24 | .08 | .22 | 3.16 | .002 | 0.17 | .06 | .15 | 2.80 | .006 |
| ≥Moderate health concern* | 0.29 | .08 | .23 | 3.61 | <.001 | 0.20 | .06 | .16 | 3.17 | .002 |
| Independent variables | | | | | | | | | | |
| Children's self-esteem | | | | | | <0.01 | .01 | .04 | 0.63 | .532 |
| Children's social support | | | | | | <0.01 | <.01 | .01 | 0.12 | .906 |
| Children's health belief | | | | | | | | | | |
| Perceived susceptibility | | | | | | <0.01 | .02 | <.01 | 0.02 | .983 |
| Perceived benefits | | | | | | 0.11 | .04 | .17 | 2.84 | .005 |
| Perceived barriers | | | | | | -0.11 | .03 | -.20 | -3.43 | .001 |
| Self-efficacy | | | | | | 0.10 | .03 | .19 | 2.87 | .005 |
| Mothers' health belief | | | | | | | | | | |
| Perceived susceptibility | | | | | | 0.02 | .02 | .06 | 1.26 | .210 |
| Perceived severity | | | | | | 0.06 | .02 | .18 | 3.32 | .001 |
| Perceived benefits | | | | | | 0.08 | .04 | .10 | 1.91 | .060 |
| Perceived barriers | | | | | | -0.04 | .04 | -.05 | -0.90 | .372 |
| Self-efficacy | | | | | | 0.01 | .03 | .02 | 0.28 | .783 |
| F ($p$) | 29.30 (<.001) | | | | | 24.98 (<.001) | | | | |
| $R^2$ | .51 | | | | | .75 | | | | |
| Adjusted $R^2$ | .49 | | | | | .72 | | | | |
| F ($p$) for $R^2$ change | | | | | | 11.59 (<.001) | | | | |
| $R^2$ change | | | | | | .24 | | | | |
| VIF | 1.07~2.88 | | | | | 1.31~4.02 | | | | |
| Durbin-Watson | | | | | | 2.06 | | | | |

SE=Standard error; VIF=Variance inflation factor; *Dummy coded 1: ≥average subjective health status, moderate health concern, high health concern, ≥moderate economic status, ≥average family closeness, ≥moderate mothers' health concern.

cern (β=.23, $p$<.001) accounted for 51.0% (F=24.97, $p$<.001) of the variance in the late school-age children's health behaviors.

In the second model, children's self-esteem, social support, perceived susceptibility, perceived benefits, perceived barriers, and self-efficacy, mothers' perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and self-efficacy were added. Among control variables, children's moderate health concern (β=.25, $p$<.001), high health concern (β=.30, $p$=.001), family closeness (β=.15, $p$=.006), and mothers' health concern (β=.16, $p$=.002) were significant factors of late school-age children' health behaviors. Among independent variables, children's perceived benefits (β=.17, $p$=.005), perceived barriers (β=-.20, $p$=.001), and self-efficacy (β=.19, $p$=.005), and mothers' perceived severity (β=.18, $p$=.001) were significant factors of late school-age children's health behaviors, even after controlling for children's subjective health status and health concern, mothers' economic status, health concern, and family closeness. The independent variables in the second model contributed to late school-age children's health behaviors 24.0% ($R^2$ change=.24, F=11.59, $p$<.001) more than the variables in the first model did. The second regression model explained 72.0% (adjusted $R^2$=.72, F=24.98, $p$<.001) of the variance in the late school-age children's health behaviors.

Children with moderate and high health concern, higher score on perceived benefits, self-efficacy, and lower score on perceived barriers reported greater health behaviors. Children who had mothers with more than average family closeness, moderate health concern, and higher score on perceived severity reported greater health behaviors.

## DISCUSSION

This study was conducted to investigate significant factors of late school-age children's health behaviors among health beliefs of children and their mothers, children's self-esteem and social support. The mean value of children's health behaviors in this study was 3.35 out of 4 points, which was slightly higher than in previous studies [1,2,7], indicating that children were practicing health behaviors quite well in this study. Considering the sub-dimensions of health behaviors, mental health was 3.62 out of 4 points, which was similar to the findings of Jeon and Cha [1]. Korean society paid special attention to the stress and mental health of school-age children [25]. Even when academic stress was high, children can restore their own health by maintaining health behaviors when family support and self-esteem were high. Identification and further investigation of high-risk children with weak family support and low self-esteem are essential.

Among health behaviors, the lowest level was eating habits, which was consistent with the previous studies [2,18]. It was found that the eating habits of avoiding salty and spicy food and eating a variety of food were poor. Late school-age children tended to eat a lot of salty and spicy foods and a less varied diet. The second lowest sub-dimension of health behaviors was PA. The levels of PA were 2.84 out of 4 points in Jeon and Kim's study of obese children [18] and in Park's study of children from low-income families [2], which were lower than the values observed in our study. Multiple attempts by the government and school, which could be short-term counterplans without consideration of long-lasting pleasurable activities for school-age children [26] seemed to have had a little effect on increasing PA of school-age children. Strategies using game characters, webtoons, and stickers and coupons rewards [14,27] can be considered as guidelines for child-friendly methods.

The health belief model explains whether an individual will adopt recommended health behaviors and emphasizes the relationship between an individual's health beliefs and an individual's behavior [6,11,20]. Interestingly, in the present study, we observed that maternal perceived susceptibility was positively related with children's health behaviors. However, children's perceived susceptibility showed a negative correlation with children's health behaviors. This is similar to the findings of Park [12], who reported a negative relationship between perceived susceptibility and oral health behavior in children. Late school-age children responded sensitively to the importance of health. However, these sensitivities were not associated with healthy behaviors and showed a lack of PA and unbalanced eating habits [6]. Active communication with late school-age children is necessary so that children can accurately recognize their levels of health behavior. Further investigation is required for health care providers to understand why children's perceived susceptibility do not lead to their health behaviors.

Children's self-esteem showed the highest correlation with health behavior, but it was not a significant factor in the regression model in this study. In a previous study, late school-age children's self-esteem directly and indirectly affected health behavior through health behavior intention [1]. Therefore, in the future it is necessary to analyze the direct and indirect effects on late school-age children's health behavior by identifying the mediating and moderating variables among children's self-esteem, soc-

ial support, and the health beliefs of children and their mothers.

Perceived barriers, self-efficacy, and perceived benefits were the important independent variables among the constructs of health beliefs in explaining the variance in late school-age children's health behaviors. Lower children's perceived barriers and higher self-efficacy and perceived benefits were associated with higher levels of health behaviors, consistent with the data from previous studies conducted with school-age children [2,9,20]. Self-efficacy is essential for maintaining healthy behavior and overcoming perceived barriers to healthy behaviors [28]. Considering that late school-age children can learn on their own, health education programs should arouse children's interests and strengthen their self-efficacy through positive rewards, which should encourage confidence in successful achievement and be beneficial to healthy behavior in the long run. Smartphone applications for guiding health behavior decisions using gamification and self-monitoring strategies [29] can be leveraged for self-directed health care that promotes self-explored engagement and self-efficacy development.

When perceived benefits were high, late school-age children performed better in healthy behaviors similar to those in previous studies [12]. Perceived benefits describe the potential benefits of health behaviors and when, where, and how these behaviors should be achieved [20]. The late school-age children in this study knew the importance of a healthy lifestyle and early diagnosis of health problems to ensure the health of their families. However, the accomplishment of actual health behaviors was low. Identification of strong predictors of actual health behavior is essential to improving the actual achievement of health behaviors.

When mothers perceived the severity of their children's health as high, their children's health behaviors were also high, which was similar to the previous literature [30]. Mothers should understand the severity of the health of their late school-age children and the need for healthy behaviors to prevent potential health problems. Systematic efforts and management are needed to improve health behaviors, including those of children and parents. It is recommended that late school-age children and their mother share health diaries and health care, and visit parent training centers or family centers together on a regular basis.

This study had several limitations. First, the generalizability of the study findings was limited because the data were collected from a single city. Second, the cross-sectional nature of this study limited the consideration of causes and effects among study variables. Third, late school-age children formed strong bonds with their peers, which might greatly influence their behavior. There was a possibility of a specification error because it did not take peer group effects into account. Last, the health belief measurement in this study was revised to be suitable for late school-age children. Even though we carefully revised the instruments with expert panel, careful interpretation was required.

Despites these limitations, this study is meaningful in that it simultaneously investigated the roles of late school-age children and their mothers' health beliefs for the purpose of explaining the children's health behaviors. In terms of nursing practice, strategies to increase children's self-efficacy, help them have beneficial experiences of healthy eating habits and increasing PA, and identify barriers to health behaviors can be proactively applied to late school-age children to improve their health behaviors. The increase in late school-age children's inappropriate behavior due to academic overload and electronic narcotics can be improved through experiential health education. With regard to health policy, it may be proposed to extend the health belief model to late school-age children and their mothers. It is necessary to establish a support system so that late school-age children can independently practice healthy behaviors. Further, family members, schools, and communities should take the lead in cultivating health knowledge and skills.

## CONCLUSION

This study aimed to establish an essential empirical basis for an intervention program to promote desirable health behaviors of late school-age children by investigating the levels of health behaviors and identifying factors affecting health behaviors. Late school-age children in the present study showed low levels of PA and unhealthy eating habits. To promote desirable healthy behaviors, children's health concern and self-efficacy should be enhanced, and perceived barriers should be minimized. In addition, consideration of the perceived severity of their mothers could be an effective strategy for late school-age children. In particular, screening high-risk children with low health behaviors and identifying barriers could be an essential first step in interventions to promote children's health.

The findings of this study are meaningful in that they support the fact that children's health beliefs were more important than their mothers in explaining the variance in their own health behaviors. Based on these findings, we suggest the following. First, the development of an intervention program for late school-age children with low lev-

els of health behaviors is recommended. Increasing the children's health concern, self-efficacy, and benefits of practicing healthy behaviors and reducing barriers could be effective. Second, there is a need for a longitudinal study to examine the causal relationship between health behaviors and other characteristics. Last, considering that late school-age children are influenced by peer groups [2], further evaluation of the role of peer group in children's health behaviors is needed.

## CONFLICTS OF INTEREST

The authors declared no conflict of interest.

## AUTHORSHIP

Study conception and design acquisition - LS, LH and LY; Data collection - LS; Analysis and interpretation of the data - LS, LH, LY, PG, and HS; Drafting and critical revision of the manuscript - LS, LH, LY, PG, and HS.

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