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Impact of the COVID-19 Pandemic on the Perceived Physical and Mental Health and Healthy Lifestyle Behaviors of People with Disabilities: Quantitative Analysis of the International Community Survey

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Abstract

Objective: This study aims to determine the perceived impact of the coronavirus pandemic on physical and mental health and healthy lifestyle behaviors in community-dwelling persons with disabilities, as compared to those without disabilities.

Design: A prospective cross-sectional study was conducted with a web-based global survey.

Results: Over three months, 3550 responses were collected from 65 countries. The study included 2689 responses without skipped questions as full data for analysis. Most respondents were women (82.82%), about half (52.81%) were between the ages of 25 and 39, followed by those between the ages of 40 and 60 (38.6%). Among participants, 52% indicated physical activity levels decreased and 20% reported eating less fruit and vegetables than before. Further, 45% noted they slept less than before. Perceived physical and mental health and changes to eating habits during the pandemic showed a significant difference in people with and without disabilities. Furthermore, perceived effects on physical health had a significant effect on the reported degree of disability.

Conclusions: This study indicates that the pandemic had a larger impact on perceived physical and mental health and changes in eating habits and tobacco use among people with disabilities than people without disabilities.

Key words: COVID-19, People with Disabilities, Healthy Lifestyles, Lack of Physical Activity, Mental Health

Summary:

What is known: COVID-19 had negative impact on physical activity and habits of general population but its impact on physical inactivity and sedentariness in people living with disabilities remains unknown.

What is new: The present work, through an international survey, found that COVID-19 had an outsized impact on healthy behaviors in people with disabilities, compared to people without disabilities. In particular, people with disabilities were more likely to report worsening physical and mental health and dietary habits when compared to pre-pandemic levels. Furthermore, perceived effects on physical health had significant impact on the reported degree of disability.

Background

The Coronavirus (COVID-19) pandemic has disrupted nearly every aspect of daily life, from basic occupational functioning to social and health-related behaviors[1, 2]. Government-imposed lockdowns, which restricted physical and social health behaviors, reduced access to in-person and group physical activity (PA), recreation, and therapeutic exercise programs contributing to the 30% decrease in reported PA globally during the pandemic [3-5]. Increased sedentariness and decreased physical activity have contributed to global weight gain during the pandemic, and obesity has further been identified as major risk factor for, and a confounder during active COVID19 infections[6]. Hospitalization rates have been reported as much as 113% higher in virus-infected patients with obesity when compared to those without it, and COVID-19 mortality rates are 48% higher in obese patients than non-obese patients with the disease[6-9].

People living with disabilities (PLWD) have experienced disproportionate impacts, as pre-existing inequity gaps related to transportation, health, wellness, physical fitness, recreation, and exercise strategies have widened during this pandemic[10-12]. Despite the United Nations' 2006 Convention on the Rights of Persons with Disabilities (CRPD) , it has been shown for example, that the right to fitness through PA and recreation is often denied or restricted for PLWD, especially in low-resource settings, due to institutional, environmental and behavioral barriers[13].

In non-disabled communities, the COVID-19 outbreak has been a documented hazard to public health. For example, results of the *Effects of home confinement on multiple lifestyle behaviors during the COVID-19 outbreak* (ECLB-COVID19) electronic survey indicate that around the world, home confinement has altered adult PA and eating behaviors in a health compromising direction[14]. In

individual groups of Australian, Italian, and Canadian adults, the pandemic negatively impacted PA, sleep, smoking and alcohol intake, which were in turn associated with higher depression, anxiety, and stress symptoms[15-17]. In a Canadian cohort, a greater proportion of previously inactive individuals became less active during the pandemic, when compared to previously active individuals. In Belgium, a population-level sample of adults reported having less time, sitting more, and missing the familiar way and competitive element of exercising as the main reasons for a self-reported exercise reduction[18]. And in France, even before home confinement/quarantine measures, the number of seniors attending group PA programs decreased[19].

In the setting of severe restrictions in access to public parks, as well as exercise, fitness, and recreational facilities, COVID-19 has exacerbated the pre-existing behaviors of physical inactivity, sedentariness, and related non-communicable chronic diseases. As such, there is a need to understand the impact of the pandemic on the physical and mental health of PLWDs and advise PLWDs on how to better integrate easily accessible and safe ways to stay healthy in limited spaces with minimal equipment. On the other hand, the lockdown has also created unprecedented opportunities for fitness content to be created, disseminated, and accessed online[20-22]. The majority of this content, be it formal or informal, is geared towards persons who do not have disabilities.

Of the 1 billion people globally with PLWDs that significantly alter their daily functioning, 80% live in developing countries. Natural disasters and armed conflicts leave 3.5 million refugees and internally displaced people who survive with a physical disability annually [23-25] in these regions. Unfortunately, the impact of the COVID-19 pandemic on PA, physical inactivity, and sedentariness remains unknown. Sutter et al. reported that access to pediatric rehabilitation therapies was disrupted during COVID-19 and

this may relate to the impact on physical and mental health[26]. A recent review confirmed that the lack of early research about the impacts of COVID-19 experienced by PLWD[27].

Aim

The primary aim of the study was to determine the impact of the coronavirus pandemic on perceived PA levels, sedentariness, healthy eating habits, sleep habits, mental health, and tobacco usage, in community-dwelling persons with disabilities, as compared to those without disabilities. These outcomes were chosen because the World Health Organization (WHO) considers food, sleep, and tobacco usage as important health outcomes, together with physical activity, for enhancing people's wellbeing and reducing their health risks [28]. A secondary aim is to compare the impact of the pandemic on the ability of the disabled people versus the non-disabled people to adopt a healthy lifestyle.

Methods

Setting and Participants

We developed a cross-sectional web-based survey for community-dwelling adult persons with and without disabilities and disseminated it through referral sampling by the manuscript's authors. A web-based survey was designed because, to varying degrees, social distancing was being enforced all over the world, and this method was useful in conducting research across countries. The survey questionnaire was made available in Korean and the six official and working languages of the World Health Organization (WHO) namely, Arabic, Chinese, English, French, Russian and Spanish. The sampling strategy was done using social media group posts, outpatient clinic distribution, and email blasts targeting a minimum of 1000 adult participants.

Survey Questionnaire

The survey questionnaire included several demographic factors such as gender, age, education level, underlying health conditions, country, and employment status (Addendum 1, Supplemental Digital Content 1, http://links.lww.com/PHM/B700). We followed the International Classification of Functioning, Disability and Health (ICF) framework in order to assess the concept of disability [29, 30]. Based on the ICF framework, current level of functioning and disability are described by assessing the following body functions: mental (intellect, attention, memory, learning, emotions regulation, language, etc.), seeing, hearing and balance, voice and vocalization, circulatory and autonomic system, digestive, defecation, genitourinary and reproductive functions, and movement (muscle power and tone, joint mobility, etc.). Activities and participation were investigated in the following areas: 1) learning, applicating knowledge and communication, 2) mobility (picking up and carrying objects, walking, using transportation), 3) self-care (eating, washing, toileting, etc.), 4) domestic life (shopping, cooking, cleaning house, washing dishes, doing laundry, etc.), 5) community, social and civic life (recreation, religion), 6) relationships (strangers, family, friends, colleagues). The score from 0 (total disability) to 4 (full functioning) was used to identify PLWDs. Disability for analysis was classified according to activity and participation. People with all scores 4 (full functioning) were defined as 'not disabled' and anyone who selected at least one score 0 (no functioning) was defined as 'severe disability' and the remainder of the people are classified as 'mild-moderate disability'. Recommendations on healthy levels of physical activity and health-promoting eating habits have been made by the World Health Organization and are publicly available. We assessed PA and eating habits based on these recommendations [31]. We used previously published survey instruments to develop the two questions related to subjects' self-perceived overall health and mental health status [32].

Data Analysis

Descriptive quantitative statistics were used for data analysis. A Chi-square test was used to compare the difference among groups (no disability, mild-moderate disability, severe disability). All statistical tests were performed using R for Windows software (R Foundation for Statistical Computing, Vienna, Austria). $P < 0.05$ was set as the level of significance. Post-hoc analysis was done for items that showed significant difference to compare each group and $P < 0.017$ was considered significant.

Ethics

This research was deemed exempt by the Human Research Protection Program Institutional Review Boards at Yale University under protocol IRB #2000028723. Participant consent and data confidentiality have been respected through seeking informed consent among participants and anonymizing results.

Results

Respondents' demographics and overall impacts of COVID-19

The survey was administered from September 25 to December 31 in 2020. In total, 3550 responses were collected from 65 countries. For the analysis, 2689 responses without skipped questions were set as full data. Most respondents were women (82.82%), about half (52.81%) were between the ages of 25 and 39, followed by those between the ages of 40 and 60(38.6%). The percentage of responses according to the WHO region is presented in Figure 1. The most represented region was The Americas (78%) and the most represented country was Mexico. Approximately 49% of respondents had chronic underlying diseases such as hypertension and diabetes. Other demographic data of the survey respondents including gender, age, education, and employment status are given in Table 1. The overall life impact of COVID-19 pandemic is described in Figure 2. More than 90% of people wore masks in public and were required

to maintain social distancing. Approximately half of participants experienced lock-down or "shelter in place" and one third lost their jobs and/or lost source of income. Since the rates of these metrics will vary drastically country to country, it is difficult to say whether the reported rates are consistent with individual national averages, but these experiences are known to have risen during the pandemic globally [1-3].

Lifestyle before the COVID-19 pandemic

General achievements of recommendation in healthy lifestyle before the pandemic are as follows: a) 20% did more than four days of 30 minutes of physical exercise per week, b) 42% had at least five servings of fruits and vegetables more than four days per week, c) 42% slept at least seven hours more than four days per week. The time spent watching television or other screens in a sitting or lying position was reported two to four hours a day, accounting for the response of approximately 45% of participants. The detailed pre-pandemic healthy lifestyle behaviors in people with and without disability are shown in Table 2. The percentage of each value did not show significant difference in all three groups: people with no disability, mild-moderate disability, and severe disability (Table 2).

Lifestyle during the COVID-19 pandemic

During the pandemic, 52% of participants indicated PA levels decreased and 28% felt remained the same (Table 3). For the eating habits, 53% reported fruit and vegetable intake remained unchanged and 20% reported eating less fruit and vegetables than before. Regarding the sleep patterns, 45% noted they slept less than before and for 33% of respondents' sleep habits remained the same. There were significant differences in perceived physical and mental health, eating habits, body weight, and smoking pattern change among three groups: people with no disability, mild-moderate disability, and severe disability. Physical and mental health and changes in eating habits showed significant differences between the no

disability group vs. mild-moderate disability group and the no disability group vs. severe disability group. Additionally, there was a significant difference in self-reported physical health between people with mild-moderate disability and those with severe disability. Table 3 shows the details of perceived health-related lifestyle patterns during the pandemic in three groups.

Smoking

Among the all respondents, 11% were smoking before the COVID-19 pandemic, and 90% reported their smoking habits were unchanged. The increase or decrease in tobacco usage during the pandemic accounted for the same proportion of 5%. Regarding the amount of tobacco product usage, there was a significant difference between the unimpaired group and the severely disabled people group (Table 3). A greater proportion of the severely disabled group reported an increase in tobacco product use during pandemic (P=0.003).

Sedentariness

In general, uninterrupted sedentary time such as watching time in sitting or reclined posture also had significantly changed when comparing before and during the pandemic. Before the pandemic, 44.92% reported that they spent 2-4 hours a day sitting or reclining and watching TV, and 32.73% said they spent 0-1 hours of sedentariness. During the pandemic, 49.68% of respondents reported 0-1 hours and 29.75% said that they spent 2-4 hours per day sitting or reclining. And there was no significant difference among the three groups.

Discussion

During the pandemic, the perceived wellness was significantly different among the three groups, people with no disability, people with mild-moderate disability, and those with severe disability, from before the COVID-19 pandemic. The demographic factors and pre-pandemic health-related lifestyle factors, however, showed no difference among the groups between before and during the pandemic. These results in our global sample of PLWDs indicated that the critical aspects of a healthy lifestyle (physical health, mental health, healthy eating habits) had worsened disproportionately for them, when compared to persons without disabilities. To our knowledge, the present survey is the first study to include the degree of disability according to activity and participation level and to be implemented across countries with different policies and responses during the ongoing COVID-19 crisis.

Not only the presence of disability but also the degree of disability had a significant influence on the self-reported physical health during the COVID-19 pandemic. While sedentariness was unexpectedly reported at lower levels during the pandemic than before, generally, 52% of participants reported that they are doing less PA, and 45.9% reported that their physical health worsened during the pandemic. This is consistent with other studies reporting reduced PA during the COVID-19. [33]. It is well known that PA is essential in the prevention of various chronic diseases. Additionally, PA is critical for quality of life and subjective well-being [34]. There is a lack of qualified data of PA levels for PLWD even before the pandemic [35]. Among them, reports from some high-income societies show that the estimates of PLWDs meeting the PA guidelines ranging from 20.6% to 60.1%, in contrast to estimates ranging from 53.7% to 91.1% for adults without disabilities [36, 37]. A recent article highlighted that the importance of addressing the needs of the disability community with eased restrictions as the effects of COVID-19 lockdown created negative impacts on PA levels and mental health of children and young adults with

disabilities[38]. Presented results also support this point as PA and physical health was more affected in the disabled and more severe groups. Accordingly, policymakers and stakeholders need to consider the more vulnerable groups to physically and mentally healthy in this prolonged crisis period.

Emerging research on COVID-19 has documented that the virus has led to a higher level of psychological distress including depression, anxiety, and loneliness [39, 40]. Prolonged social isolation itself might have a considerable effect on mental health, chronic physical symptoms, frailty, even increased mortality risk or suicidal ideation [41]. Changes in sleep pattern and increased family conflicts due to restrictions in outside activities were revealed to be associated with depression due to COVID-19 [40]. In this survey, as well as physical health, many people reported worsened perceived mental health. About 66.9% reported worsened mental health during the COVID-19 pandemic, a higher percentage than those who reported worsened physical health. Also, a higher rate of deterioration was noted in the group with disabilities. Even before the pandemic, people with disabilities had to make more effort to cope with loneliness and stress [42]. However, the COVID-19 pandemic introduced trauma, stress, and risk of isolation with decreased access to facilities in the disability community [43]. As a result, mental health in a disabled group might have been affected to a higher degree by the effects of COVID-19 restrictions on PA than those without a disability group.

There is a report that food consumption and meal patterns (the type of food, eating out of control, snacks between meals, number of main meals) were unhealthier during home confinement [44]. The presented results of our survey, however, showed relatively preserved healthy food consumption compared to physical and mental health in terms of the amount of fruit and vegetable consumption. Overall, over 40% of people had five or more fruit and vegetable servings for more than four days per week. About 40%

reported they had sufficient fruit and vegetable two to four days per week before the pandemic. Moreover, 80% reported that their eating the same or more fruit and vegetables during the pandemic. Nevertheless, as with physical and mental health, people with mild-moderate or severe disabilities reported significantly higher deterioration rates than those without disabilities. The concept of 'healthy eating' may not correlate with increased fruit and vegetable intake in different contexts. A WHO report recommends 400g edible fruit and vegetables per day to reduce the risk of non-communicable diseases, which translates to roughly five portions per day [45]. In this regard, the questions on whether people ate more than 5 servings of fruits and vegetables was used to assess eating habits. In the future, the use of consistent wording may improve the interpretation.

Limitations

There are limitations related to the cross-sectional nature of our sampling strategy since it does not allow for temporal analysis of trends or conclusions on causal relationships. Moreover, as the study relies on self-report and perceived data, we have to consider the possibility of a perception bias. This is supposed to be present in all analyzed subgroups, whose demographic factors and pre-pandemic health-related lifestyle showed no difference between three groups. These aspects become important because health-related decisions and behaviors (and the perceptions of them) are dynamic, especially during the pandemic where local regulations, information about COVID-19 and vaccine uptake is changing rapidly as well as with great variation across countries. The study was done at the first year of the pandemic after or during the time of first wave. The COVID-19 pandemic situation is constantly changing, such as the second and third wave, variants, and policies and people's reactions are changing accordingly. The sampling strategy relied heavily on technology and internet connectivity, so our responders were highly educated and technology-savvy, which is not representative of the global population, especially those ill-

equipped with online technological applications. Results, therefore, may not be generalizable beyond the cohort of self-selected survey respondents. It should be noted that even in this group, regardless of disability, over 60% felt that their mental health had deteriorated, and 35% lost their job or lost their income, while higher education did not guarantee stability in life. The Americas, and Mexico in particular, were overrepresented which would limit generalizability and the relevance of all findings to other regions. Finally, women outpaced men in terms of responses. While it is unclear why, this led to an imbalanced dataset. This finding is not unusual as women tend to be more likely to self-select to participate in online surveys [46]. Further research is needed to understand the effects on a broader range of regional, socioeconomic, sexual, age, and disability statuses. The characteristics and policies of the society to which each population group belongs can also have a significant impact, so related research is needed.

Conclusion

Ultimately, self-reported health-related behaviors including physical health, mental health, and healthy eating habits, were worse in those with disabilities and those perceptions worsened with increasing disability severity. As numerous studies from various sectors have suggested, the pandemic has illuminated—and in some cases widened—existing gaps in access to health for marginalized populations, such as PLWDs that exist within and outside the context of the pandemic. As the pandemic progresses, vaccinations are globally taking place, and societies start to re-open, health and wellness advocates and organizations should take stock of how equitable and inclusive movement-, eating- and sleep-related health strategies are, and intentionally fill in gaps where needed.

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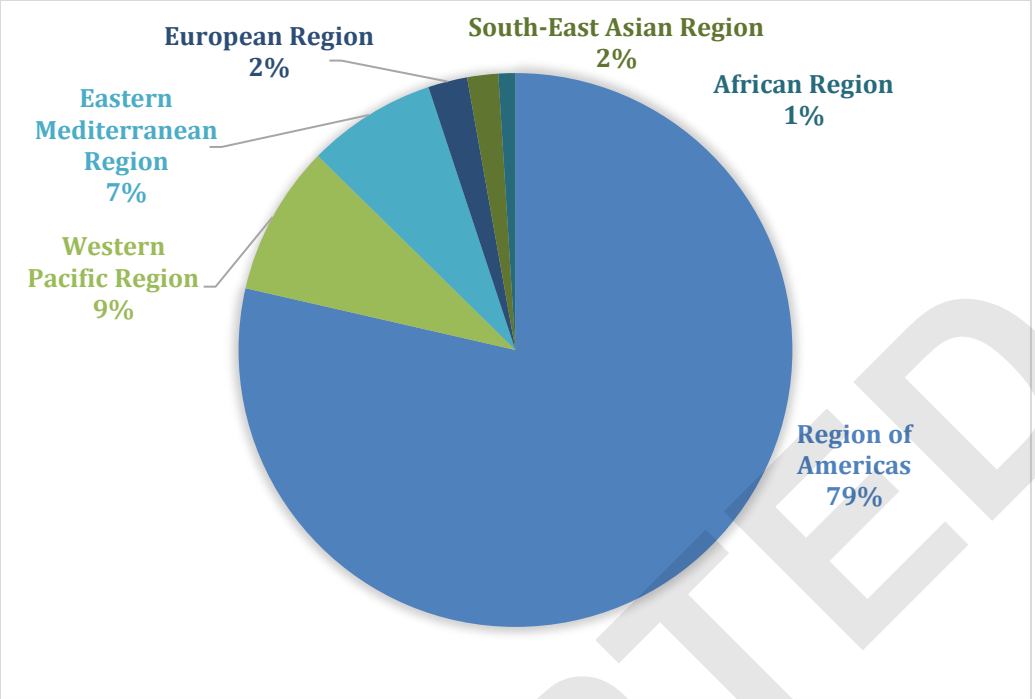
Figure Legends

FIGURE 1. The percentage of responses according to the WHO regions.

FIGURE 2. General impact of COVID-19 pandemic



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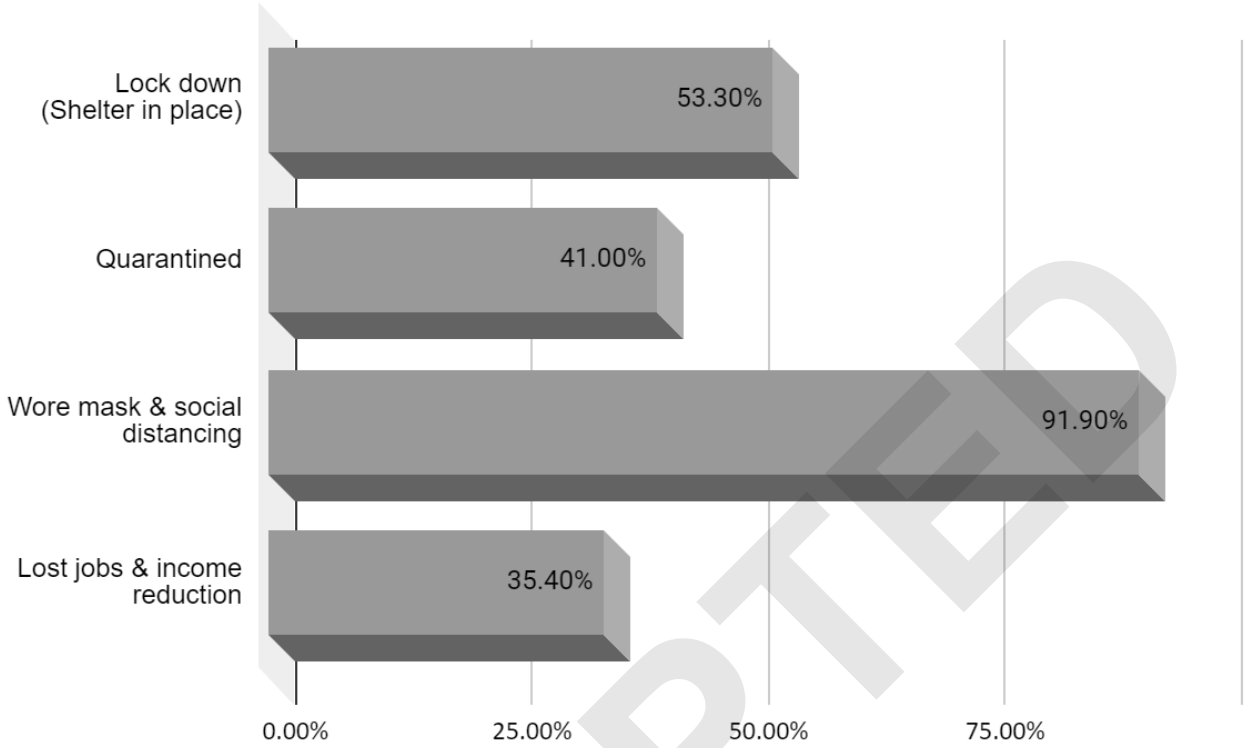

FIGURE 2. General impact of COVID-19 pandemic

TABLE 1. Demographic data of survey respondents.

		Not disabled % (n)	Mild-Moderate % (n)	Severe % (n)
Gender	Female	79.01 (1035)	84.13 (578)	88.73 (614)
	Male	20.99 (275)	15.87 (109)	11.27 (78)
Age group	18 to 24	2.52 (33)	2.33 (16)	2.31 (16)
	25 to 39	50.99 (668)	53.13 (365)	55.92 (387)
	40 to 60	40.46 (530)	37.12 (255)	36.56 (253)
	60 +	6.03 (79)	7.42 (51)	5.20 (36)
Education	No school	0.00 (0)	0.29 (2)	0.29 (2)
	Primary/Elementary school	0.08 (1)	0.29 (2)	0.29 (2)
	Secondary/Middle or High school	1.91 (25)	4.37 (30)	4.62 (32)
	Bachelor or equivalent	35.11 (460)	34.06 (234)	26.73 (185)
	Postgraduate	62.90 (824)	60.99 (419)	68.06 (471)
Employment	Employed (part-time or full-time)	85.27 (1117)	79.04 (543)	82.66 (572)
	Housewife/homemaker	3.44 (45)	5.68 (39)	5.64 (39)
	Retired	4.12 (54)	5.68 (39)	4.62 (32)
	Student	4.73 (62)	4.80 (33)	3.32 (23)
	Unemployed	2.44 (32)	4.80 (33)	3.76 (26)
Smoking	No	89.01 (1166)	90.10 (619)	87.57 (606)
	Yes	10.99 (144)	9.90 (68)	12.43 (86)

Mild-Moderate indicates Mild-Moderate disability; Severe, Severe disability

TABLE 2. Pre-pandemic healthy lifestyle behaviors in people with and without disabilities.

	Frequency	Not disabled % (n)	Mild-Moderate % (n)	Severe % (n)	*P*
Physical exercise ≥30 minutes	> 4 days/week	20.46 (268)	20.96 (144)	20.09 (139)	
	0-1 days/week	19.39 (254)	17.47 (120)	17.05 (118)	
	2-4 days/week	41.15 (539)	40.03 (275)	41.47 (287)	
	None	19.01 (249)	21.54 (148)	21.39 (148)	0.6719
Fruit and vegetable intake ≥5 servings	> 4 days/week	41.53 (544)	42.07 (289)	44.08 (305)	
	0-1 days/week	10.38 (136)	10.48 (72)	11.42 (79)	
	2-4 days/week	43.89 (575)	44.54 (306)	40.03 (277)	
	None	4.20 (55)	2.91 (20)	4.48 (31)	0.4447
Sleep≥7 hours	> 4 days/week	43.66 (572)	42.94 (295)	39.88 (276)	
	0-1 days/week	14.50 (190)	11.79 (81)	14.74 (102)	
	2-4 days/week	35.50 (465)	37.99 (261)	36.99 (256)	
	None	6.34 (83)	7.28 (50)	8.38 (58)	0.2385

	> 4 hours/day	16.95 (222)	17.47 (120)	16.62 (115)	
Sedentariness	0-1 hours/day	32.60 (427)	32.17 (221)	33.53 (232)	
	2-4 hours/day	44.89 (588)	45.12 (310)	44.80 (310)	
	None	5.57 (73)	5.24 (36)	5.06 (35)	0.9962

Mild-Moderate indicates Mild-Moderate disability; Severe, Severe disability

TABLE 3. Perceived physical and mental health, eating habit, body weight and smoking pattern changes in people with and without disabilities during the pandemic.

		Not disabled % (n)	Mild-Moderate % (n)	Severe % (n)	*P*
Physical health (Physical fitness)	Better than	18.78 (246)*‡	17.18 (118)†‡	15.90 (110)*†	
	Same as	41.68 (546)*‡	34.79 (239)†‡	28.18 (195)*†	
	Worse than	39.54 (518)*‡	48.03 (330)†‡	55.92 (387)*†	<0.001
Mental health (Emotional wellness)	Better than	7.02 (92)*†	6.70 (46)†	6.36 (44)*	
	Same as	31.60 (414)*†	23.73 (163)†	19.08 (132)*	
	Worse than	61.37 (804)*†	69.58 (478)†	74.57 (516)*	<0.001
Eating habits	Better than	30.61 (401)*†	33.92 (233)†	29.19 (202)*	
	Same as	42.21 (553)*†	34.93 (240)†	32.51 (225)*	
	Worse than	27.18 (356)*†	31.15 (214)†	38.29 (265)*	<0.001
Weight gain	No	53.13 (696) *	45.71 (314) *	47.25 (327)	
	Yes	42.90 (562) *	48.33 (332) *	48.55 (336)	
	I don't know	3.97 (52) *	5.97 (41) *	4.19 (29)	0.005
Smoking patterns	Less than	5.27 (69)*	5.39 (37)	6.07 (42)*	
	More than	3.44 (45)*	4.80 (33)	6.65 (46)*	
	Same as	91.30 (1196)*	89.81 (617)	87.28 (604)*	0.021

*,†,‡ $P < 0.017$ was deemed to have significant differences between groups with post-hoc analysis.

Mild-Moderate indicates Mild-Moderate disability; Severe, Severe disability