

Original Research

Participation in physical activity among people with disabilities during the COVID-19 pandemic in South Korea

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Abstract

Background: Quarantine, social distancing, and restricted movement and social interaction due to the coronavirus disease (COVID-19) have been reported reduce physical activity across several countries. However, few studies have evaluated the changes in physical activity patterns before and after COVID-19 among people with disabilities. Therefore, this study aimed to evaluate how physical activity participation has changed during COVID-19 among people with disabilities in South Korea. **Methods:** This study was conducted among 3871 persons with disabilities, aged 10–69 years, who participated in the 2020 Sports Survey for the Disabled conducted by the Korean Ministry of Culture, Sports and Tourism in March 2020. This survey collected data regarding participants' demographic characteristics (age, gender, etc.) and disability along with the type of physical activity (intensity, frequency, time, etc.), method (facilities, home training, classes/lectures, club), and type (swimming, resistance training, walking and jogging, etc.) of participation in physical activity before and after COVID-19. A chi-squared frequency test was performed to confirm the difference in the ratio of participation frequency, time, intensity, and method and type of physical activity before and after COVID-19. **Results:** After the COVID-19 outbreak, the frequency, duration, and intensity of physical activity of people with disabilities were reduced compared to before the COVID-19 pandemic. Additionally, in terms of physical activity participation method, attendance of classes, lectures, and clubs decreased, while physical activity at home increased. In participation types of physical activity, participation in walking and jogging, gymnastics, mountain climbing, and cycling increased, whereas swimming, weight training, and other activities decreased. **Conclusion:** Public health guidelines and social distancing due to COVID-19 have reduced the frequency, duration, and intensity of physical activity, while changing the types and methods of participation in physical activity for people with disabilities. Therefore, public health support to promote adherence to physical activity should be needed.

Keywords: COVID-19 pandemic; physical activity participation; disabled; disability

1. Introduction

Coronavirus disease 2019 (COVID-19)—first reported in Wuhan, China in December 2019—is a respiratory infection that has spread worldwide and been classified as a global pandemic by the World Health Organization (WHO) [1]. Currently, governments and organizations are making great efforts to prevent the spread of COVID-19 worldwide; although the numbers of new confirmed cases and deaths have declined slightly, they are on the rise again [2]. All countries' healthcare departments, including the Korea Centers for Disease Control and Prevention, have emphasized social distancing, mandatorily wearing masks, limiting the number of users and operating hours of multi-use facilities, avoiding social gatherings, and limiting contact with unhealthy people and senior citizens [3].

Although government interventions can be advantageous in reducing new coronavirus cases and lowering mortality rates, they have led to an unintentional rise in a sedentary lifestyle with reduced physical activity among individuals, increasing the chances of exposure to chronic deter-

ioration [4]. Unexpected lifestyle changes due to prolonged social distancing and isolation can contribute to physical inactivity and increased sedentary time. For example, confinement due to COVID-19 caused a 16.8% decrease in self-reported high-intensity physical activity, a 58.2% decrease in walking time, and a 23.8% increase in sitting time among 3800 Spanish adults [5]. Additionally, negative changes in physical activity, sleep, smoking, and alcohol intake due to COVID-19 were associated with higher levels of depression, anxiety, and stress among 1491 Australians [6]. Therefore, physical inactivity and increased sedentary time due to COVID-19 confinement can lead to secondary health problems in those infected with COVID-19, as well as the general population. In particular, older adults or persons with disabilities are more likely to develop serious complications related to chronic disease and dying as a result of being infected with COVID-19 compared to healthy people [7–9].

Many epidemiological studies have highlighted the effects of physical activity on the prevention of all-cause



mortality [10,11], cardiovascular disease [10,12], metabolic syndrome [13], immune function [14–16], and bone and muscular health [12,16]. Subsequently, it is very important to prevent chronic diseases and maintain health conditions by adhering to the physical activity guidelines during the COVID-19 quarantine period [9]. Currently, after the emergence of COVID-19, WHO and the American College of Sports Medicine recommend at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity physical activity per week for abled people as well as for people with disabilities to promote health [9,17]. However, this can pose a challenge as public health agencies' guidelines to prevent the spread of the pandemic (e.g., mandatory use of masks, social distancing) can have an adverse effect on people's physical activity participation [18].

Moreover, people with disabilities may find it more difficult to meet the physical activity guidelines compared to abled adults because they need additional environmental assistance such as facilities that accommodate the nature of their disability—physical assistants and exercise coaches—for people with disabilities [19–21]. For these reasons, people with disabilities meet only half of the physical activity guidelines compared to healthy adults [22,23] and have lower physical strength than healthy people [24]. In addition, their likelihood of being exposed to chronic diseases is 50% higher than that of healthy people [22], which increases the importance of achieving physical activity in public health [25,26]. As previously mentioned, a few studies have reported that COVID-19 has significantly reduced physical activity in healthy adults due to social isolation and physical time limit and operating time limits in many countries [5,6]. However, very few studies have been conducted with people with disabilities, who need more physical and environmental support for physical activity. Therefore, the purpose of this study was to describe upon the changes related to the patterns of physical activity (intensity, frequency, time and type) and participation of people with disabilities per social public health guidelines due to the COVID-19 outbreak in Korea. Accordingly, we hypothesized that physical activity participation would be lower during the quarantine and social distancing period compared to before the COVID-19.

2. Methods

2.1 Participants and procedure

The Korea Ministry of Culture, Sports and Tourism and the Korea Paralympic Committee have been conducting regular surveys of physical activity participation among people with disabilities every 3 years since 2005, starting in 2000. The survey is conducted with people with disabilities aged 10–69 years registered under the Korea Ministry of Health and Welfare's disabled registration status. The 2020 Physical Activity Survey for the Disabled conducted a sample survey based on the type of disability, degree of disability, and geographical area of people with disabilities.

In particular, unlike previous surveys, the 2020 survey investigated the patterns of physical activity of the disabled by classifying the time points before and during the pandemic [27]. In this study, data provided by the Korea Paralympic Committee regarding 3871 people with disabilities were analyzed. Participants provided information regarding their participation in physical activities before and after the COVID-19 pandemic. The 2020 Physical Activity Survey for the Disabled was conducted with the approval of the Korea Ministry of Culture, Sports and Tourism and the Korea Paralympic Committee (Institutional Review Board number: 113020), and informed written consent was obtained from all participants.

2.2 Measures

Data collection for the 2020 Physical Activity Survey for the Disabled was conducted by interviewers who were trained in advance on the subject's understanding and approach, how to write questions, sample replacement standards, precautions during the survey, and responses to inquiries. Surveys are conducted in principle through visiting surveys, but in consideration of the COVID-19 pandemic, web-camera-based online surveys and non-contract delivery methods were sometimes used. In addition, participants were replaced if they could not participate in the investigation for any reason (refusal to be interviewed individually due to COVID-19, refusal to participate after a request for investigation guidance and participation through phone calls and visits at least thrice, and changes the participants' contact information or address transfer).

The preparation period for the design and data collection for the survey was from August 2019 to July 2020, and the survey was conducted from November 2020 to January 2021. The survey included basic information and characteristics of the respondents, health and fitness awareness, physical activities and conditions, behavior of daily sports, and information and benefits of daily sports. Participation in pre-and post-COVID-19 questionnaires (before and after March 2020) was added to the physical activity participation, conditions, and characteristics of physical activity practice to understand its impact.

2.3 Statistical analysis

The characteristics of the participants were expressed as proportions (%) with a 95% confidence interval (CI). a chi-squared frequency test was used to assess participation in physical activity before lockdown and during COVID-19. All statistical analyses were performed using STATA (SE) 12.0 (Stata Corp., College Station, TX, US), and the statistical significance level was set to $p < 0.05$.

3. Results

Participants' characteristics are presented in Table 1. The number of teenagers with a disability was the lowest at 4.9%, and the proportion of people with disabilities in

their 60s was the highest at 44.4%. Furthermore, 65.8% of the participants were male, while 34.2% were female. The participation rate according to the type of disability was the highest at 31.8% for physical disability, while other disabilities, including facial disorders and kidney and heart disorders, were the lowest at 2.5%. In case of the degree of disability, 60.8% were mild and 39.2% were severe. Congenital and acquired disabilities were 18.8% and 81.2%, respectively.

Table 1. Characteristics of participants.

	n	Proportion	95% confidence interval
Age (years, %)			
10–19	186	4.9	
20–29	274	7.1	
30–39	272	7.0	
40–49	466	12.0	
50–59	954	24.6	
60–69	1719	44.4	
Sex (%)			
Male	2548	65.8	
Female	1323	34.2	
Type of disability (%)			
Physical disability	1229	31.8	30.2–33.2
Visual impairment	693	17.9	16.6–19.1
Hearing disability/language impairment	673	17.3	16.1–18.5
Autism & intellectual disability	688	17.7	16.5–18.9
Disability of brain lesion	492	12.8	11.6–13.7
Others	96	2.5	1.9–2.9
Severity of disability* (%)			
Mild	2351	60.8	59.1–62.2
Severe	1520	39.2	37.7–40.8
Congenital/acquired (%)			
Congenital	727	18.8	17.5–20.0
Acquired	3144	81.2	79.9–82.4
Marital status (%)			
Never married	1108	28.6	27.1–30.0
Married	2419	62.5	60.9–64.0
Divorced	209	5.5	4.6–6.1
Widowed	128	3.3	2.7–3.8
Separation/cohabit	7	0.1	0.0–0.3
Household income (USD)			
<1000	1272	32.9	31.3–34.3
1000–2000	1201	31.0	29.5–32.4
2000–3000	773	19.9	18.7–21.2
3000–4000	368	9.6	8.5–10.4
4000–5000	175	4.5	3.8–5.1
>5000	82	2.1	1.6–2.5

*Severity of disability was classified as “Severe”: grades 1 to 3 and “Mild”: grades 4 to 6.

The number of days of physical activity per week before and during the COVID-19 pandemic are significantly changed (Table 2) ($p < 0.001$). The frequency of those

who did not participate, participated once a week, or participated 2–3 days a week increased by 1.9%, 1.7%, and 2.0%, respectively, than before the pandemic. The frequency of people who reported exercising 4–5 days a week and almost every day was reduced by 1.6% and 4.0%, respectively. It showed a decrease in the frequency of people with disabilities who participated in physical activity for more than 4 days a week.

Average physical activity time per session before and during the COVID-19 pandemic are significantly changed (Table 3) ($p < 0.001$). The percentage of respondents who participated in physical activity for less than 30 minutes and 30–60 minutes increased by 2.3% and 2.0%, respectively, after COVID-19. However, the proportion of people who responded to 60–90 minutes, 90–120 minutes, and over 120 minutes of physical activity decreased by 2.3%, 1.0%, and 1.0%, respectively ($p < 0.001$).

Physical activity intensity before and during the pandemic are significantly changed (Table 4) ($p < 0.001$). The number of people participating in light-intensity physical activity since the pandemic increased by 1.5%. However, the number of respondents participating in moderate- and vigorous-intensity physical activity decreased by 0.8% and 0.7%, respectively.

The method of physical activity participation before and during the pandemic are significantly changed (Table 5) ($p < 0.001$). Home training increased by approximately 5.3% since the pandemic compared to the pre-pandemic period. Facility visits, classes/lectures, and clubs decreased by 4.2%, 0.9%, and 0.2%, respectively.

The type of physical activity participation before and during the pandemic are significantly changed (Table 6) ($p < 0.001$). Walking and jogging, gymnastics, hiking, and cycling increased by 3.9%, 0.3%, 0.1%, and 0.3%, respectively, compared to the pre-pandemic period. Swimming, resistance training, and other activities (e.g., yoga, soccer, and table tennis) declined by 1.6%, 2.0%, and 1.0%, respectively.

4. Discussion

This is the first study to confirm in a large sample that social restriction (e.g., social distancing and isolation) due to the COVID-19 outbreak led to changes in the patterns of and participation in physical activity of people with disabilities in South Korea. It was found that the participation rate of low-intensity physical activity increased more during confinement among the disabled in South Korea, while the participation rate of moderately vigorous intensity—which is known to provide physical benefits—decreased. The proportion of persons with disabilities participating in physical activity daily or more than 4 days, for more than 60 minutes, decreased. Therefore, our results show that social restrictions caused by COVID-19 negatively changed the types of physical activity, such as intensity, frequency, and time, of persons with disabilities.

Table 2. Changes in the frequency of engaging in physical activity per week before and during the COVID-19 pandemic.

Physical activity participation	Before COVID-19	During COVID-19	<i>p</i> -value
No participation	94 (2.4%)	168 (4.3%)	
Once a week	254 (6.5%)	314 (8.2%)	
2–3 days a week	1489 (38.5%)	1565 (40.5%)	<0.001
4–5 days a week	914 (23.7%)	857 (22.1%)	
Almost every day	1120 (28.9%)	967 (24.9%)	

Tested using Chi-squared frequency test.

Table 3. Changes in average time spent engaged in physical activity per session before and during the COVID-19 pandemic.

Time per session (minutes)	Before COVID-19	During COVID-19	<i>p</i> -value
<30	677 (17.4%)	765 (19.7%)	
30–60	1682 (43.5%)	1761 (45.5%)	
60–90	829 (21.4%)	741 (19.1%)	<0.001
90–120	314 (8.1%)	271 (7.1%)	
>120	369 (9.6%)	333 (8.6%)	

Tested by Chi-squared frequency test.

Table 4. Changes in physical activity intensity before and during the COVID-19 pandemic.

Physical activity intensity	Before COVID-19	During COVID-19	<i>p</i> -value
Light intensity	1810 (46.7%)	1865 (48.2%)	
Moderate intensity	1867 (48.2%)	1836 (47.4%)	<0.001
Vigorous intensity	194 (5.1%)	170 (4.4%)	

Tested by Chi-squared frequency test.

Table 5. Changes in the methods of physical activity participation before and during the COVID-19 pandemic.

Methods	Before COVID-19	During COVID-19	<i>p</i> -value
Facilities	573 (14.9%)	414 (10.7%)	
Home training	3084 (79.7%)	3289 (85.0%)	<0.001
Classes/lectures	146 (3.7%)	110 (2.8%)	
Club	68 (1.7%)	58 (1.5%)	

Tested by Chi-square frequency test.

Table 6. Changes in the type of physical activity participation before and during the COVID-19 pandemic.

Events	Before COVID-19	During COVID-19	<i>p</i> -value
Swimming	122 (3.2%)	60 (1.6%)	
Resistance training	359 (9.2%)	279 (7.2%)	
Walking and jogging	2268 (58.5%)	2415 (62.4%)	
Gymnastics	299 (7.8%)	317 (8.1%)	<0.001
Hiking	254 (6.6%)	257 (6.7%)	
Cycling	268 (6.9%)	281 (7.2%)	
Others (yoga, soccer, table tennis, so on)	301 (7.8%)	262 (6.8%)	

Tested by Chi-squared frequency test.

Although many studies have shown that regular physical activity has various benefits in health and physical function [28,29], lack of physical activity still remains a serious public health problem worldwide [30,31]. According to the Centers for Disease Control and Prevention, people with disabilities reported a greater health risk from lack of phys-

ical activity [24] because they were less likely to engage in leisure-time physical activity [31], were inactive [32,33], and had much lower fitness compared to non-disabled people [24,26]. In this study, compared to the very low participation rate of high-intensity physical activity, the participation rate in low-intensity physical activity was close to 50%, confirming that most people with disabilities participate in physical activities that require low physical fitness.

Although studies on physical activity during the pandemic have been limited, some have suggested that post-pandemic social distancing and closure of public sports facilities can further decrease physical activity and increase sedentary lifestyles [5,6,34,35]. For example, a systematic review of the literature by Stockwell *et al.* [35] reported decreased physical activity and increased sedentary time due to social lockdown in several countries, including children and patients with various medical conditions. In addition, Stanton *et al.* [6] showed that public health restrictions and social distancing due to COVID-19 negatively affect physical activity and sleep patterns, drinking, and smoking, and decrease physical health conditions in healthy adults. Particularly, although studies of physical activity in people with disabilities are limited, Song *et al.* [36] found that the intensity, frequency, and amount of exercise in Korean older adults with Parkinson’s disease decreased during COVID-19. Moreover, 61% of British children and adults with physical and/or intellectual disabilities reported a decrease in physical activity [37], and 41% of French children with cerebral palsy and neuromuscular disorders reported

discontinuation of physical activity [38]. Similarly, the results of this study show that there were negative changes in the frequency, intensity, and time of physical activity participation during COVID-19. To our knowledge, research on participation in physical activity in a large sample of people with disabilities during COVID-19 is very limited. Our research results also suggested that social isolation caused by COVID-19 had changed not only the physical activity patterns of the disabled, but also their types and methods of physical activity participation.

Previous studies have shown that environmental barriers such as physical characteristics (e.g., physical abnormality, pain, lack of energy, etc.), accessibility, disability-related facilities, disability-related specialists, and discriminatory practices in fitness centers and playgrounds affect the physical activity of people with disabilities [19,39,40]. In our study, the percentage of participation in physical activity at home (home training) increased as a result of social confinement. Conversely, the percentage of participation in physical activity through facilities, classes, or lectures, as well as through coaches and club activities that require interaction between people, has decreased. Moreover, the comparison of participation rates for each physical activity event resulted in a relatively large or independent participation rate of walking and jogging, gymnastics, hiking, and cycling. Conversely, swimming, weight training, and other activities that are likely to have interactions between people in limited spaces have shown lower participation rates after the pandemic.

To date, research on factors affecting changes in physical activity in people with disabilities related to COVID-19 has been very limited. However, based on some studies of healthy adults, screen-based sedentary activities increased during COVID-19 due to the recommendations to stay at home, sudden prohibition of access to exercise facilities, and non-face-to-face activities. Hence, we decided that we could support such findings with a study on people with disabilities [4,5].

This study has some limitations. First, data were collected through self-report surveys among people with disabilities; thus, we cannot rule out the possibility of recall bias or inaccuracy in results. Second, this study employed a cross-sectional design conducted within a specific time period. Depending on the survey period, the impact on the physical activity pattern or participation method of people with disabilities may appear differently due to the difference in the prevalence of COVID-19 in each country and the corresponding quarantine guidelines. Lastly, since our study used a questionnaire on physical activity participation of persons with disabilities, it may not be equivalent to their actual participation. Nevertheless, it is significant that this study is the first to confirm changes in physical activity of more than 3871 people with disabilities before and after the pandemic. In a future study, if the global physical activity questionnaire used internationally and the questionnaire

related to life sports participation using the same index are conducted with a sample of people with disabilities, international comparisons with people with and without disabilities could be facilitated. Furthermore, based on the findings of this study, measures will be needed to improve physical activity and health of people with disabilities by developing customized physical activity policies and infrastructure (e.g., active promotion of institutions online and through smartphones) suitable for them, as they are vulnerable to more physical problems and diseases during COVID-19.

5. Conclusions

After analyzing the changes in physical activity patterns and participation of Korean people with disabilities before and during COVID-19 public health restrictions and social distancing, we found that the frequency, time, and intensity of physical activity of people with disabilities had reduced compared to before COVID-19. Additionally, compared to pre-COVID-19, there have been many changes in physical activity participation and sports events among people with disabilities. Therefore, further well-designed studies are needed in the future on ways to enhance physical activity in people with disabilities, even amid public health restrictions due to COVID-19.

Abbreviations

COVID-19, Coronavirus disease 2019; WHO, World Health Organization.

Author contributions

Study conception, design, and data acquisition—CC, WS; data analysis and interpretation—CC, WS, JL, JSK; drafting and revising the article—CC, WS, JL, JSK; providing intellectual content of critical importance to the work—JL, JSK. All authors approved the final version of this manuscript for publishing.

Ethics approval and consent to participate

The 2020 Physical Activity Survey for the Disabled was conducted with the approval of the Korea Ministry of Culture, Sports and Tourism and the Korea Paralympic Committee (Institutional Review Board number: 113020), and informed written consent was obtained from all participants.

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Conflict of interest

The authors declare no conflict of interest.

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