

Article

The Structural Relationship between Exercise Frequency, Social Health, and Happiness in Adolescents

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Abstract: The aim of this study was to verify the relations between exercise frequency, social relationships, sense of community, and subjective happiness among adolescents. The data analysed in the study were from the 11th Korean Child–Adolescent Happiness Index conducted by the Korean Bang Jeong Hwan Foundation in 2019. The data consisted of questionnaire responses from 5094 middle-school and high-school students. Data were analysed using descriptive statistics, exploratory factor analysis, reliability analysis, confirmatory factor analysis, model validity and fit analysis, path analysis, and effects analysis. The results showed that exercise frequency was associated with social relationships, sense of community, and subjective happiness in adolescents, and a comprehensive examination of relations between exercise frequency, a part of social relationships, sense of community, and subjective happiness was confirmed. It can be concluded that adolescents who participate in frequent exercise become more socially adept, which could in turn make them happier. Policymakers and stakeholders, including educational institutions and parents, should therefore promote adolescent participation in exercise and sports.

Keywords: exercise; social health; social relationships; sense of community; happiness



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1. Introduction

Exercise and health are two important factors of happiness in humans [1–3]. This idea suggests that happiness can be induced in individuals by promoting health through exercise [4]. The World Health Organization (WHO) classified health into three aspects: physical, mental, and social [5]. Exercise has been reported to promote all three aspects of health [4,6,7]. An overwhelming body of evidence supports the relationship between exercise and physical health [7], and the relationship between exercise and mental and social health has also been extensively documented [8,9]. In recent years, there have been attempts to shed light on the comprehensive relations among various factors (exercise frequency, self-esteem, stress, depression, school satisfaction, degree of happiness) [4,10].

Exercising throughout one's life is undoubtedly significant in sustaining and improving health. Furthermore, exercise in adolescence is especially significant, as it is closely linked to exercise in adulthood [6,11,12]. While its influence on health management in adulthood draws significant attention to exercise in adolescence, the most important aspect remains how exercise in adolescence directly impacts adolescent health. Despite the significance of exercise in adolescence, the level of physical activity among adolescents continues to decrease worldwide, thus raising concerns [13]. Howie et al. [14] mentioned the “contribution of sports to adolescents' physical, mental and social health” as one of the most prioritised sports-related research topics. The importance of exercise and sports involvement for health management in adolescents in modern society cannot be overemphasised. In terms of research on the health-promoting effects of exercise, studies on the social effects of exercise are lacking compared to those on the physical and mental effects [15].

Studies on the social health effects of adolescents' exercise and sports involvement have shown positive effects [16], including reduced school dropout, detention, crime rate,

and aggression [17,18]; development of social capital and social skills [14,19]; improved relationships with parents, friends, teachers, and coaches [18,20–25]; formation of social identity, integration, adjustment, and a sense of community [26–29]; and promotion of life satisfaction and happiness [1,4,30,31]. These study topics can be classified into changes in personality, cultivation of interpersonal skills, building interpersonal relationships, formation of a sense of community, and life satisfaction. In general, past studies have reported that exercise and sports participation have positive social effects.

However, past studies have simply investigated relations, with exercise and sports participation as the independent variable and one or two factors chosen by the researcher based on their own interest as the dependent variable(s). In other words, research has yet to explore the relationships among the various dependent variables that can be considered the social effects of exercise. Recently, some studies have attempted to comprehensively examine the relations between sports involvement, mental health, and happiness in adolescents, and have broadened our understanding of the relationships between exercise participation, mental health promotion, and happiness [10]. Moreover, some studies have gone beyond examining the relationship of the various factors with exercise participation or non-participation, and are instead examining the association of exercise frequency with mental health and happiness [4,30].

Thus, this study focused on verifying the comprehensive relationships between exercise frequency, social relationships, sense of community, and happiness. The intent was to empirically verify the effect of exercise on social health. It is urgent to elucidate the mechanisms by which exercise affects adolescents' social health, particularly in Korean adolescents, because the problem of deficiency in adolescent physical activity has become a matter of serious concern. This analysis will help generate knowledge about the mechanism that contributes to improving health in relation to exercise frequency, thereby presenting a more persuasive explanation of the need for exercise and sports participation among adolescents.

Study Hypotheses and Model

This study tested the following research hypotheses:

Hypothesis 1. *Exercise frequency would be positively related to social relationships.*

Hypothesis 2. *Exercise frequency would be positively related to a sense of community.*

Hypothesis 3. *Exercise frequency would be positively related to subjective happiness.*

Hypothesis 4. *Social relationships would be positively related to a sense of community.*

Hypothesis 5. *Social relationships would be positively related to subjective happiness.*

Hypothesis 6. *A sense of community would be positively related to subjective happiness.*

The rationale for the research model and hypotheses were based on the following prior research. Exercise and sports foster an environment that promotes interactions with team members and family, and in such an environment, adolescents learn about teamwork and undergo social training [14,32,33]. Through this experience, adolescents acquire social capital and social skills [19,34], which facilitate their social relationships [18,20–25]. Further, changes in one's social network is associated with certain psychological changes [35]; and most typically, adolescents build an identity as a member of a community [29,36,37]. Finally, an identity as a member of a community leads adolescents to feel satisfied with their lives and achieve a sense of happiness [3,6,38–41]. Consequently, a structural model for exercise participation, social relationships (parents, friends, teachers), sense of community, and subjective happiness was created (Figure 1).

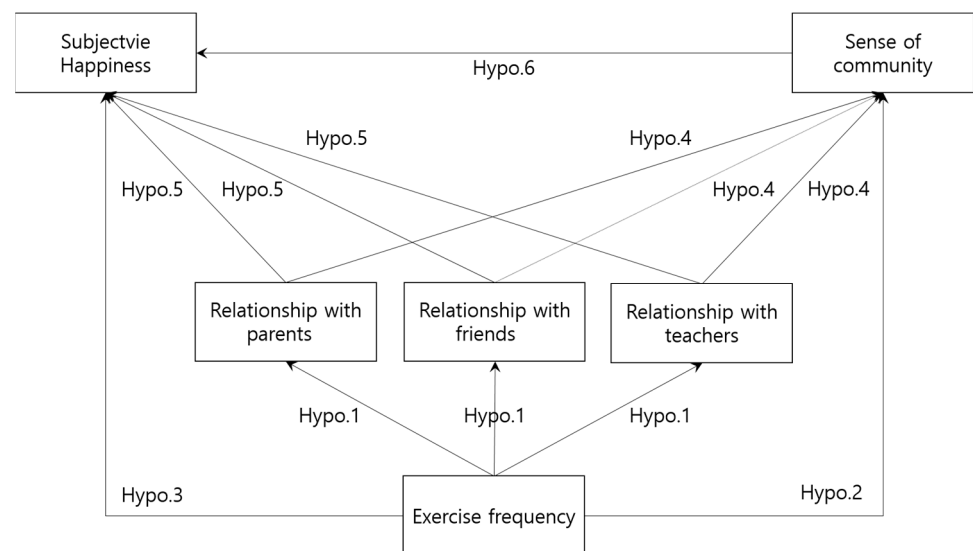


Figure 1. Study model.

2. Materials and Methods

2.1. Data Collection

This study used data from the Korean Child–Adolescent Happiness Index, 2019: Middle School and High School Students, which was collected by Yonsei University and the Korea Bang Jeong Hwan Foundation for the 2019 Korean Child–Adolescent Happiness Index: An International Comparison. The dataset was acquired from the Korea Social Science Data Archive (kossda.snu.ac.kr) following the necessary procedure. From the acquired dataset, data on the number of days per week with an exercise duration of 60 min or more, and relationships with parents, relationships with friends, relationships with teachers, sense of community, and subjective happiness were used for this study.

2.2. Participants

The participants of this study were 5094 adolescents recruited from schools all over Korea, comprising 2296 middle school students (age = 13–15 years; boys = 1138, girls = 1158) and 2798 high school students (age = 16–19 years; boys = 1413, girls = 1385). By size of region, 2228 were from large cities, 2294 from small to medium-sized cities, and 572 from rural areas and eup/myeon regions (an eup/myeon is one of the administrative units of Korea, with a population of around 20,000 and 2000, respectively; generally, it means a small city). The study was approved by the Public Institutional Bioethics Committee of the Ministry of Health and Welfare, Korea (p01-202012-22-002). Participants were fully informed of the study, understood the purpose of the study, and only those who voluntarily agreed to participate in the study responded to the survey.

2.3. Questionnaire

The questions used in this study were excerpts from the “2019 Korean Child and Adolescent Happiness Index Survey”. Exercise frequency was to be entered directly from day 0 to day 7, and the rest of the questions were measured on a 5-point Likert scale. A self-constructed questionnaire was used for this study. The questionnaire comprised one item for exercise frequency (number of days per week with ≥ 60 min of exercise, EF), eight items for relationship with parents (RP), eight items for relationship with friends (RF), two items for relationship with teachers (RT), four items for sense of community (SC), and five items for subjective happiness (SH) (Appendix A).

2.4. Data Analysis

The data were analysed using descriptive statistics, exploratory factor analysis (EFA), reliability testing, and validity testing using IBM SPSS Statistics 23.0 software. EFA was performed by the principal component analysis method. Factors were extracted when the eigenvalue was greater than 1. For factor rotation, orthogonal rotation was performed by selecting varimax. The factors were then classified using the rotated component matrix table. The reliability analysis was confirmed by obtaining the Cronbach's alpha coefficient for each factor.

In addition, confirmatory factor analysis (CFA), correlation analysis, model validity, model fit, and effect analyses were performed using IBM SPSS AMOS 23.0 software. CFA was performed with maximum likelihood. The concentration validity of the model was verified with average variance extraction (AVE) and composite reliability (CR). Model fit was validated with the comparative fit index (CFI), normed fit index (NFI), root mean square error of approximation (RMSEA), and standardized root mean residual (SRMR). For each test, the significance was confirmed by performing bootstrap with maximum likelihood. The confidence interval for all analyses was 95%.

3. Results

3.1. Descriptive Statistics

The item mean and standard deviation of each scale are provided in Table 1. For each scale, the absolute value of skewness was 3 or less, and the absolute value of kurtosis was 10 or less, so the normality was examined [42].

Table 1. Descriptive Statistics.

Scale	M	SD	Range	Skewness	Kurtosis
Exercise Frequency	2.73	2.19	0–7	−1.50	2.48
Relationship with Parents	4.14	1.24	1–5	1.89	6.44
Relationship with Friends	4.17	1.22	1–5	2.71	8.70
Relationship with Teachers	3.78	1.01	1–5	−0.37	−0.09
Sense of Community	3.60	0.88	1–5	0.17	2.23
Subjective Happiness	3.90	0.89	1–5	−0.58	1.71

Note. M = mean; SD = standard deviation.

3.2. Exploratory Factor Analysis

Social relationships (parents, eight items; friends, eight items; teachers, two items), sense of community (four items), and subjective happiness (six items) were analysed using EFA. All measures were analysed as one factor. However, item seven for relationship with parents and item six for subjective happiness were excluded from the analysis because they scored less than 0.40 in communality [43]. Table 2 provides the EFA results.

Table 2. Item factor loadings of the scales.

Factor	Item	Factor Loadings	Communality	Eigenvalue	CFV
Exercise Frequency	Item 1	-	-	-	-
	Item 3	0.899	0.802	5.152	64.396
Relationship with Parents	Item 2	0.877	0.763		
	Item 1	0.866	0.745		
	Item 4	0.862	0.740		
	Item 5	0.847	0.715		
	Item 6	0.820	0.679		
	Item 8	0.784	0.614		
	Item 7	0.308	0.095		

Table 2. Cont.

Factor	Item	Factor Loadings	Communality	Eigenvalue	CFV
Relationship with Friends	Item 3	0.874	0.765	5.381	67.264
	Item 5	0.865	0.749		
	Item 2	0.858	0.736		
	Item 4	0.836	0.699		
	Item 1	0.829	0.688		
	Item 6	0.813	0.661		
	Item 8	0.751	0.564		
	Item 7	0.721	0.520		
Relationship with Teachers	Item 1	0.902	0.814	1.628	81.379
	Item 2	0.902	0.814		
Sense of Community	Item 2	0.817	0.667	2.496	62.401
	Item 3	0.812	0.659		
	Item 4	0.777	0.604		
	Item 1	0.753	0.567		
Subjective Happiness	Item 2	0.841	0.707	3.166	52.771
	Item 3	0.835	0.697		
	Item 5	0.789	0.622		
	Item 1	0.730	0.532		
	Item 4	0.685	0.469		
	Item 6	0.373	0.139		

Note. CFV = common factor variance.

3.3. Confirmatory Factor Analysis

In the model of this study, the critical ratio of each variable was over 1.96 ($p < 0.05$). Composite reliability (CR) ranged from 0.772 to 0.927, and AVE from 0.501 to 0.642, confirming convergent validity and the requirements for structural equation modelling. The requirements for both are a CR of at least 0.7 and AVE of at least 0.05 [44]. The internal consistency reliability ranged from 0.757 to 0.930.

Model fit was tested using CFA. The results indicated a good fit: CFI = 0.958, NFI = 0.954, RMSEA = 0.048, SRMR = 0.0334. In the verification of model fit, if the incremental fit was greater than CFI and NFI 0.90, the absolute fit was considered to be suitable when RMSEA and SRMR were less than 0.05 [45]. Table 3 provides the CFA, AVE, and CR results.

Table 3. Confirmatory factor analysis.

Factor	Indicator	Estimate	SMC	Cronbach's α	AVE	CR
Relationship with Parents	Parents 1	0.859	0.006	0.930	0.642	0.925
	Parents 2	0.873				
	Parents 3	0.948				
	Parents 4	0.870				
	Parents 5	0.704				
	Parents 6	0.677				
	Parents 8	0.623				
	Relationship with Friends	Friend 1				
Friend 2		0.851				
Friend 3		0.884				
Friend 4		0.811				
Friend 5		0.844				
Friend 6		0.746				
Friend 7		0.625				
Friend 8		0.671				

Table 3. Cont.

Factor	Indicator	Estimate	SMC	Cronbach's α	AVE	CR
Relationship with Teachers	Teacher 1	0.774	0.011	0.757	0.628	0.772
	Teacher 2	0.810				
Sense of Community	Item 1	0.670	0.069	0.796	0.501	0.800
	Item 2	0.747				
	Item 3	0.737				
	Item 4	0.674				
Subjective Happiness	Item 1	0.650	0.331	0.838	0.514	0.840
	Item 2	0.803				
	Item 3	0.759				
	Item 4	0.609				
	Item 5	0.747				

Note. AVE = average variance extracted; CR = composite reliability; SMC = squared multiple correlation.

3.4. Correlation Analysis

Exercise frequency was significantly correlated with relationship with parents, teachers, sense of community, and subjective happiness, but the degree of correlation was weak. Relationship with parents was significantly correlated with sense of community and subjective happiness, but the degree of correlation was weak. Relationship with friends was significantly correlated with sense of community, and subjective happiness, again displaying a weak degree of correlation. Relationship with teachers was significantly correlated with sense of community and subjective happiness, and the degree of correlation was moderate. Sense of community was significantly correlated with subjective happiness, and the degree of correlation was moderate. In addition, discriminant validity was verified because the square root of AVE was larger than the correlation coefficient. Table 4 provides the correlation analysis results.

Table 4. Correlation analysis.

Variable	1	2	3	4	5	6
1. EF	-					
2. RP	0.080 *	0.801				
95% CI	[0.052, 0.101]					
3. RF	0.029 *	0.076 *	0.785			
95% CI	[0.006, 0.056]	[0.043, 0.109]				
4. RT	0.107 *	0.225 *	0.089 *	0.793		
95% CI	[0.082, 0.136]	[0.193, 0.256]	[0.057, 0.121]			
5. SC	0.108 *	0.202 *	0.012	0.405 *	0.708	
95% CI	[0.076, 0.136]	[0.167, 0.236]	[-0.21, 0.046]	[0.373, 0.433]		
6. SH	0.207 *	0.252 *	0.105 *	0.461 *	0.475 *	0.717
95% CI	[0.178, 0.235]	[0.218, 0.288]	[0.066, 0.142]	[0.434, 0.486]	[0.438, 0.508]	

Note. EF = exercise frequency; RP = relationship with parents; RF = relationship with friends; RT = relationship with teachers; SC = sense of community; SH = subjective happiness; CI = confidence interval; The values in bold were the square roots of AVE. * $p < 0.05$.

3.5. Hypotheses Testing Results

The results of the hypotheses tests are shown in Table 5. In general, exercise frequency was an antecedent variable that increased social relationships, sense of community, and subjective happiness. Hypothesis 1 was supported: exercise frequency was positively related to relationship with parents, friends, and teachers. Hypothesis 2 was supported: exercise frequency was positively related to sense of community. Hypothesis 3 was also supported. Exercise frequency was positively related to subjective happiness. Hypothesis 4 was partially supported. Relationships with parents and teachers were positively related to

sense of community, but relationships with friends was not significantly related to sense of community. Hypothesis 5 was supported: relationships with parents, friends, and teachers were positively related to subjective happiness. Lastly, Hypothesis 6 was supported. Sense of community was positively associated with subjective happiness.

Table 5. Hypothesis testing results.

Hypothesis				Unstandardized Estimate	SE	CR	p-Value
1	EF	→	RP	0.041	0.008	5.517	0.010
		→	RF	0.016	0.008	1.966	0.027
		→	RT	0.038	0.006	6.664	0.010
2		→	SC	0.017	0.004	3.940	0.010
3		→	SH	0.047	0.005	9.635	0.010
4	RP	→	SC	0.073	0.008	8.666	0.010
		→	SC	−0.12	0.008	−1.597	0.190
		→	SC	0.294	0.015	19.337	0.010
5	RF	→	SH	0.084	0.010	8.705	0.010
		→	SH	0.045	0.009	5.208	0.010
		→	SH	0.288	0.018	15.823	0.010
6	SC	→	SH	0.408	0.023	17.558	0.010

Note. SE = standard error; CR = critical ratio; EF = exercise frequency; RP = relationship with parents; RF = relationship with friends; RT = relationship with teachers; SC = sense of community; SH = subjective happiness.

3.6. Effects Analysis

The results of the effects analysis are presented in Table 6. Exercise frequency had a direct effect on relationship with parents, relationship with friends, and relationship with teachers, and direct and indirect effects on sense of community and subjective happiness. Relationship with parents had a direct effect on sense of community and direct and indirect effects on subjective happiness. Relationship with friends did not have any effect on sense of community, but had a direct effect on subjective happiness. Relationship with teachers had a direct effect on sense of community, and direct and indirect effects on subjective happiness. Sense of community had a direct effect on subjective happiness.

Table 6. Effects analysis.

		RP	95% CI	RF	95% CI	RT	95% CI	SC	95% CI	SH	95% CI
EF	te	0.080 *	[0.043, 0.108]	0.029 *	[0.004, 0.06]	0.107 *	[0.072, 0.139]	0.109 *	[0.072, 0.142]	0.210 *	[0.176, 0.246]
	de	0.080 *	[0.043, 0.108]	0.029 *	[0.004, 0.06]	0.107 *	[0.072, 0.139]	0.059 *	[0.024, 0.094]	0.132 *	[0.098, 0.164]
	ie	0.000	-	0.000	-	0.000	-	0.050 *	[0.034, 0.065]	0.078 *	[0.059, 0.096]
RP	te							0.135 *	[0.100, 0.178]	0.168 *	[0.123, 0.210]
	de							0.135 *	[0.100, 0.178]	0.124 *	[0.080, 0.166]
	ie							0.000	-	0.044 *	[0.030, 0.096]
RF	te							−0.024	[−0.060, 0.011]	0.070 *	[0.024, 0.100]
	de							−0.024	[−0.060, 0.011]	0.079 *	[0.032, 0.107]
	ie							0.000	-	−0.008	[−0.019, 0.004]
RT	te							0.374 *	[0.334, 0.413]	0.291 *	[0.371, 0.443]
	de							0.374 *	[0.334, 0.413]	0.291 *	[0.251, 0.337]
	ie							0.000	-	0.121 *	[0.098, 0.142]
SC	te									0.323 *	[0.269, 0.371]
	de									0.323 *	[0.269, 0.371]
	ie									0.000	-

Note. RP = relationship with parents; RF = relationship with friends; CI = confidence interval; RT = relationship with teachers; SC = sense of community; SH = subjective happiness; EF = exercise frequency; te = total effect (the standard regression coefficient); de = direct effect; ie = indirect effect. * $p < 0.05$.

4. Discussion

4.1. Exercise Frequency and Social Relationships

In this study, adolescents' exercise frequency had a positive effect on their relationship with their parents. This is consistent with previous findings that reported adolescents' participation in sports affected the quality of their relationship with their mother [46], and was associated with overall trust in parents [24], communication with parents, and parental attachment [22]. Adolescent athletes, as compared to non-athletes, were found to be more expressive in their relationship with their parents (in terms of trust, communication, and alienation) [47]. One of the reasons that sports participation has been described as a contributing factor of the parent–adolescent relationship is that parents are heavily involved in the decision-making regarding adolescents' participation in sports activities [48,49]. As adolescents' participation in sports activities increases, contact with parents and permission from parents for related decision-making increase at the same time, such that there is the potential for a positive relationship between adolescents' participation in sports activities and their parents. In particular, parents' permission to participate in sports can be very relevant for Korean youth, whose lives are highly affected by college entrance exams. Previous studies demonstrating that parents played a pivotal role in adolescents' sports participation [47] and that parental support for sports was associated with adolescents' happiness [50] support the present finding.

In this study, exercise frequency had a positive effect on relationship with friends. Previous results on the relation between exercise participation and relationship with peers have not been consistent across studies [30]. Some studies have reported that physical activity and friendship networks are mutually dependent [51] and that physical activity and physical education are associated with adolescents' perceived peer acceptance [52,53], and adolescent's participation in sports clubs makes them more supportive of their friends [35]. However, other studies have showed that adolescents' participation in competitive sports did not affect their peer attachment [24] and that adolescents' physical activity was not associated with peer trust, peer communication, and peer alienation [22]. These differences in results may arise from differences in how adolescents who participate in physical activity, exercise, sports, and physical education understand the situational context [51,54,55]. In other words, the relationship is likely to be influenced by the type of purpose, friends, and physical activities (exercise, sports) involved. Studies that found friends' support and positive relationships with peers were associated with adolescents' physical activity involvement [20,23] support this notion.

The results of this study indicate that adolescents perceive their friend relationships as a different kind of social relationship than their relationships with parents and teachers. Parents and teachers are a relationship that adolescents cannot choose, whereas friends are a relationship that adolescents can choose for themselves. Keegan et al. [56] argued that parents and coaches differ qualitatively from peers in their influence on students' motivation to participate in sports. They suggested that parents and coaches are key, authoritative decision-makers with similar roles in leadership and responsibility. Therefore, it can be understood that the difference between parents, teachers, and peers means differences in the adolescents' involvement in decision-making. For adolescents, they may feel that they have no choice but to submit to the authority of parents and teachers regarding their opinions, whereas they would not feel they have to do so with their peers.

The results showed that adolescents' exercise frequency had a positive effect on their relationship with teachers. This is consistent with previous findings. Adolescents' participation in exercise during physical education and relationship with teachers has been extensively studied. Parents of adolescents involved in sports mentioned that sports participation contributed to the adolescent's social development, such as building a positive relationship with the coach [57]. Moreover, research showing that teachers influenced students' exercise participation [58] and that a positive relationship with teachers was associated with an optimal physical education experience [20] suggests that exercise participation and relationships with teachers are closely linked, and that they should be

understood as a mutually complementary, cyclical relationship as opposed to a causal relationship. In other words, exercise participation promotes relationships with teachers, and improved relationships with teachers in turn facilitates exercise participation in a cyclical relationship.

In this study, “teacher” conveys a much broader concept than simply a teacher of physical education. Teacher here refers to the faculty member whom an adolescent encounters at school; it does not specifically refer to a teacher of a specific subject. In other words, relationships with teachers are the typical example of formal relationships among one’s interpersonal relationships after excluding family relationships. According to our results, the correlation between exercise frequency and relationship with teachers was stronger than the correlations for relationships with friends and parents, although the correlations were weak. This could be owing to the fact that Korean adolescents participate in exercise primarily in school; therefore, a higher exercise frequency means more frequent contact with teachers.

Therefore, it can be said that a positive relation is shared between the frequency of the adolescent’s exercise and its relationship with social capital.

4.2. Exercise Frequency and Sense of Community

In this study, adolescents’ exercise frequency affected their sense of community. This result is in line with previous studies, which have consistently reported that sports participation played a role in building a sense of community among participants. Past studies have found that adolescents’ sports participation was associated with a sense of community [29], and that participation in school sports in college was closely associated with a sense of community [59]. Further, athletes demonstrated a higher sense of community compared to the members of social organisations [37]. Additionally, hands-on activities, including physical activities, increased interaction with others and helped promote social cooperation and awareness of public interest, thereby cultivating a sense of community in Korean middle-school students [55]. This body of evidence shows that involvement in sports or physical activities with others is a useful way to foster a sense of community in adolescents.

Furthermore, exercise frequency had significant direct and indirect effects on sense of community. The results of this study showed that exercise frequency had greater indirect effects by building social relations than direct effects on the sense of community. The results of the path analysis indicate that exercise frequency promoted relationships with teachers and parents, which in turn contributed to fostering a sense of community. When youth athletic programs are more appropriately managed and designed, more satisfactory socialization and community development can be brought about [37]. Proper design and management of sports programs should consider competition, differences, equity in administrative decisions, social space, common interest, and voluntary activity [60]. Moreover, the results of this study suggest that additional consideration of social relations during exercise can more effectively form a sense of community in adolescents.

4.3. Exercise Frequency and Subjective Happiness

Exercise and sports have been a topic of sustained interest in terms of adolescents’ happiness [3,41,61–63]. Exercise frequency has also been identified as a predictor of adolescents’ happiness [4,30]. Particularly, the results of this study showed that exercise frequency had a greater direct effect on perceived happiness than indirect effects (social relationship, sense of community). The finding that adolescents’ exercise frequency influenced happiness is consistent with previous research. Past studies have reported that sports that involve more social interaction led to greater wellbeing [31,34] and that social abilities cultivated by sports participation predicted increased hope [35]. Further, studies have reported that life satisfaction increased with increasing physical activity involvement in adolescents [30]. The present study took a step further and examined the relationship structure in which exercise frequency affects relationships with parents and relationships with teachers, as well as

happiness through a sense of community. The indirect effect was smaller than the direct effect in the relationship between exercise frequency and happiness. This suggests that the physical and mental effects of exercise frequency are greater than its social effects. Thus, if the purpose of participating in exercise is to achieve social health, exercise programs should be designed more appropriately for that purpose.

4.4. Social Relationships, Sense of Community, and Happiness

This study confirmed that social relationships, in particular with parents and teachers, influenced adolescents' sense of community. In previous studies, the relationship with neighbours was the most important variable predicting a sense of community; it was suggested that this relationship promotes social interaction and thus develops a sense of community [64,65]. However, contrary to what was expected, relationship with friends was not a predictor of a sense of community. This is presumed to be because Korean adolescents perceive parents, teachers, and peers differently. These results point to the need to consider the combination of parents, peer groups, and friendship relationships in order to understand social relationships and motivational links in youth sports [25]. The results of this study make it possible to infer Korean youths' perceptions about their sense of community. Korean adolescents seemed to perceive the community as authoritative, such as parental and teacher relationships. No association between friend relationships and sense of community supported this assumption.

In addition, adolescents' sense of community predicted subjective happiness. In previous studies, community consciousness was related to subjective wellbeing and life satisfaction [64–67]. Moreover, social wellbeing can be enhanced by allowing adolescents to experience a sense of belonging to a peer group and by providing opportunities to encourage pro-social behaviour in a community context [68]. The perception of social support was found to be a predictor of subjective wellbeing [69]. The results of this study suggest that Korean students recognize that they are receiving positive support from parents, friends, and teachers.

5. Limitations

This study is significant because it demonstrated the relations between happiness, social health (social relationship, sense of community), and exercise in a large sample of Korean adolescents. However, this study was only confirmed by applying the collected data to a theoretical research model. As a result of this study, there was a limitation in that the causal relationship of actual phenomena could not be verified [70]. It could not be excluded that the inverse causal relationship between the variables might be established. In addition, it is limited in terms of generalizing the results to adolescents in other countries and from other cultures, because the special situation faced by Korean adolescents is different from that of other cultures (e.g., the enormous pressure associated with the college entrance exam).

6. Conclusions and Suggestions

This study verified the structure of the relations between adolescents' exercise frequency, social relationships (parents, friends, teachers), sense of community, and happiness. The results showed that exercise frequency had a positive effect on social relationships, sense of community, and happiness. Relationships with parents and teachers had a positive effect on sense of community. Lastly, all three types of social relationships and sense of community had a positive effect on adolescents' happiness. Based on these results, we conclude that adolescents who frequently participate in exercise become more socially adept, which could in turn make them happier.

In this study, exercise was not classified into different types because the aim was to investigate whether general physical activity affects social health and happiness. Subsequent studies should classify physical activities (e.g., resistance/endurance exercise, specific sports) and examine the effects of each type of physical activity on social health. It also

raises the need for follow-up studies on the different perceptions of community among youths in each country.

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Data Availability Statement: Publicly available datasets were analysed in this study. This data can be found here: [<http://hdl.handle.net/20.500.12236/23562>].

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Appendix A

The questions used in this study were as follows. These questions are some excerpts from what was used to study the 2019 Korean Child and Youth Happiness Index.

Exercise Frequency

How many days have you been physically active for more than an hour over the past week?

_____days

The following questions were provided to be answered with a five-point Likert scale. (R) is a reverse-scored item.

① Strongly Disagree ② Disagree ③ Neutral ④ Agree ⑤ Strongly Agree

Relationship with Parents

1. My parents get along well with me.
2. My parents try to spend a lot of time with me.
3. My parents and I understand each other well.
4. I can talk to my parents about any problem.
5. My parents and my friends know each other well.
6. My parents and my school teacher know each other well.
7. My parents and my private education teacher know each other well.
8. My parents and my friend's parents know each other well.

Relationship with Friends

1. I feel ashamed or foolish when I talk to my friends about my problems. (R)
2. I hope my friends are not current friends but other friends. (R)
3. I feel lonely even when I am with my friends. (R)
4. Sometimes I get angry because of my friends. (R)
5. When I'm upset, my friends tend to take it lightly. (R)
6. My friends understand me.
7. I know my friends and my (last year) school teacher well.
8. My friends and my parents (father or mother) know each other well.

Relationship with Teachers

1. I have a good relationship with my school teacher.
2. I can talk to my school teacher about my problems.

Sense of Community

1. If I have a friend who is in trouble around me, I can actively help him.
2. I can volunteer at a welfare institution even if I can't take a holiday off.
3. I can make a donation to help a country that has more economic difficulties than our country.
4. I can actively participate in material saving, recycling, etc. to protect the Earth.

Subjective Happiness

1. I think I am healthy.
2. I like school very much.
3. I'm satisfied with my life.
4. I feel a sense of belonging to my group.
5. I get along well with people around me.

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