
Exploring Physical Activity and Psychological Stress Changes during the COVID-19 Lockdown Periods for Children

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Abstract

The paper aims to explore at how primary students' physical activity varies during the COVID-19 lockdown times. During lockdown periods, an online survey was performed, and 924 children (432 boys, 492 girls; Mage = 12.00, SD = .73) from cities around the Republic of Korea participated. They responded to Gordin and Sheperd's self-response physical activity questionnaire, which measured the dimensions of physical activity: strenuous activity, moderate activity, and light activity, and responses to psychological stress through an online questionnaire. Participants were asked how often they engaged in vigorous, moderate, and light physical activity for at least 15 minute or more per week during their leisure time. As a result, light exercise, such as walking at a minimal level, resulted in higher physical activity than a moderate and strenuous exercise in all grades. Additionally, there was a significantly positive correlation between the participant's the total amount of physical activity and grade. Children had greater levels of physical activity than high-intensity and medium-intensity exercise, while female students had lower levels of physical activity than male students. The boys were also more physically active than girls. Children responded that they did not experience psychological stress (lonely, anxiety, depression) during the COVID-19 blockade period. On the other hand, during that period, it was found that female students felt loneliness, anxiety, and depression more than male students. The COVID-19 pandemic has put a high level of mental health and physical fatigue on children. It is essential to provide preventive guidance so that children can go back to school and lead their daily lives.

Keywords: COVID-19; physical activity; psychological stress; mental health; children.

1. INTRODUCTION

The rate of infection of the coronavirus (COVID-19), which originated in China, broke an unusual record, and on March 11, 2020, the World Health Organization (WHO) declared the outbreak of COVID-19 a pandemic, the highest alert level of the epidemic. Because of these restrictions, Korean citizens were encouraged to work at home and students to do online classes and physical activities instead of working at sports facilities or outdoors. Therefore, the level of physical activity (PA) may be dramatically affected.

According to the prolonged social and physical distance due to COVID-19, people are afraid of infection and experience anxiety and physical abnormalities as a result of excessive stress. [1]. People's anxiety levels were observed to have more than doubled compared to before COVID-19 [2]. Furthermore, the amount of unpleasant feelings generated by COVID-19 among students is stated to be particularly high, with tightness due to not going out, nonspecific fear about infection, disconnection of relationships owing to social distancing, and lack of communication [3]. This psychological stress phenomenon also appeared in a young person and youth. Due to the prolonged COVID-19, children and adolescents are experiencing depression, anxiety, and fear, and the number of psychological counseling session is growing, which is claimed to have considerable stress and aftereffects from the COVID-19 pandemic [4]. Because of their autonomy and greater need for peer bonds, children and adolescents may be more affected by this stress. Furthermore, because the closure of schools has a significant influence on their academic advance and a healthy mind, experts urged that precautions be taken to preserve adolescents' active lifestyles and psychological health throughout the pandemic [5].

Childhood is a time when motivation for peer relationships is strengthened. The group supplies an important contexts for social and emotional aid and has a important effect on the socialization of diverse

behaviors [6]. However, during social isolation, it is difficult for children to physically interact with their peers. Moreover, during that time, they are more likely to experience emotional and cognitive stress such as adults [7]. Schools are not only spaces for children to learn, but also an opportunity to connect with friends and gain emotional comfort. For this reason, it is believed that school that are not open are believed to have had an acute psychosocial impact on children. Previous studies have shown that children are less physically active when they are not in school (e.g., on weekends or summer vacations), use media screens such as the Internet or cell phones for longer periods of time, and have less healthy eating and unstable sleep patterns [5, 6].

Childhood and adolescence are periods of heightened motivation for colleagues. As mentioned above, the social and emotional aspects of childhood provide a serious context for behavioral development, and these behaviors have a important influence on socialization. However, peer interaction during social and physical isolation is difficult to achieve in the form of the past. According to the literature, social isolation can cause depression, anxiety, or physical symptoms, but it can also cause psychotic seizures and suicidal thoughts. It was said that the proportion of young people was higher. Loneliness and depression have a significant impact on academic achievement and interpersonal relationships. In addition, if you get sick due to excessive media negative information, you can develop a fear of death, anxiety, depression, and stigma in quarantined people. Evidence shows that psychological stress associated with fear, tension, sadness, and nervous during the pandemic was higher in isolated children and adolescents than peers [5-7]. Therefore, it is considered very necessary to research the quality of life related to physical activity and wellness in childhood during this crisis.

When a social crisis occurs, the ripple effect of the socio-economic shock caused by the crisis does not affect the members of society equally. It is difficult for children to independently lead social and economic life, and they are still in the stage of physical, mental, and emotional development. Therefore, they are not only more vulnerable than adults in a social crisis situation but are also more affected by regions, families, environments, social groups, races, and ethnicities. Moreover, the influence of COVID-19 on children during the global pandemic is not limited to the direct impact of viral infection. In the era infectious disease, the physical activity environment inside and outside the school has been limited, and problems with children's physical activity have been raised. To date, only a few studies have been conducted on physical activity, positively healthy mind, and daily habits for children and young people during the this period. Jang (2021) is one of the people who conducted research on youth physical activity and COVID-19 stress during the pandemic [8]. According to the results, among Korean middle and high school students, men showed high levels of COVID-19 stress, loneliness, anxiety, and depression, and showed changes in physical activity level by gender.

Previous studies have suggested that increasing physical exercise and reducing sedentary behavior might help mentally healthy in children [9]. Children's physical activity has a favorable influence on adolescents and adults, and it is suggested as a useful strategy to address psychosocial problems. This reports that physical activity or participation in sports is related to peer acceptance, depression, and aggression in children and adolescents in several empirical studies [6, 10][44]. Furthermore, according to a studies on physical activity in children and young people, physical activity during that period is an essential contributing factor in adulthood [11, 12]. There is extensive evidence that physical activity has a positive effect on both physically and mentally health. For example, periodic physical movements are related to lowering medical health problems such as melancholy, uneasiness, as well as cardiovascular disease. Hence, it will be very meaningful to check how children's physical activity are being carried out in situations where their daily lives are temporarily suspended, and to check the emotional state of children in situation.

Physical activity for children and young people provides positive benefits for health outcomes such as physical, mental, cardiometabolic, bone, cognitive outcomes, mental health, and fat reduction [13]. Furthermore, the World Health Organization (WHO) suggested that children participate in moderate and strenuous aerobic exercise for at least 60 minutes a day, seven days a week. In addition, active intensive aerobic activities should be included at least three times a week, as well as muscle and bone-strengthening activities. Proper physical activity also helps improve participants' mood and prevent and reduce anxiety and depression. Moreover, past research has shown that physical activity generates immediate psychological benefits for mood, anxiety, and stress through physical activity as well as long-term benefits in mental health. Therefore, considering the benefits of physical activity on physical and mental health, it seems very important that people meet global suggestions

for physical activity, although it should be performed at home to maintain the government's social distancing requirements.

Under these circumstances, the pandemic has further heightened their social isolation and separation. In many countries, recreational facilities such as indoor and outdoor sports facilities, gymnasiums, public swimming pools, and playgrounds are all closed to prevent the spread of infection[14]. Online communication for work, leisure, and shopping is now part of everyday life, and students are using the Internet for school daily and social interactions. With the development of the Internet and smartphones, the area of activity for daily life, including body, decreased rapidly and the inactive lifestyle increased rapidly [15]. As such, the pandemic has completely changed the pattern of our daily lives. Many people around the world had to stay at home and self-quarantine for a certain that time. In special circumstances, a general physical activity of elementary school students cannot be determined by various social and environmental influences such as gender, socio-cultural, school, and family [16]. These effect result in multiple risks factors, including children's rights, security, and growth. Social responsibility and solidarity are needed to mitigate these risks. The reason why understanding the extent of their mental and health should be a top priority if action is because social coping and alternatives are needed. However, according to the first case observed in China and the United States [45], it may not be a big problem that the infection directly affects children, but the hospitalization rates of children with symptoms is lower than the middle-aged children. At the same time, children may struggle with psychosocial influences and changes in their normal living environment [17, 18].

In general, male students are more physically active than female students due to physical activity, self-confidence, and self-efficacy. However, it is a special issue to determine the degree of variety in elementary school students during that time. Children who are physically active are essential for the future. It is very important to perform physical activity continuously, and it must be continued for the increase and evolution of young people even during epidemic situation [19, 20].

Moreover, the increase in job instability and income decline due to the prolonged pandemic also seems to have an adverse effect on mental health. The worldwide economy has been stagnant due to the spread of COVID-19 expansion since social and economic activities have been constrained, and many people are enduring income decrease and employment instability [21, 22]. Rapid changes in social interaction patterns during a pandemic can exacerbate emotional distress by creating relationship conflicts. Due to the government's policy to stop the extend of disease between people, as telecommuting and online learning are prolonged for a long time, the burden of housework and care increases, and it is reported that family conflicts are on the rise [23-25]. A Chinese study found that during COVID-19, married people had lower emotional well-being than unmarried people. The government's policy is to avoid the spread between human, but this lead to relational conflicts between them and reduces emotional wellness in the long term [26]. The pandemic has put children and parents throughout the world in different stressful situations, and a lot of prior studies in Korea indicate numerous crises that happened in children's school life, dietary life, and daily life [27]. As schools closed, children missed essential learning and potential growth opportunities, as well as the daily habit and social learning was disconnected. These changes will cause a significant loss of learning, and there is concern that it will bring a potential crisis to children's academic achievement as well as social and emotional learning [28-30].

Although it is not known exactly how closure affects mental and physical health in humans, earlier research has reported findings that it is negatively associated with adults and children [7, 12, 16, 17]. It has been shown that children at home has been shown to negatively affect their wellness because of inexperienced variety in lifestyles, including limited body activities and increased conflicts within the home. As in many countries, Korea has imposed nationwide school closures. However, it is necessary to see how school closures affect children's lives.

Therefore, the aim of this research is to explore the physical activity and psychological stress among elementary school students who are active at home due to online classes during the COVID-19 lockdown period. During that time, Korea, like most other countries, closed not only public institutions including schools but also indoor and outdoor sports facilities, gyms, swimming pools, and playgrounds due to virus infection and spread. In addition, all classes including physical education classes were conducted online instead of in closed schools.

2. METHODS

2.1 Participants

In this study, participants were conducted on elementary school students who were taking classes at home without going to school during the pandemic, and the survey used an online platform. The final analysis included 924 data points (432 males, 492 females), removing individuals who consented to participate in the survey but did not answer insincerely or omitted. Their ages ranged from 11 to 13, with an average age of $12.00 \pm .73$. There were 245 (26.5%) in the fourth grade, 432 (46.8%) in the fifth grade, and 247 (26.7%) in the sixth grade. Prior to conducting the online survey, the researcher acquired the participation of the school, physical education teacher, and homeroom teacher, as well as consulting with parents for guidance. A research participation manual and consent form were prepared for the participants of this study, and the explanation and consent form for the study were sent online. Finally, participants who finally completed their consent to participate were asked to answer to the online questionnaire.

2.2. Measures

Self-Reported Physical Activity It was assessed using Leisure Time Exercise Questionnaire by Godin & Shephard [31]. Since LTEQ was utilized in the study of Godin & Shephard, it has been used variously in studies evaluating the current level of individual motor behavior, and its reliability and validity have been verified through several previous studies [31]. This is a self-assessment of the general PA level reported by the participants themselves. Self-reported data for vigorous activity, moderate activity, and mild activity were collected. A vigorous means "making your heart beat faster and sweat faster". Examples of hearty activities supplied described in the consist of jogging, hockey, football, soccer, squash, cross country, and basketball. Moderate activity are expressed as "makes you sweat a little without getting tired such as baseball, tennis, easy bicycling, volleyball, badminton, and folk dancing." Finally, light activities are explained as "it takes less effort and doesn't sweat involve yoga, archery, bowling, horseshoeing, and snow-mobiling". Indeed, LTEQ is a way to obtain the level of units or calculated the violent, moderate, and light activity categories. The total amount of physical activity was calculated by Godin's score calculation $\{(high\ intensity \times 9) + (medium\ intensity \times 5) + (low\ intensity \times 3)\}$ [32]. The level of physical activity was classified into two groups: vigorous and mild activity levels.

Psychological Stress The questions were prepared through literature research and expert consultations in order to investigate the loneliness, anxiety, and despair that children feel throughout the COVID-19 lockdown time. The final question was chosen after the expert panel reviewed the sentence's intelligibility and clarity. Each item was a single question (e.g., "I think I am a lonely during the COVID-19 lockdown period.", "I think I feel anxious during the COVID-19 lockdown period.", "I think I feel depressed during the COVID-19 lockdown period.", and it is a single item, on a 5-point Likert scale, with responses ranging from 'strongly agree' to 'strongly disagree'. The reliability level of this question was $\alpha = .09$, and the correlation between the average items was $\gamma = .75$.

2.3. Procedures

The data collection of this study was conducted through an online questionnaire considering the situation in which direct investigation was difficult. Before beginning the study, the researcher obtains the cooperation of the school, the physical education teacher, and the homeroom teacher, explains the research purpose, and after consultations regarding parent guidance, agreement, and the online survey, an official letter with the online survey URL and QR code attached is sent to the consented school. The survey period was conducted from September 1 to 30, 2021, and was conducted for participants who wished to respond to the survey. As a criterion for participating in this study, students must be between the ages of 11 and 13 in elementary school, and also must be in a school where online classes are conducted at home to voluntarily participate in the study. In addition, the parents of the students who participated in the study had to sign an informed consent form. The survey was conducted on students who met the above-mentioned conditions and wanted to voluntarily participate in this study. Participants who do not intend to participate in the research can withdraw at any time, and research ethics are secured by guaranteeing confidentiality along with a prior

explanation that the responses will not be used for anything other than academic purposes.

2.4. Data analysis

All data collected in this research were analyzed using the SPSS 20.0 program. Based on the study hypothesis, frequency analysis, descriptive statistics, reliability analysis, and cross-tab analysis were performed to find out the degree of physical activity and psychological stress of children. To verify the significance of each difference, a χ^2 test was performed. All statistical significance levels were set to less than $p < .05$.

3. RESULTS

Table 1 shows the general properties of the participants. The data from a total of 924 (432 boys, 492 girls) participants were used in the analysis and ages were between 11-13 years ($M = 12.00$, $SD = .73$). The grade distribution consisted of 245 (26.5%) Grade 4s, 432 (46.8%) Grade 5s, 247 (26.7%) Grade 6s.

Table 1. Subject characteristics

| | Fourth Grade | Fifth Grade | Sixth Grade | Total |
|--------|--------------|-------------|-------------|-------|
| Gender | | | | |
| male | 109 | 200 | 123 | 432 |
| female | 136 | 232 | 124 | 492 |
| Total | 245 | 432 | 247 | 924 |

Godin and Shephard developed a simple quantitative self-report measure of physical activity questionnaire. This reported the number of times an average of 15 minutes or more per week spent on activities categorized as light (3 x light), moderate (5 x moderate), and vigorous (9 x strenuous). The child's physical activity self-report showed in Table 2. The data shows a difference in levels of physical activity at the light, moderate, and strenuous levels in scores from grade. Participants reported that the average weekly physical activity level was very low, particularly for intense physical activity (10.8 for strenuous, 15.4 for moderate, 30.8 for light activity in fourth grade, 11.9 for strenuous, 16.9 for moderate, 33.6 for light activity in fifth grade, 11.8 for strenuous, 17.7 for moderate, 33.4 for light physical activity in sixth grade). The total amount of physical activity consisted of 56.7 for fourth grade, 62.4 for fifth grade, and 63.0 for sixth grade.

Table 2. Physical activity self-reports in children by grade

| | Fourth Grade | Fifth Grade | Sixth Grade |
|-----------|--------------|-------------|-------------|
| Strenuous | 10.8 | 11.9 | 11.8 |
| Moderate | 15.4 | 16.9 | 17.7 |
| light | 30.8 | 33.6 | 33.4 |
| METs | 56.7 | 62.4 | 63.0 |

Table 3 shows the results of simple quantitative physical activity self-reports by gender. This result is the amount of physical activity of participants who do not go to school due to COVID-19 and take classes at home and do daily activities. The participants' strenuous exercise was 11.76 for boys and 11.31 for girls, 18.51 for boys and 15.17 for girls for moderate exercise, 35.83 for boys, and 30.18 for girls for light exercise. Also, the total amount of physical activity was 66.10 for males and 56.67 for females. Overall, it was found that male students had more physical activity than female students, and light exercise was higher than strenuous and moderate exercise.

Table 3. Physical activity self-reports in children by gender

| | male | female |
|-----------|-------|--------|
| Strenuous | 11.76 | 11.31 |
| Moderate | 18.51 | 15.17 |
| light | 35.83 | 30.18 |
| METs | 66.10 | 56.67 |

Table 4 presents the results of cross-analysis to find out children's psychological stress of children during the COVID-19 closure period by gender. Specifically, looking at the psychological stress and gender response ratio, overall, children did not feel lonely, anxious, or depressed during the COVID-19 lockdown period. Among them, girls (15.3%) responded that they felt loneliness, anxiety, and depression more than boys (9.2%). On the other hand, female students had a lower negative response rate than male students. As a result of analyzing psychological stress during that time by gender through the χ^2 test, female students had higher psychological stress than male students in all items, and it showed a statistically significant difference ($p < .001$).

Table 4. The psychological stress of children by gender

| Items | Gender | % (n) | | | | | | $\chi^2(df)$ |
|------------|--------|----------|------------|------------|------------|------------|-----------|------------------|
| | | 1 | 2 | 3 | 4 | 5 | Total | |
| Lonely | male | 2.3 (10) | 6.9 (30) | 24.3 (105) | 29.2 (126) | 37.3 (161) | 100 (432) | 20.121*** (4) |
| | female | 4.5 (22) | 10.8 (53) | 28.9 (142) | 30.9 (152) | 25 (123) | 100 (492) | |
| | Total | 3.5 (32) | 9 (83) | 26.7 (247) | 30.1 (278) | 30.7 (284) | 100 (924) | |
| Anxiety | male | 3.9 (17) | 12.7 (55) | 30.8 (133) | 25.5 (110) | 27.1 (117) | 100 (432) | 19.754*** (4) |
| | female | 7.7 (38) | 19.7 (97) | 29.5 (145) | 24.4 (120) | 18.7 (92) | 100 (492) | |
| | Total | 6 (55) | 16.5 (152) | 30.1 (278) | 24.9 (230) | 22.6 (209) | 100 (924) | |
| depression | male | 2.3 (10) | 4.2 (18) | 18.3 (79) | 28 (121) | 47.2 (204) | 100 (432) | 34.676*** (4) |
| | female | 4.3 (21) | 9.3 (46) | 20.9 (103) | 35.6 (175) | 29.9 (147) | 100 (492) | |
| | Total | 3.4 (31) | 6.9 (64) | 19.7 (182) | 32 (296) | 38 (351) | 100 (924) | |

4. DISCUSSION

Previous studies discussed reduced degree of physical activity and psychological instability of adolescents and the elderly during the pandemic. However, it means that childhood school life and mutual exchange with their peers in the process of development are important factors that has a positive influence on various social, bodily, academic, and emotional adaptations. Therefore, it can be said that it is meaningful to understand the social, physical, and psychological relationships of children who are socially and physically isolated during the COVID-19 lockdown period. In particular, children can be dangerous for their wellness and physical because they are far from the school environment in a pandemic situation.

In this regard, the study were conducted to find out the degree of PA by using self-report questionnaires in which children do not go to school and participate in online classes at home during the shutdown period.

As a result of self-reporting how often the participants exercised during their leisure time for more than 15 minutes during the week, physical activities such as light exercise such as walking at a minimum level in all grades were performed. The total physical activity index was higher for children in the higher grades, but it can be seen that the low-intensity physical activity was higher than high-intensity physical activity. However, this does not mean that the high-intensity physical activity index of the lower grades is high. These results have a wide negative effect on the academic development, mind health, and physical health of children who are socially and physically isolated due to the pandemic situation, and interventions in support children's emotional and physical development are required. Several previous studies also suggested that active lifestyle habits and the psychological health of children and adolescents should be protected during the pandemic period. In particular, it was suggested that the child's physical activity experience is necessary to establish an active lifestyle in adulthood, and clear recommendations are needed for this [11, 12, 18, 19]. Childhood is the time when you experience various changes and development processes, including physical, psychological, and social maturity, and is the time when physical activity is most needed [17, 18]. Participation in sports during this period motivates peer relationships and facilitates communication with various social activities, which has a positive influence on social, bodily, psychological, and academic work. Additionally, it is said that it provides a positive effect on psychological health due to a decrease in negative psychological factors through physical activity [6, 17, 33]. This study reinforces the results found in a recent study that the children population in all types of physical activity had lower PA levels during the COVID-19 lockdown. Importantly, the study showed that isolation of just a few weeks can have a significant effect on reduced physical activity.

Participants had more variable exercise such as walking than medium-intensity exercises such as fast heart beating or fast walking. In the present study, a correlation was analyzed to show the correlation between the grade and METs. According to the results, it was confirmed that grade had a low correlation with METs. The ratio of gender to this was higher for men than for women. Male students are more natural in participating in physical competition activities than female students and are more positive in participating in sports or sports activities. In particular, male students relieved negative emotional and psychological stress through participation in physical competition activities. However, due to restrictions on sports activities due to online classes and the closure of various sports facilities, it is reported that light exercise that can be enjoyed easily with parents is more frequent than strenuous exercise. These results are expected to be the biggest environmental factor in children's physical and social isolation due to the pandemic. The biggest environmental change among them is the change in the way children learn. With schools closed and indoor and outdoor sports facilities, gymnasiums, and public swimming pools closed, children are using online communities or social media for social and physical communication. Due to these changes, not only the negative psychological factors of children but also the physical activity have changed. Based on these research results, it is believed that it is necessary to expand research on social and physical environmental changes in children due to the coronavirus pandemic.

The degree of physical activity among gender, the strenuous activity index was similar for boys and girls, but the mild physical activity was higher for boys than for girls. In addition, male students were found to be higher than female students in all (high-intensity, medium-intensity, low-intensity) physical activity indices. Still, the participation rate of male students in physical education classes and physical competition activities in Korea is higher than that of female students [34]. One problem in domestic sports classes has been raised as an activity-oriented education that is easy for female students to be alienated. Physical education classes and sports activities must achieve common goals with peers, and mutual cooperation and competition structures naturally take place in the achievement goal process. Therefore, positive interaction is possible for male students, but it is unnatural for female students who prefer a relationship in which individuals achieve tasks alone. Before the COVID-19 pandemic, national and international self-reported epidemiological data show that up to 80% of children and adolescents are not getting enough physical activity for their health and wellness [13]. This low-intensity level of PA not only negatively affects school performance, but also poses a risk to children's physical and mental health.

It was different that the results of the previous study, which showed that men were more motivated to participate in physical activity than women [35-37]. One of the biggest causes of these contradictory research results is expected to be the environmental factor of social and physical isolation caused by COVID-19. Among them, the biggest change in the environment is the change in children's learning. Schools are closed and indoor and outdoor sports facilities, gyms, and public swimming pools have disappeared where children can socially and physically integrate. Instead, when children's learning spaces went online, sharing of children's online communities became a venue for social and physical contact. Due to these changes, negative psychological factors of children increase, and the physical activity of physically isolated children also seem to have changed negatively. The daycare centers and schools closed due to public health restrictions may have made it more difficult for children to participate in physical activity.

The impact of the COVID-19 pandemic has appeared worldwide, and not only adolescents but also children were no exception [2, 5, 12, 17]. In particular, the pandemic situation caused by COVID-19, which has lasted for over two years, has brought about wide-ranging changes throughout society, which has negatively affected the development of children.

According to the findings of the study, children did not experience psychological loneliness, anxiety, or sadness throughout lockdown period. Meanwhile, according to former study, children who were physically and socially isolated due to COVID-19 showed depressive symptoms [16-18, 38]. Therefore, as shown in the results of this study, male students seem to have lower stress, loneliness, anxiety, and depression related to the COVID-19 crisis than female students by participating in their favorite sports or physical activities. On the other hand, female students who seek emotional stability through close contact with their peers in socially and physically isolated situations seem to suffer psychological stress compared to male students. Nevertheless, it seems that the reason why children do not feel much psychological stress and depression compared to adults during the

lockdown is owing to members of the community called their family. However, in this study, children were found to have lower psychological symptoms of stress. It is believed that parents also spend a lot of time at home with their children during this period. These studies can be seen as consistent with previous studies that groups with high family culture have a positive effect on COVID-19 anxiety and life satisfaction [39-41]. A meta-analysis of factors associated with mental distress in the context of coronavirus found that one in three adults experienced anxiety or depression [42]. In addition, this effect was different according to the age group, and it was found that the younger the generation, the more pronounced the increase in loneliness due to social contact restrictions [43]. Therefore, it is thought that it is necessary to find the psychosocial factors that made children feel emotionally stable during the COVID-19 period through further research. Furthermore, in the female student group, loneliness was 15.3%, anxiety was 27.4%, and depression was 13.6%, while in the male student group, loneliness was 9.2%, anxiety was 16.6%, and depression was 6.5%. Compared to the total number of groups, the number of children who feel psychological stress is low, but it should not be ignored. In particular, it can be seen that both men and women have higher anxiety than loneliness and depression. This is presumed to have had a serious psychosocial impact on students due to school closures. This is because school is a place where children to learn, but it also provides chances to connect with friends and gain emotional comfort. Although these are explanatory findings, they are consistent with other researches of the effect on children's emotional health and wellness during containment periods [43]. This suggests that Korean children also tend to be emotionally and behaviorally affected by the temporary stops.

A significant continuation of the research is to investigate the bodily and psychological changes according to the environmental characteristics of children. An interesting observation suggests that these psychosocial changes may not contribute significantly to alleviating the physical and emotional aspects, although participants reported that children may experience little physical activity and may feel psychological instability. This assumption needs further investigation and, if confirmed, has serious reasoning in research into how it enable to successfully support the mental health of children in general as well as during periods of social distancing. In addition, it is considered that an investigation into children's media usage during the period of social and environmental change should be preceded.

5. CONCLUSION

This study investigated variations in physical activity levels and psychological stress of children who are physically and socially isolated during the closure period, and the following conclusions were drawn based on the derived results.

First, during the lockdown period, children's physical activity level according to grade was high in light exercise activities in all 4th, 5th, and 6th grades.

Second, during the that time, male students had higher levels of physical activity according to their gender than female students.

Finally, because schools and public life sports facilities were closed during the COVID-19 lockdown, children living with their families experienced less loneliness, anxiety, and depression.

Therefore, in the future, it is expected that children will need a multifaceted approach to participate in physical activities happily in the face of post-corona. Children, like adults, are physically exhausted as a result of continuing pandemic. It is critical to encourage children to exercise safely, simply and readily in order to preserve their and reduce psychological suffering. In addition, as students return to their daily lives in the aftermath of COVID-19 and resume daily sports and physical activities, it is expected to prepare physical activity and health guidelines through proactive precautions.

Schools have been closed to stop the extend of the virus pandemic. The pandemic has been linked to long-term closures of schools, and studies have reported that school closures are associated with poor physical and emotional well-being of children. Moreover, it has been found to negatively affect children's well-being due to unusual lifestyle changes, including restrictions on physical activity and increased situational conflicts. If the COVID-19 lockdown period is different from children's school holidays, it seems that psychological changes are greater than physical changes. As children's physical activity decreases during the vacation period, but is

satisfied by other external factors, it is also necessary to conduct research on children's other external factors during the COVID-19 lockdown period.

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