

Article

# Pursuing Sustainable Happiness through Participation in Exercise for South Korean Students: Structural Relationships among Exercise, Mental Health Factors, School Satisfaction, and Happiness

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**Abstract:** The purpose of this study was to explore the possibility that exercise participation can be an important factor in the pursuit of sustainable happiness. For this purpose, this study focused on the causal relationships among the frequency of exercise, self-esteem, stress, depression, school satisfaction and degree of happiness in elementary, junior high and high school students (n = 11,132) in South Korea. The data used for this study were collected in 2016 by the National Youth Policy Institute (NYPI) for the “UN convention on the rights of the child.” The results were as follows; firstly, the exercise frequency had a significant causal relationship with self-esteem, stress, school satisfaction and happiness but not with depression. However, it was found that exercise frequency had an indirect effect on depression through stress. In detail, exercise frequency could positively reduce stress, and less stress affects depression. Secondly, there were significant direct or indirect effects on self-esteem, stress, depression, degree of happiness and school satisfaction. Lastly, only depression did not affect school satisfaction and happiness.

**Keywords:** exercise frequency; self-esteem; stress; depression; school satisfaction; happiness

## 1. Introduction

The ultimate goal of schools is to help students believe in themselves and to provide learners with the ability to lead happy and independent lives [1]. If schools fail to deliver on this, it can raise questions regarding the role of schools in society [2], which could be detrimental to both schools and society as a whole. In this regard, research results are published continuously that question whether Korean students are currently learning what is needed to be learned in school.

According to Yonsei University’s Social Development Institute, the degree of Korean students’ happiness was ranked 20 out of 22 OECD member countries in 2017 [3]. One of the biggest reasons for Korean students being ranked at the lowest level of individual happiness was because of the culture of entrance exams in Korea [4]. Entering a highly ranked university is the most important goal that students should achieve in Korean society. Most students, as well as their parents, focus on entering well known universities from the time of entering elementary school. Thus, Korean schools operate under an atmosphere of intense admission competition. Consequently, standards for evaluating good schools have typically only focused on students’ admission to well known universities [5]. Within this environment, other subjects like physical education, which are not included in the university entrance exam, have long been undervalued.

This alienation of physical education has caused a serious lack of physical activity among Korean students. In 2016, 94.2% of Korean youth were identified as having a “lack of exercise”, with Korea

having the lowest rate of student exercise among 146 countries in the world [6]. According to the Office of Policy Development for the Healthy Society of Seoul National University, only one out of four schools fulfills the recommended physical education class hours for high schools, which is about 150 min per week [7]. These studies suggested problems in physical education and the improvement of the educational environment in South Korea. Moreover, as Schmalz, Deane, Birch and Davison argued, a lack of physical activity and a sedentary lifestyle were found to be associated with anxiety and depression [8].

Currently, it seems clear that Korean education ignores the global belief that physical education can improve quality of life. It has long been proven that physical activities provide not only physical benefits but also mental health and social benefits. Exercise increases self-esteem [9,10], reduces stress [11], reduces depression [12,13], provides satisfaction with school life [14,15] and improves happiness [16–18]. In addition, some studies have identified that exercise, stress, self-esteem, depression, school satisfaction and happiness are related to each other. There also seems to be a relationship between stress and depression [19], self-esteem, depression, and happiness [20,21], stress and school satisfaction [22], school experience, and happiness [23], as well as body image and happiness [24]. However, their causal relationships are not yet clear and the pathways by which exercise makes a student happy have yet to be identified.

Experiencing pleasure from physical activities, as well as physical, mental and social health benefits, are the result of political choices influencing the social design and not just a coincidence [5]. Unfortunately, the alienation of physical education from Korean schools restricts the benefits of physical activity that students could experience as part of the education curriculum [25]. Korean schools need to provide a variety of experiences and health benefits as a way for students to attain happiness [2]. Korean school education needs to be reviewed regarding students' physical and sports activities, through a new direction in political efforts and social design. Various aspects of theoretical support, that is, the verification of the importance of study results regarding the Korean educational environment, are required to change society [6].

Even though the 2020 report by World Health Organization shocked Korean society by revealing the current reality and problems of the exercise system for Korean youths [6], schools and policymakers appear to be lacking in the movement for such a change. This highlights that the verification and development of convincing theories are needed to induce changes in Korean school education. However, recent public opinion in Korean society has also suggested that physical activities should be given up in favor of further academic advancement in school. Unfortunately, this strategy will certainly be harmful to the pursuit of individual happiness, as well as to the development of society. Although the benefits of exercise are identified at all ages, it is especially those who are active in childhood and adolescence who are the most likely to benefit from exercise throughout their lives [26].

In order to change public opinion around the inclusion of exercise during school time, a better persuasive statement and evidence are required. It may be more realistically persuasive to aggregate relevant variables and compare them at the same time, rather than taking the findings of one research study, which verified the causal relationship of one or two of the variables. This would provide better persuasive evidence and a comprehensive logical theory regarding the role of exercise at school, and could be secured by identifying the total causality of the various variables. For this reason, this study aimed to secure an understanding of the importance of physical education and sports activities. Understanding the effects of exercise for students, for what reasons and how, will provide a persuasive understanding of the effectiveness of exercise compared to previous studies.

This research examined the causal relationship between exercise, stress, self-esteem, depression, school satisfaction and happiness, which to date have not been investigated together in-depth. Exploring the reason for which exercise affects students' happiness will help to secure more logical evidence for the impact of physical education and sports on students. This study also revealed how mental health factors affecting happiness were related to each other. It provided a stronger and

more reasonable indication that participation in exercise can help students to achieve happy and independent lives.

## 2. Methods

### 2.1. Research Model

The research model of this study is presented in Figure 1 to examine the effect of the exogenous latent variables on the endogenous latent variables, as well as the effects of the endogenous latent variables upon one another. The following are the questions guiding this study:

1. Is there significant causality of exercise frequency on self-esteem, stress, depression, school satisfaction and degree of happiness?
2. Are there mediating effects of exogenous latent variables on endogenous latent variables and endogenous latent variables upon one another?

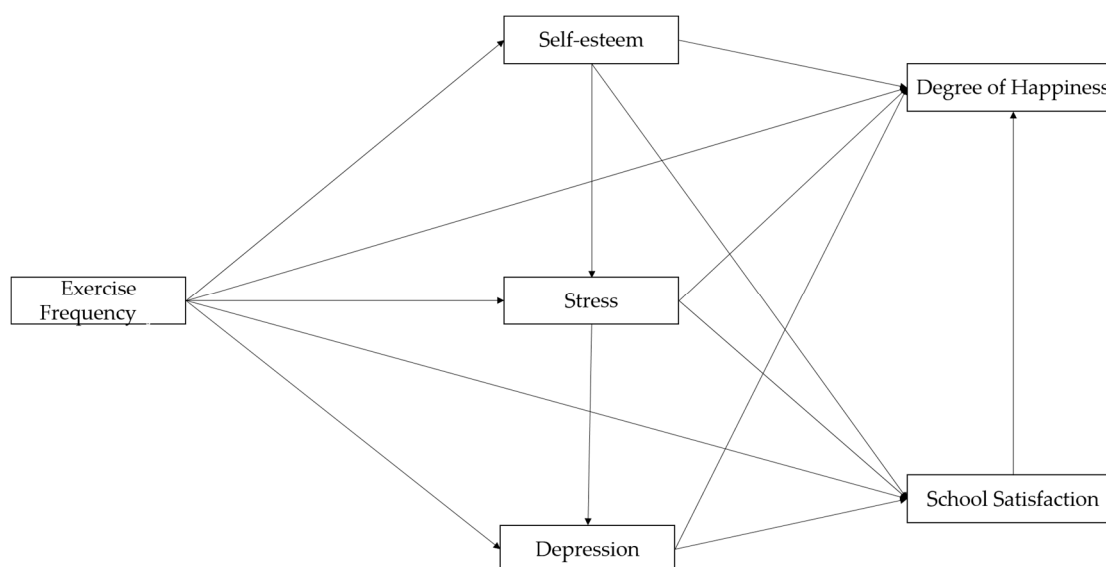


Figure 1. Current study's research model.

The relationship between exercise frequency and self-esteem was confirmed in results with (i) adolescents, (ii) early adolescent non-Hispanic women, (iii) children and (iv) adolescents (meta-analysis) [9–11]. Research findings that exercise frequency improved self-esteem were consistently reported [8]. Exercise and self-esteem were consistently reported as being interrelated. The relationship between exercise frequency and stress was reviewed in results of (i) physical and perceived stress/hassles, (ii) the role of exercise in stress management, (iii) stress relief, (iv) the effects of stress on physical activity and exercise, the effectiveness of exercise interventions on coping with stress, etc. [18,27–32]. Previous studies consistently reported the relationship between exercise and stress.

The relationship between exercise and depression was confirmed on results with the (i) effectiveness of exercise as an intervention in the management of depression (meta-analysis), (ii) a review of exercise and depression, (iii) exercise as a treatment for depression (meta-analysis), the relationship between physical activity, (v) sedentary behavior and symptoms of depression and anxiety [33–36]. The general consensus was that exercise affected depression.

The relationship between sports and school satisfaction was confirmed in reports that (i) youth sports activities positively influenced school satisfaction in Korea, China and Japan [15], and (ii) physical activity was related to the life satisfaction of high school students [37]. (iii) For the relationship between exercise and happiness it was reported that athletes were happier than non-athletes [38],

(iv) so participation in sports promoted happiness [39], (v) there was a link between college students' sports participation and happiness [40] (vi) and a systematic review of the literature confirmed that there was a consistent relationship between exercise and happiness [41]. The exercise was an important factor in promoting happiness and there was no disagreement.

Then, researchers explored the relationships between the factors, not exercise. The relationship between stress and depression was confirmed in the report that stress was related to depression [19], and the relationship between self-esteem, depression and happiness were confirmed in the report that self-esteem and depression were factors that predicted happiness [20]. The relationship between self-esteem, depression and happiness were analyzed by a structural equation and self-esteem was reported to be related to happiness and not to depression [21]. The relationship between self-esteem and school satisfaction was confirmed in a report that there was a relationship between school self-esteem and quality of life [22]. The relationship between school satisfaction and happiness was confirmed by a report that positive student experiences and student happiness were related [23].

## 2.2. Participants

The study was approved by the Bioethics Committee of the public institution under the Korea Ministry of Health and Welfare (p01-202003-22-001). The data from the participants for this study were available in the data archives of the National Youth Policy Institute (NYPI). The students who took part in the survey were 4–6th grade elementary school students, 7–9th grade junior high school students and 10–12th grade high school students across Korea. Based on the 2016 Education Statistics Yearbook of Korea, the sample was selected by the proportional distribution of 11,132 students; 5793 male students and 5339 female students participated in the survey [42]. More detailed participant information is given in Table 1.

**Table 1.** Characteristics of the research targets.

|                 |             | Participants (n) | Ratio (%) |
|-----------------|-------------|------------------|-----------|
| Sex             | Male        | 5793             | 52.0      |
|                 | Female      | 5339             | 48.0      |
| Schools         | Elementary  | 3170             | 28.5      |
|                 | Junior high | 3741             | 33.6      |
|                 | High school | 4221             | 38.0      |
| Local area size | Large       | 4473             | 40.2      |
|                 | Medium      | 5295             | 47.6      |
|                 | Small       | 1364             | 12.3      |
| Grades          | High        | 3587             | 32.4      |
|                 | Average     | 4731             | 42.7      |
|                 | Low         | 2769             | 25.0      |
| Financial level | High        | 5768             | 52.1      |
|                 | Average     | 3973             | 35.9      |
|                 | Low         | 1340             | 12.1      |

## 2.3. Procedure

The survey was conducted by an investigator using the method of self-administered questionnaires. The questions consisted of the frequency of exercise participation (1 question), self-esteem (3 questions), stress (6 questions), depression (3 questions), school satisfaction (4 questions) and current degree of happiness (1 question). All responses were measured on a four-point Likert scale (1 = very negative, 2 = negative, 3 = average and 4 = very positive). Table 2 shows the results of the exploratory factor analysis for each variable.

**Table 2.** Factor loading of the perceptual scales.

| Constructs          | Measurement   | Factor Loadings | Communality | Eigen Value | CFV    |
|---------------------|---|-----------------|-------------|-------------|--------|
| EF                  | Exercise of health care   | -               | -           | -           | -      |
| Self-esteem         | I have an advantage   | 0.861           | 0.741       | 2.030       | 67.650 |
|                     | I have something to be proud of                                     | 0.817           | 0.620       |             |        |
|                     | I have a positive attitude  | 0.788           | 0.668       |             |        |
| Stress              | Family discords   | 0.793           | 0.630       | 2.722       | 45.367 |
|                     | Economic difficulties   | 0.771           | 0.634       |             |        |
|                     | Relationship with peer  | 0.649           | 0.489       |             |        |
|                     | Academic problems   | 0.836           | 0.705       |             |        |
|                     | Anxiety of the future   | 0.833           | 0.731       |             |        |
| Depression          | Physical conditions   | 0.560           | 0.555       | 1.023       | 17.042 |
|                     | I've been lonely  | 0.916           | 0.816       |             |        |
|                     | I've been anxious before  | 0.904           | 0.807       |             |        |
|                     | I've been depressed   | 0.898           | 0.839       |             |        |
| School satisfaction | School helps me grow up healthy                                     | 0.897           | 0.751       | 2.962       | 74.047 |
|                     | School builds me a desirable personality                            | 0.875           | 0.805       |             |        |
|                     | School makes me considerate of others and have a sense of community | 0.866           | 0.765       |             |        |
|                     | School teaches me the knowledge necessary for social life           | 0.801           | 0.642       |             |        |
| DH                  | Current degree of happiness   | -               | -           | -           | -      |

CFV = common factor variance, EF = exercise frequency, DH = degree of happiness.

The reliability values of each statement are given in Table 3. Cronbach's  $\alpha$  was 0.751–0.891. The reliability of the questions used in this study was found to be good.

**Table 3.** The reliability value of the items.

|                     | EF<br>(1 Item) | Self-Esteem<br>(3 Items) | Stress<br>(6 Items) | Depression<br>(3 Items) | SS<br>(4 Items) | DH<br>(1 Item) |
|---------------------|----------------|--------------------------|---------------------|-------------------------|-----------------|----------------|
| Cronbach's $\alpha$ | -              | 0.759                    | 0.751               | 0.891                   | 0.882           | -              |

EF = exercise frequency, SS = school satisfaction, DH = degree of happiness.

## 2.4. Data Analysis

The data were analyzed by IBM SPSS PAWS Statistics 18.0 for descriptive statistics, exploratory factor analysis, reliability analysis and correlation among variables analysis. The confirmatory factors analysis and structural equation model analysis was undertaken using IBM SPSS AMOS 18.0.

## 3. Results

### 3.1. Correlations between Variables

Positive and negative correlations were identified between all the variables. According to Cohen, correlation coefficients of 0.1 are classified as small, an absolute value of 0.3 is classified as medium and 0.5 is classified as large [43]. Exercise participation showed a positive correlation with self-esteem ( $r = 0.231$ ), school satisfaction ( $r = 0.191$ ) and happiness ( $r = 0.192$ ), and a negative correlation with stress ( $r = -0.233$ ) and depression ( $r = -0.214$ ). Self-esteem was positively related to school satisfaction ( $r = 0.379$ ) and happiness ( $r = 0.492$ ), but negatively related to static correlation stress ( $r = -0.443$ ) and depression ( $r = -0.394$ ). Stress had a positive correlation with depression ( $r = 0.619$ ) and a negative correlation with school satisfaction ( $r = -0.395$ ) and happiness ( $r = -0.508$ ). Depression had a negative correlation with school satisfaction ( $r = -0.368$ ) and happiness ( $r = -0.447$ ). School satisfaction had a positive relationship with happiness ( $r = 0.423$ ) (Table 4).

**Table 4.** Correlations among the study variables.

|                        | 1         | 2         | 3         | 4         | 5        |
|------------------------|-----------|-----------|-----------|-----------|----------|
| 1. EF                  |           |           |           |           |          |
| 2. Self-esteem         | 0.231 **  |           |           |           |          |
| 3. Stress              | −0.233 ** | −0.443 ** |           |           |          |
| 4. Depression          | −0.214 ** | −0.394 ** | 0.619 **  |           |          |
| 5. School satisfaction | 0.191 **  | 0.379 **  | −0.395 ** | −0.368 ** |          |
| 6. DH                  | 0.192 **  | 0.492 **  | −0.508 ** | −0.447 ** | 0.423 ** |

EF = exercise frequency, DH = degree of happiness; \*\*  $p < 0.01$ .

### 3.2. Confirmatory Factor Analysis of the Study Variables

The results measuring the adequacy of this research model were: comparative fit index (CFI) = 0.985, Tucker–Lewis index (TLI) = 0.978, normed fit index (NFI) = 0.984, root mean square error of approximation (RMSEA) = 0.040 and standardized root mean square residual (SRMR) = 0. Based on these results, the research model for exploratory factor analysis was identified to be suitable. The results of the confirmatory factor analysis are shown in Table 5. For the convergent and discriminant validity of each factor, the concept reliability (CR) and average variance extraction (AVE) were calculated. Among the analyzed questions, CR exceeded 0.7 (minimum standard) with 0.798–0.934 and the AVE also exceeded 0.5 (minimum standard) with an AVE of 0.574–0.782, which verified both the convergent validity and discriminant validity.

**Table 5.** Confirmatory factor analysis.

| Standardized Regression Weights |                       |          |       |       |  |
|---------------------------------|-----------------------|----------|-------|-------|--|
| Factor                          | Item                  | Estimate | CR    | AVE   |  |
| EF                              | EF                    | 1.268    | -     | -     |  |
| Self-esteem                     | Self-esteem2          | 0.633    | 0.798 | 0.574 |  |
|                                 | Self-esteem3          | 0.804    |       |       |  |
|                                 | Self-esteem4          | 0.575    |       |       |  |
| Stress                          | Stress1               | 0.621    | 0.804 | 0.674 |  |
|                                 | Stress2               | 0.762    |       |       |  |
| Depression                      | Depression1           | 0.851    | 0.903 | 0.755 |  |
|                                 | Depression2           | 0.840    |       |       |  |
|                                 | Depression3           | 0.875    |       |       |  |
| School satisfaction             | School satisfaction 1 | 0.823    | 0.934 | 0.782 |  |
|                                 | School satisfaction 2 | 0.881    |       |       |  |
|                                 | School satisfaction 3 | 0.825    |       |       |  |
|                                 | School satisfaction 4 | 0.706    |       |       |  |
| DH                              | Happiness             | 0.454    | -     | -     |  |

Comparative fit index (CFI) = 0.985, Tucker–Lewis index (TLI) = 0.978, Normed Fit Index (NFI) = 0.984, root mean square error (RMSEA) = 0.040, Standardized Root Mean square Residual (SRMR) = 0.0236; CR = concept reliability, AVE = average variance extraction.

### 3.3. Causality among the Variables

The suitable research range of this research model encompassed the values of CFI = 0.988, TLI = 0.980, NFI = 0.987, RMSEA = 0.038 and SRMR = 0.020. This research model was thus confirmed to be suitable. The results verifying the importance of each pathway in this research model are provided in Table 6 and Figure 2 to examine the effect of the exogenous latent variables on the endogenous latent variables and the endogenous latent variables upon one another. Exercise frequency was causally related to self-esteem (0.128,  $p < 0.01$ ), stress (−0.038,  $p < 0.05$ ), school satisfaction (0.017,  $p < 0.05$ ) and degree of happiness (−0.013,  $p < 0.05$ ). Self-esteem had a causal relationship with stress (−0.473,  $p < 0.05$ ), school satisfaction (0.268,  $p < 0.01$ ) and degree of happiness (0.347,  $p < 0.01$ ). Stress had a causal relationship with depression (1.715,  $p < 0.01$ ), school satisfaction (−0.540,  $p < 0.01$ ) and degree of happiness (−0.739,  $p < 0.05$ ). Depression had no causal relationship with school satisfaction and degree of happiness. School satisfaction was causally related to degree of happiness (0.156,  $p < 0.01$ ).

Table 6. Causality among the variables.

|                     | Causality |                     | Estimate | SE    | CR      | p        |
|---------------------|-----------|---------------------|----------|-------|---------|----------|
| EF                  | →         | Self-esteem         | 0.128    | 0.005 | 24.820  | 0.006 ** |
|                     | →         | Stress              | -0.038   | 0.004 | -10.257 | 0.012 *  |
|                     | →         | Depression          | 0.006    | 0.007 | 0.874   | 0.335    |
|                     | →         | School satisfaction | 0.017    | 0.005 | 3.284   | 0.015 *  |
|                     | →         | DH                  | -0.013   | 0.005 | -0.502  | 0.016 *  |
| Self-esteem         | →         | Stress              | -0.473   | 0.012 | -38.728 | 0.013 *  |
|                     | →         | School satisfaction | 0.268    | 0.021 | 12.722  | 0.008 ** |
|                     | →         | DH                  | 0.347    | 0.021 | 16.786  | 0.006 ** |
| Stress              | →         | Depression          | 1.715    | 0.033 | 52.144  | 0.006 ** |
|                     | →         | School satisfaction | -0.540   | 0.050 | -10.887 | 0.007 ** |
|                     | →         | DH                  | -0.739   | 0.052 | -14.320 | 0.016 *  |
| Depression          | →         | School satisfaction | -0.009   | 0.017 | -0.510  | 0.645    |
|                     | →         | DH                  | 0.037    | 0.017 | 2.176   | 0.051    |
| School satisfaction | →         | DH                  | 0.156    | 0.012 | 13.072  | 0.009 ** |

EF: exercise frequency, DH: degree of happiness, CFI = 0.985, TLI = 0.978, NFI = 0.984, RMSEA = 0.040, CR = concept reliability, SRMR = 0.0237; \*  $p < 0.05$ , \*\*  $p < 0.01$ ; SE = standard error, CR = t-value.

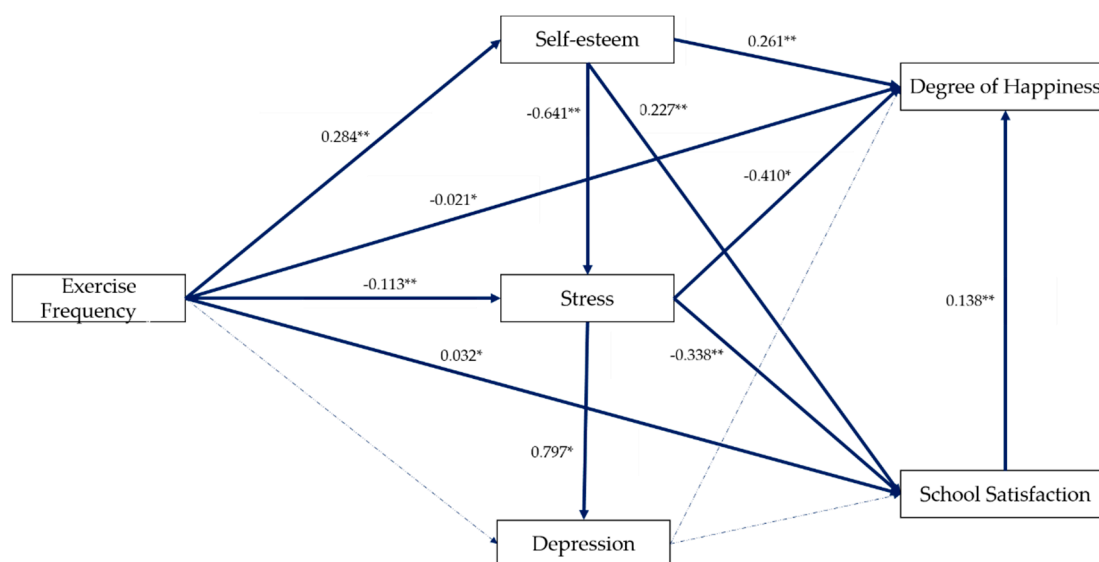


Figure 2. The results of the verified pathways among the variables by using standardized) regression weights; \*  $p < 0.05$ , \*\*  $p < 0.01$ .

3.4. Verification of Variable Effects

The results verifying the effects between the variables are provided in Table 7. Firstly, the results showed that exercise frequency had a direct effect (0.284,  $p < 0.01$ ) on self-esteem, direct (-0.113,  $p < 0.01$ ) and indirect effects (-0.182,  $p < 0.01$ ) on stress, direct (0.032,  $p < 0.05$ ) and indirect effects (0.167,  $p < 0.01$ ) on school satisfaction (0.032, 0.167), as well as direct (-0.021,  $p < 0.05$ ) and indirect effects (0.213,  $p < 0.01$ ) on degree of happiness. However, exercise frequency (EF) had only indirect effects (-0.236,  $p < 0.01$ ) on depression. Secondly, self-esteem was directly influenced by stress (-0.641,  $p < 0.01$ ), indirectly influenced by depression (0.511,  $p < 0.05$ ), directly (0.227,  $p < 0.01$ ) and indirectly (0.223,  $p < 0.01$ ) influenced by school satisfaction, as well as directly (0.261,  $p < 0.01$ ) and indirectly (0.303,  $p < 0.05$ ) influenced by happiness. Thirdly, stress had a direct effect (0.797,  $p < 0.05$ ) on depression, school satisfaction (-0.338,  $p < 0.05$ ) and degree of happiness (-0.410,  $p < 0.05$ ). Finally, it was statistically verified that school satisfaction had a direct effect (-0.138,  $p < 0.01$ ) on the degree of happiness. However, depression had no direct or indirect effects on school satisfaction and happiness.

**Table 7.** Verification of inter-variable effects.

|                     | Self-Esteem                   | Stress                            | Depression                      | School Satisfaction              | DH                               |
|---------------------|-------------------------------|-----------------------------------|---------------------------------|----------------------------------|----------------------------------|
| EF                  | 0.284 **<br>(0.284 **, 0.000) | -0.295 *<br>(-0.113 **, -0.182**) | -0.228 **<br>(0.008, -0.236 **) | 0.199 **<br>(0.032 *, 0.167 **)  | 0.192 **<br>(-0.021 *, 0.213 **) |
| Self-esteem         | -                             | -0.641 *<br>(-0.641 **, 0.000)    | -0.511 *<br>(0.000, -0.511 *)   | 0.450 **<br>(0.227 **, 0.223 **) | 0.564 **<br>(0.261 **, 0.303 *)  |
| Stress              | -                             | -                                 | 0.797 *<br>(0.797 *, 0.000)     | -0.347 *<br>(-0.338 **, -0.009)  | -0.423 *<br>(-0.410 *, -0.013)   |
| Depression          | -                             | -                                 | -                               | -0.012<br>(-0.012, 0.000)        | 0.042<br>(0.044, -0.002)         |
| School satisfaction | -                             | -                                 | -                               | -                                | 0.138 **<br>(0.138 **, 0.000)    |

EF: exercise frequency, DH: degree of happiness, \*  $p < 0.05$ , \*\*  $p < 0.01$ .

#### 4. Discussion and Conclusions

Despite a lot of research in the development of physical education, the function of sports exercise in school remains controversial and there are no consistent answers to explain the causal relationship between exercise participation and its psychological effect focused on positive and negative self-esteem, stress, depression and school satisfaction. In such a context, this study attempted to investigate the positive and negative effects of exercise frequency on psychological factors during student's school years. This study also examined the mediating effects of exogenous latent variables on endogenous latent variables as well as the effects of endogenous latent variables upon one another. For this purpose, this study used analyzed data from the National Youth Policy Institute (NYPI); a survey of 11,132 students across South Korea. According to the results of this study, several noteworthy findings were observed.

##### 4.1. Exercise Frequency and Self-Esteem

The analysis indicated that the frequency of exercise had direct positive effects on self-esteem. It was shown that exercise gave them a feeling of success of increased mental and physical strength, thus enhancing self-esteem. It improved the adequacy and efficiency of an individual [14]. In other words, self-esteem was one of the essential factors of mental health, affecting many behaviors and the outcomes of actions during students' adolescent years [10]. High self-esteem creates many psychological and social benefits and the higher a person's self-esteem, the more likely one is not to participate in risky behavior [44]. Low self-esteem has been related to dangerous behaviors and outcomes such as depression, drug abuse and suicide [45]. It was also supported by research findings that most studies analyzing the relationship between exercise and self-esteem have said that exercise affected self-esteem [14], but the relationship was not always consistent. Those who participated in the study where the relationship was not verified were mainly female adolescents of a certain age. The researchers said that in order to clarify the relationship between exercise and self-esteem, a heterogeneous sample was needed rather than a single group [10]. For those reasons, this study supported these arguments well.

##### 4.2. Exercise Frequency and Stress

This study found a negative causal relationship between exercise frequency and stress. In detail, exercise frequency had both direct and indirect effects on reducing stress. This means that regular exercise participation reduced stress. These findings supported other studies that found stress to be an essential factor related to many physical and mental health problems, and 75% to 90% of patients seeing a doctor for the first time were estimated to be experiencing stress-related diseases [18]. Moreover, various stresses were associated with adolescents' quality of life [46]. Stress is known to have a close relationship with exercise [14]. Exercise is an important management strategy for stress. It has been reported to reduce perceived stress. Especially when performed regularly, it is



effective in reducing and controlling stress [31]. In other words, exercise is an important key strategy in controlling stress, although there are many theories (the destruction hypothesis, the mastery hypothesis, the self-expansion theory and the social interaction hypothesis) on how exercise affects stress and the exact mechanism behind this relationship to date has not been agreed on [32]. In addition, this study found that the relationship between these two was confirmed to be partially mediated by self-esteem. These results supported the mastery hypothesis and Bandura's theory of self-efficacy as evidence that self-esteem mediated exercise and stress [47]. This was because the mastery hypothesis explains that when an effort such as exercise is completed, it leads to a sense of mastery or a sense of achievement, which improves mood and reduces stress. As the frequency of exercise increases, the student will feel a sense of mastery.

#### 4.3. Exercise Frequency and Depression

Social stress in adolescence is considered a risk factor that could cause youth depression [44]. Depression has been known to be a factor that can increase the level of risk in morbidity and suicide. Depression in adolescence is caused by irritability, mood and fluctuating symptoms [48]. Depression ultimately has a negative impact on youth life satisfaction [34]. Severe stress in childhood increases the likelihood of developing depression or anxiety disorders [4]. Exercise is effective in reducing this negative impact and has been used as a treatment for depression [35]. Cardio exercise, in particular, is effective in reducing depression [17].

In this study, the direct effect of exercise frequency on depression was not confirmed. However, exercise frequency had a negative indirect effect on depression through stress. The results of this study showed that the reduction of stress through exercise participation may be one of the ways to free students from depression.

Moreover, it has been reported that high self-esteem reduced depression [21]. This study also confirmed that self-esteem had an indirect effect on depression. The results of this study indicated that self-esteem might reduce depression by reducing stress.

#### 4.4. Exercise Frequency and School Satisfaction

In this study, exercise was found to improve school satisfaction. It was found to have a direct positive effect on school satisfaction and an indirect positive effect through the pathways of improving self-esteem or reducing stress.

It has been reported that there is a positive relationship between exercise and life satisfaction [46]. Most Korean students experience significant control of their lives by their school schedule due to the societal importance of their final university entrance exam. Because of these circumstances in Korea, students' exercise routines and habits could affect their school satisfaction [49]. Additionally, students' sports club activities affected students' school satisfaction in Korea, China and Japan [15]. The results of this study supported previous studies claiming that exercise affected a student's life satisfaction [46].

In the present study, exercise frequency, self-esteem and stress, but not depression, were found to affect school satisfaction. Self-esteem and school satisfaction were closely linked. Self-esteem was reported to be the most important factor in improving individuals' life satisfaction [45]. In fact, self-esteem was found to be the most important factor in school satisfaction [22] and was an indicator of happiness [20]. The results of this study also showed that self-esteem had direct and indirect positive effects on school satisfaction. The increased frequency of exercise programs should also be mandatory in schools as an official program because self-esteem was an important variable of school satisfaction [22].

In this study, stress had a negative direct effect on school satisfaction. The results of this study indicated that schools may improve students' self-esteem and therefore study performance, by providing regular exercise programs.

In the relationship between depression and school satisfaction, the results of this study were only partially consistent with the results of previous studies. In this study, negative correlations were found

between depression and school satisfaction. However, the causal relationship was not verified. In a previous study, depression was strongly correlated with life satisfaction, which was confirmed in studies of children and adolescents [46].

#### 4.5. The Causal Relationship between Variables

Happiness was defined as the subjective appreciation of one's life as a whole [24], or a mental or emotional state characterized by positive or pleasant emotions [50]. As a topic, happiness has been garnering much attention from researchers recently [40]. There are many factors that affect happiness. Proctor, Linley and Maltby reviewed 14 categories of adolescent happiness. According to their report, almost everything in youth is related to their happiness. Variables in this study were also included in their reviews [46].

Many researchers have suggested various ways to enhance happiness, and exercise is a factor able to increase happiness [40]. Participation in sports brings happiness to both men and women. In particular, men gain greater happiness than women [39]. This study also showed that exercise affected a student's degree of happiness. However, the direct effect showed negative values and the indirect effects were positive. The total effect was calculated as a positive value because the indirect effect with a positive value was higher than the direct effect with a negative value. Therefore, the exercise frequency could be understood as having a positive result through other connections, such as improving self-esteem and school satisfaction or reducing stress and depression rather than directly affecting a student's happiness.

Self-esteem is an important factor affecting happiness. People with high self-esteem promote psychological health because they value their existence. They are more likely to experience a happy state of mind [21]. The results of this study also showed that self-esteem had direct and indirect positive effects on happiness.

Depression was reported as a predictor of happiness [20]. However, in some studies, the relationship did not appear. In previous studies that also analyzed structural relationships, depression was correlated with happiness but did not show any causal relationship [21]. The researchers predicted that this inconsistent discrepancy was due to the number of study participants. However, this study analyzed 11,132 samples and no causal relationship between depression and happiness was verified, even though there was a correlation between depression and happiness. The research in this study is in need of further investigation to see whether this is a phenomenon unique to South Korea. This is because the previous study was also conducted on college students in South Korea [21].

Positive experiences in school affect students' well-being, which in turn leads to positive experiences of students' school life [23]. In this study, it was also verified that school satisfaction affected the degree of happiness. The researcher of this study thinks it is because school is the most important part of life for students. In this study, the researchers identified that the effect of exercise on happiness was mediated by mental health factors. The results of this study let us know that exercise brought happiness by keeping the mind healthy, apart from being physically healthy.

#### 4.6. Conclusions

The results of this study suggested that Korean schools should implement more exercise programs to increase student happiness. To promote a happier life in its citizens, the government should invest more in mental health care [51]. The research results of the present study emphasized that Korean students' frequency of exercise is a meaningful factor in order to improve their level of happiness. Thus, it was proven that mental health management was possible through exercise participation. In order to increase awareness of the benefits of physical activities among Korean students who are not aware of the importance of exercise, this study confirmed the relationship between the frequency of Korean students'—elementary, junior high, and high school—exercise participation and other various psychological factors, such as self-esteem, stress, depression, school satisfaction and happiness, as well as discussed research results and compared with other studies' results.

The ultimate goal of Korean education is to help students believe in themselves and provide them with the ability to lead happy and independent lives. Therefore, efforts towards increasing the frequency of students' participation in exercise can be seen as a way to prove that the Korean school education system is pursuing a holistic and effective education program, which supports not only academic achievement but also lifelong wellbeing.

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