

The Impact of COVID-19 Lockdown on Physical Activity and Weight Gain Among Active Adult Population in Israel. A Cross-Sectional Study

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Abstract

The COVID-19 outbreak holds public health concerns. Staying at home, increases sedentary behavior, with unintended adverse outcomes. Since organized recreation and sports facilities were closed, we aimed to study how the crisis of closure affected exercise habits and weight gain among the trainee population in Israel, assess the frequency of activity and age-adjusted weight gain, measure and ability to embrace digital media, as an alternative training framework

A cross-sectional survey consisted of a multiple-choice questionnaire that was obtained using a web-based survey application. 1,202 trainees who exercise on a regular basis, anonymously answered the questionnaire sent by their coaches regarding their activity and weight gain during lockdown times.

Results confirmed that 70% of Israelis trained less than their usual routine, 60% used digital media for training, 55% gained weight. Half of the respondents gained more than 2 kg, with an average increase of 1.2 kg. However, those who exhibited a higher physical activity level gained less weight. Using digital media for training was associated with higher physical activity levels. The aged population was less likely to use digital media.

Since increased sedentary behavior could increase the risk for potential worsening of health conditions, health agencies should look for strategies, especially in the aged population, including digital media to promote physical activity and subsequently, preventing the increased burden of future comorbidities worsening by a sedentary lifestyle.

Background

The coronavirus disease 2019 (COVID-19) has a major impact on physical activity (PA) behaviors worldwide. People around the world were forced to stay at home self-isolated due to lockdown policy [1]. Although the lockdown is important and is the best recommendation for preventing the spread of the disease, it may create a new challenge. Staying at home for a prolonged time, can lead to disturbing consequences such as weight gain, social isolation [2] and may also cause a reduction in PA levels [2, 3]. The reduction in PA level may be especially apparent among active individuals habitually practicing sports. Diminished PA resulting from home isolation may worsen a wide range of health conditions, including the chronic ones, such as cardiac and metabolic diseases [2–5], as well as infectious diseases, due to negative immune-modulation [6–11] even without substantial weight gain [12, 13]. Therefore, maintaining an active lifestyle at home including mainly PA is extremely important for the general population's health, but especially for people with additional risk factors including old adults during the quarantine [14–16].

According to the recommendation of the world Health Organization (WHO), the American College of Sports Medicine (ACSM) Position Stand, and PA Guidelines for healthy adults, adults should do at least 150 minutes of moderate aerobic exercise or do at least 75 minutes of vigorous aerobic exercise during the week [16, 17]. This is in addition to muscle-strengthening activities, involving major muscle groups, for two or more days weekly [16, 18]. According to the Israeli National Health Interview Survey – INHIS 2013–2015 [19] only one-third of the Israeli population aged 21 and over complies with the WHO's recommendations and walking being the sport of choice for most people [19]. As the consequence of physical inactivity is rising globally, WHO had developed a new Global Action Plan to promote PA in 2018–2030 [17]. However, with COVID-19 striking globally, adherence and devotion to PA is much more challenging, even for active individuals [20].

Longitudinal observational studies and experimental data identified determinants that have strong causal associations with adherence to PA, such as characteristics of the person and his or her lifestyle habits, features of environments, and type of the activity itself [21, 22]. Markedly, socioeconomic status, education level, living arrangements, health status, physical fitness, and depression are factors affecting adherence, especially in old adults [23–25]. Improving adherence to PA at times of pandemics could have a significant impact on longevity, quality of life, and health care costs in the long run [23]. Thus, it is important to understand how lockdown policy has affected PA behavior. Despite the barriers, it is crucial to maintain the regular pace of physical activity practiced on ordinary days, for the sake of good mental and physical health [2]. Furthermore, it is important to understand how to develop and utilize strategies to promote independent (i.e., home-based) exercise behavior upon completion

of formal exercise programs. Recent advances in mobile technology enable novel approaches to remotely guide and support PA. There is a wide range of video- or app-guided equipment-free for aerobics or strength training that can be performed at home. Studying the feasibility of an at-home, web-based, interactive exercise programs [25] could enable researches and health organizations to plan better strategies to promote participants to engage in their PA.

The current study aimed to evaluate the effects of lockdown policy on trainees' PA level and exercising habits, to analyze the association between these habits and weight gain. Also, to evaluate the adaptability of the trainees to home-based digital technologies to maintain a healthy lifestyle during COVID-19 pandemics. The study was approved by the Helsinki ethics committee of Sheba Medical Center (6504-19-SMC). All participants gave written informed consent.

Methods

The cross-sectional survey examined the participants' PA during the months of March-April 2020. 1,202 participants answered anonymously to the survey which consisted of multiple-choice questionnaires (ST1). The sample size was determined by an a priori power analysis showing that for multiple regression analysis (F test) with small effect size ($f^2 = 0.02$), a err probability = 0.05, and maximum four predictors, the total sample size required for achieving actual power of 0.80 is $n = 602$. For one-way analysis of variance (F test), with a small effect size ($f = 0.10$), a err probability = 0.05, and five groups, the total sample size required for achieving actual power of 0.80 is $n = 1200$. Power analysis calculations were conducted using G*Power 3.0.10. The survey was obtained using the IMKFORMS, a web-based survey application. The IMKFORMS system is optimized for mobile phones, collecting information from the respondents and export it into an Excel file (ST2). The cross-sectional survey was delivered via WhatsApp groups of trainers targeting their trainees who were exercising regularly, in classes, gyms, and community centers. The survey was sent as an URL link via the WhatsApp to the trainers on May 1st, 2020. the data were collected until May 10th, 2020.

Data analysis

Participants' demographics (age and sex), PA, and exercising characteristics were described using descriptive statistics (mean, median, range, and 95% confidence of interval) and chi-squared tests. Associations between age, PA level, and health parameters, were examined using the Spearman rank correlations. Based on weight gain status, participants were divided into two groups (no weight gain vs. weight gain). Between-group differences in PA frequency were compared using the Mann-Whitney U test. To measure PA frequency, participants were divided into two groups (physically active for < 3 days /week vs. active > 3 times/week). Between-group differences in health status were compared using the Mann-Whitney U test. Participants' intention to return to a previous PA level based on health status was compared using the Kruskal-Wallis test and Conover post-hoc test. To examine differences in age among individuals within each PA frequency group, one-way analysis of variance with Tukey-Kramer post-test for all pairwise comparisons were done. Two forward stepwise multiple linear regression was conducted, to analyze the factors predicting PA frequency and weight gain (ST3-ST4). Only variables that had significant correlations with the dependent variables and matched the study's hypothesis were included [ST2, ST3). All independent variables were examined for multicollinearity using the variance of inflation factor > 10 [26]. The inclusion criteria were defined at the alpha level of 0.05, the exclusion criteria were defined at the alpha level of 0.10. coefficient of reliability (or consistency) of the questionnaire was measured using Cronbach's alpha [27].

Results

1,202 adults participated in the study. Mean age was 48.52 ± 15.60 years, (age range: 18–85 years). 75.0% (901) females and 25% (301) males (chi-squared = 299.50, $p < 0.001$). The questionnaire's Cronbach's alpha was acceptable (Cronbach alpha = 0.70).

Participants' physical activity and exercising characteristics

Participants in the survey were trained in fitness room (25.45%), exercise with a personal coach (3.49%), participating in more than one organized activity (26.03%), or not (8.48%). Most study participants usually exercised as part of a team or in organized PA groups (36.52% of the sample; chi-squared = 439.75, $p < 0.01$). Seventy percent of the participants, were less active during the COVID-19 pandemic (less active 22.46%; significantly less active 48.08%, chi-squared = 355.15, $p < 0.001$). Most of the participants (51.50%) reported that they intend to return to PA activities as soon as the restrictions will be over or when PA will be by the regulations (35.90%). Only 0.20% of the participants informed about health deterioration in the past months and therefore have no intention of returning to their previous PA types. 6.30% reported they were afraid to return to their previous PA types, and 6.10% have not decided whether or not to return to their previous PA types, (chi-squared = 736.10, $p < 0.001$). 37.18% of the participants reported exercising 4 times/week as compared to 20.38% (3 times/week), 18.71% (2 times/week), 14.30% (1 day a week) and 9.40% who did not practice at all (chi-squared = 262.23, $p < 0.01$). The median physical activity was 3 times/week (Table 1).

Table 1
Participants' physical activity characteristics

Physical activity characteristic	n	%	Chi-squared (p value)	
Organized physical activity (n = 1202)	In a team or an organized group	439	36.52%	439.75 (< 0.001)*
	Fitness room	306	25.45%	
	Personal training	42	3.49%	
	More than one organized activity	313	26.03%	
	Not in an organized activity	102	8.48%	
Current physical activity level vs. before Corona (n = 1202)	Similar level	185	15.39%	355.15 (< 0.001)*
	Less active	270	22.46%	
	Significantly less active	578	48.08%	
	More active	169	14.05%	
Home digital physical activity modalities (n = 1202)	Not used	265	22.04%	189.25 (< 0.001)*
	I tried but it wasn't good for me	256	21.29%	
	Movies in the internet/TV	196	16.30%	
	Programs like Zoom	285	23.71%	
	Training applications	54	4.49%	
	Several digital training modalities	146	12.14%	
Intention to return to previous physical activity types (n = 1198)	No – afraid of the virus	75	6.30%	736.10 (< 0.001)*
	Not decided	73	6.10%	
	Yes, considering activity will be in accordance with the regulations	430	35.90%	
	Yes, immediately	618	51.50%	
	No, my health deteriorated in the last month	2	0.20%	
Last month physical activity frequency (n = 1202)	0 / week	113	9.40%	262.23 (< 0.001)*
	1 / week	172	14.30%	
	2/ week	225	18.71%	
	3/ week	245	20.38%	
	4 / week or more	447	37.18%	

Notes: sample size (n) and prevalence (%); * significant differences in prevalence at the $p < 0.001$ (2-tailed).

Participants' health status

Overall, 87.3% reported to be in good health, 11.3% reported having good health in conjunction with chronic diseases, and 1.3% were suffering from chronic diseases and disability (chi-squared = 1614.12, $p < 0.001$). Regarding weight gain, 45.2% did not gain weight, 16.2% gained 1Kg, 18.8% gained 2 KG, 11.2% gained 3Kg, 8.6% gained 4 Kg or more (chi-squared = 1181.14, $p < 0.001$). The median weight gain was 1 kg (Table 2).

Table 2
Associations between age, physical activity, and health parameters.

		Age	Health Status	Weight gain	Last month physical activity frequency	Home digital physical activity modalities
Age	r	—	0.229	-0.080	0.094	-0.033
	p	—	< 0.001*	0.006*	0.001*	0.258
	n	—	1175	1178	1175	1178
Health status	r	—	—	-0.002	-0.031	-0.052
	p	—	—	0.952	0.283	0.072
	n	—	—	1202	1202	1202
Weight gain	r	—	—	—	-0.382	-0.111
	p	—	—	—	< 0.001*	< 0.001*
	n	—	—	—	1202	1202
Last month physical activity frequency	r	—	—	—	—	0.295
	p	—	—	—	—	< 0.001*
	n	—	—	—	—	1202

Notes: using Spearman rank correlation coefficients; * significant correlation at the $p < 0.05$ level (2-tailed).

Associations between age, physical activity, and health parameters

Significant correlations between age and health status were observed. Weight gain significantly correlated with PA frequency ($r = -0.38$, $p < 0.001$, r ranges from -0.080 to 0.229 ; $p < 0.05$) and usage of home digital physical activity modalities ($r = -0.111$, $p < 0.001$). PA frequency significantly correlated with usage of home digital PA modalities ($r = 0.295$, $p < 0.001$; Table 2).

In comparison to participants gaining weight, participants who did not gain weight were significantly more physically active ($P < 0.001$, the median number of PA days = 2 vs. 4, respectively; Fig. 1).

Compared to individuals with chronic diseases or chronic diseases with disabilities, individuals with good health had significantly higher intention to immediately return to their previous PA level ($P < 0.001$, Fig. 2).

No age-related differences were observed in the different categories with the intention to return to previous PA types. Similarly, no significant between-group differences were observed in the different health status groups with PA frequency (Fig. 3).

Participants who conducted PA > 4 /week ($n = 446$), were significantly older than participants who conducted PA less than 4/week ($n = 756$; $F = 4.14$, $p \leq 0.002$; Fig. 3). However, comparing the participants who were physically active (conducting PA > 3 /week), no significant between-group differences were found concerning their health status (good health, 61.90%; good health with chronic diseases, 65.69%; and chronic diseases with a disability, 62.50%).

Prediction of physical activity level and weight gain

Multiple regression analysis showed that older age and greater usage of home digital physical activity modalities predicted greater frequency of PA level (adjusted R² = 0.10; F ratio = 69.51; p < 0.001). However, only reduced PA frequency significantly predicted weight gain (adjusted R² = 0.156; F ratio = 71.05; p < 0.001). For additional information (Table 3).

Table 3
Prediction of physical activity level and weight

Dependent variables	Independent variables	B Coefficient	Standard error	t	p
Last month physical activity frequency	(Constant)	1.40			
	Age	0.007	0.002	3.42	< 0.001
	Usage of home digital physical activity modalities	0.26	0.022	11.36	< 0.001
	R² = 0.10; Adjusted R² = 0.10; F ratio = 69.51; P < 0.001				
Weight gain	(Constant)	2.469			
	Age	-0.004	0.002	-1.949	0.051
	Last month physical activity frequency	-0.385	0.028	-13.357	< 0.001
	Usage of home digital physical activity modalities	-0.008	0.024	-0.353	0.723
	R² = 0.158; Adjusted R² = 0.156; F ratio = 71.05; P < 0.0001				
Notes: Continues variables: only variables that had significant correlations with the dependent variables were included; categorical variables – only variables that differed significantly in the dependent variables were included; the Variance inflation factor in all analyses was < 10.					

Discussion

Our study shows that PA level significantly decreased during the COVID-19 lockdown, which was related to increased weight gain by most of the trained population. Most prone to the pandemic quarantine were the elderly adults that were less likely to initiate home-based activities.

The current study demonstrates the negative effect of lockdown and social distancing policy on peoples' PA level and exercising habits as well as on health status among physically active adults during COVID-19. The study suggests that pandemics such as the current COVID-19,(1) pose unique health issues, possibly on account of the requirement to stay at home that causes the reduction in PA, among all people and especially among physically active individuals who habitually practicing in sports [28]. Although lockdown may be essential as a strategy to mitigate the pandemic, it also generates new challenges to health. Staying at home for a prolonged time may increase sedentary habit [2, 3] and decrease PA level [12, 29] which may lead to disturbing consequences such as an increased risk of worsening health conditions (including chronic ones) [2, 3], weight gain [12, 29], insufficient sunlight exposure, social isolation [2], and can effect metabolic health [30]. Altogether, sedentary behavior and low levels of PA can have negative effects on well-being and quality of life.

The Israeli Ministry of Health closed all organized activities in mid-March including gyms and fitness centers [31]. The government enforced restrictions on outdoor and recreational activities and limited outdoor and social activities to a maximal radius of 100 meters' distance from home. Whereas health policy has been directed to prevent the spread of COVID-19, there was no reference or guidance on how to maintain PA during times of social distancing and isolation, regardless of the health implications that could result from physical inactivity. Thus, our survey exhibited the difficulty of maintaining a healthy and active lifestyle during the lockdown. Seventy percent of the participants, who were physically active in their daily life before the pandemic broke, indicated a significant decrease in the PA level that was related to increased weight gain. A correlation was found between age, health status, and the decrease in the PA level. Most prone to the pandemic quarantine was the old adult population that was less likely to initiate home-based activities. The health toll in this population might be higher as a result of physical inactivity and can lead to deterioration of their health condition. Cardiovascular deconditioning might increase the risk for cardiovascular disease while deconditioning of the musculoskeletal system might increase frailty osteoporosis and risk of falling among the elderly [32, 33].

Physical inactivity and sedentary lifestyle are both risk factors for coronary vascular disease, diabetes, and many more non-communicable diseases (NCDs). Although the general activity of the old adult group has limited a priori, nevertheless, this population is the most vulnerable to high morbidity caused by COVID-19. (34–36) WHO data indicates that up to 40 million individuals die each year from NCDs and 20–30% of these cases are related to a deficiency in PA [37]. For individuals, the failure to perform adequate levels of PA increases the risk for cancer, heart disease, stroke, and diabetes by 20–30% and shortens their lifespan by 3–5 years [37]. The total volume of accumulated sedentary time in prolonged, uninterrupted bouts is also associated with all-causes of mortality. Therefore, any PA guidelines should aim to reduce the sedentary time to avoid the risk of death [38, 39].

Lifestyles and PA have been changed globally during the coronavirus pandemic lockdown [2, 28, 40]. Data collected by Fitbit wristwatches from over 30 million active users around the globe, showed a decrease in PA of 38% in Spain, a 14% decrease in North America and 24% decrease in Israel [41]. Garmin user's reported a massive decline in the overall number of steps taken during the second two weeks of March [42]. Therefore, it is important to grant access to activity substitutes, especially for old adults, to keep them fit and healthy at their own homes. However, this option is limited by the ability of people with specific physical habits to change to a new, unaccustomed regime that uses digital technology and social media. It is necessary to make digital technology effective and accessible for all people, particularly for those with special needs. Furthermore, there is a need to implement and improve people's digital orientation and attitude toward digital technology. Such technologies can help in introducing a wider range of PA and media solutions, focusing on different populations, communities, languages, and cultures. Using digital technology, it is possible to deliver content that is designed for remote PA exercise at home when regular training options are unavailable.

The current survey found that 55% of the participants gained weight during the March-April pandemic quarantine. Weight gain was significantly negatively correlated with age, PA level, and use of home digital PA modalities. However, a multiple regression analysis showed that only reduction in PA level significantly predicted weight gain. Weight gain and metabolic syndrome has emerged as a major public health problem around the world and raises more concern concerning sedentary behavior during the COVID-19 pandemic [43, 44]. The syndrome is related to increased weight gain, abdominal obesity, hypertriglyceridemia, low high-density lipoprotein cholesterol, high blood pressure, and hyperglycemia [43, 45]. People having metabolic syndrome are at increased risk of developing diabetes and cardiovascular disease [45]. According to the Israeli Central Bureau of Statistics 48% of adults are overweight [46]. Although our survey was conducted on overall active individuals (57% of study participants were performing PA at list 3 times a week), the average increase in weight was considerable (1.25 kg). However, participants who conducted PA > 4 times/week did not gain weight. The weighted mean weight regained with or without exercise training was only 0.28 and 0.33 kg/month, respectively. Based on observational studies, an actual increase in energy expenditure of PA of approximately 6300–8400 kJ/week (1500–2000 kcal/week) is associated with improved weight maintenance [47]. The increased weight gain outcome in active individuals could be explained by the decrease in non-exercise activity thermogenesis (NEAT) which is the energy expenditure of all physical activities other than volitional sporting-like exercise. Since activity levels were decreased, it is not surprising that the whole NEAT decreased substantially, reflecting the increased indoor inactivity time.

To reverse this, there is a need to develop strategies by re-engineering our home environments [48]. Exercise is also associated with long-term weight loss through the relationship of its associated psychological changes together with improved nutrition, then through direct effects of energy expenditures, which are typically minimal in deconditioned individuals. There is a mutual relationship between exercise and diet [49–51]. Exercise induces changes in mood, body image, self-efficacy, self-esteem, and improves eating habits and weight loss [49, 51]. Likewise, diet and dietary practices affect mental well-being. (50) Engaging in healthy behaviors leads to increased motivation for the enhancement of well-being and improvement of mental health. That mutual effect has a better impact than the direct effects of energy expenditures that are typically minimal in deconditioned individuals [13, 52, 53]. Weight gain is associated not only with PA level but also with nutrition. COVID-19 has influenced people's eating habits. Preliminary data from the Brookdale Institute survey in Israel showed changes in nutritional habits, during the home lockdown, wherein people were reporting consuming more food, more sweets and snacks [30].

The current survey showed PA behavioral changes among the trainee population. Even though participants have had more spare time to exercise, they had numerous difficulties maintaining their PA routine. This effect of the pandemic health crisis on a well-trained person's behavior is paradoxical. Hypothetically, a person who routinely exercises in normal times has acquired a "toolbox" filled with skills and training habits. Naturally, we would expect him/her to be able to use his/her skills while in urgent need. But paradoxically the study shows that most participants reduced their PA level and only 15% of the respondents increased their PA. One explanation for this aforementioned paradoxical effect might be related to stress. More specifically, the stressful situation caused by the pandemic might have brought difficulties in maintaining an active lifestyle. Another possible explanation for the observed reduction in the PA level might be related to differences in adherence to individualized and group exercise. At times of closure, it is not possible to use the existing infrastructure for PA found in residential areas such as parks and fitness clubs as Israel had closed all recreation and sports facilities. Therefore, the ability to exercise with others was limited. Exercising with others was associated with superior adherence behavior [54]. Adults exposed to a team-building activity intervention reported greater adherence than those who participated in a standard-care program [55]. Thus adherence was associated with team-building more than the actual exercise program [56]. An alternative to the group activity might be engaging in PA with digital technology. In our study, we found a correlation between physical activity frequency and the level of one's efficacy to adopt digital PA technology, such as training online, digital application, exercise video clips, and more. Appropriate adaptation to the changed situation allowed most of the participants to maintain their active routine even during the lockdown. However, that adjustment was age-dependent and older adults found it difficult to adopt digital technology as an alternative to organized PA [57, 58].

For an active adult population, the consequences of inactivity and improper diet will be reflected, long after the crisis is over. It may result in an increased burden of NCDs, increased risk for morbidity due to metabolic, cardiovascular disease, and muscular deconditioning. Thus, the various governmental institutions and health agencies need to consider how to prevent it. Within a health promotion policy, an emergency plan should be established to include specific policies and guidelines for home-based physical training. We hence encourage the various governmental institutions and health organizations to include clear exceptions for PA in nationwide lockdowns. These should also allow for the safe performance of outdoor PAs (e.g. walking, running, or other individual sports, where an adequate interpersonal distance can be maintained), and thus prevent any future pandemic from generating unfavorable consequences that should arise due to acute cessation of physical activity. Furthermore, it might be advisable to engage in community-wide campaigns that deliver messages regarding upholding the PA level during lockdown by using the media such as television, radio, and newspaper columns.

This study was subject to several methodological limitations. The majority of the participants who responded to the survey were women, the generalizability of this study may be limited mainly to overall active females. Besides, this cross-sectional study refers to reports on PA level and weight. Future studies should incorporate objective measures (e.g., accelerometry and weight measurements). Finally, the data presented in this study represents a snapshot of the current situation which is relevant to the early stages of the pandemic in Israel. As the pandemic evolves and subsequent national and institutional new policies and practices are developed and implemented, future follow-up investigations will be necessary to understand the effects of COVID-19 over time.

Conclusion

In conclusion, this study demonstrates the negative effect of lockdown and social distancing policy on peoples' PA levels and metabolic status. However, those who exhibited higher PA level gained less weight. Using digital media for training was associated with a higher PA level. Therefore, there is a need for governmental and health agencies to rethink of a health policy in which PA will be more accessible during pandemic crises, especially for the aged population and people with special physical and medical needs. Alternatives to organized PAs could be achieved with digital technology and remote training which can be a suitable substitute for many. Moreover, the elevated motivation of all trainees, including the aged and those with medical risk factors to return to their original organized activity, illustrates the importance of organized PA in people's lives as an essential need for their physical, social and mental health. This fundamental need should be taken into consideration involving some complex risk assessments when organized activity is forced to be closed.

Abbreviations

PA

physical activity

ACSM

American College of Sports Medicine

WHO

World Health Organization

NCD's

non-communicable diseases

Declarations

- Competing interest: none of the authors have any potential, perceived, or real conflict of interest.
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- Consent for publication: Not applicable
- Author's contribution:

HDH - Initiator and designer of the research and methods, writing

SK - Scientific writing and editing

PR - Conducting the survey and writing

HL - Writing and scientific consulting

SB - Statistical and Data Analysis, writing

All authors have read and approved the manuscript

- Ethics Approval and Consent to Participate: The study was approved by the Helsinki ethics committee of Sheba Medical Center (6504-9-SMC). All participants gave written informed consent.
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- Availability of data and material: Will be included as a supplement S1

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Figures

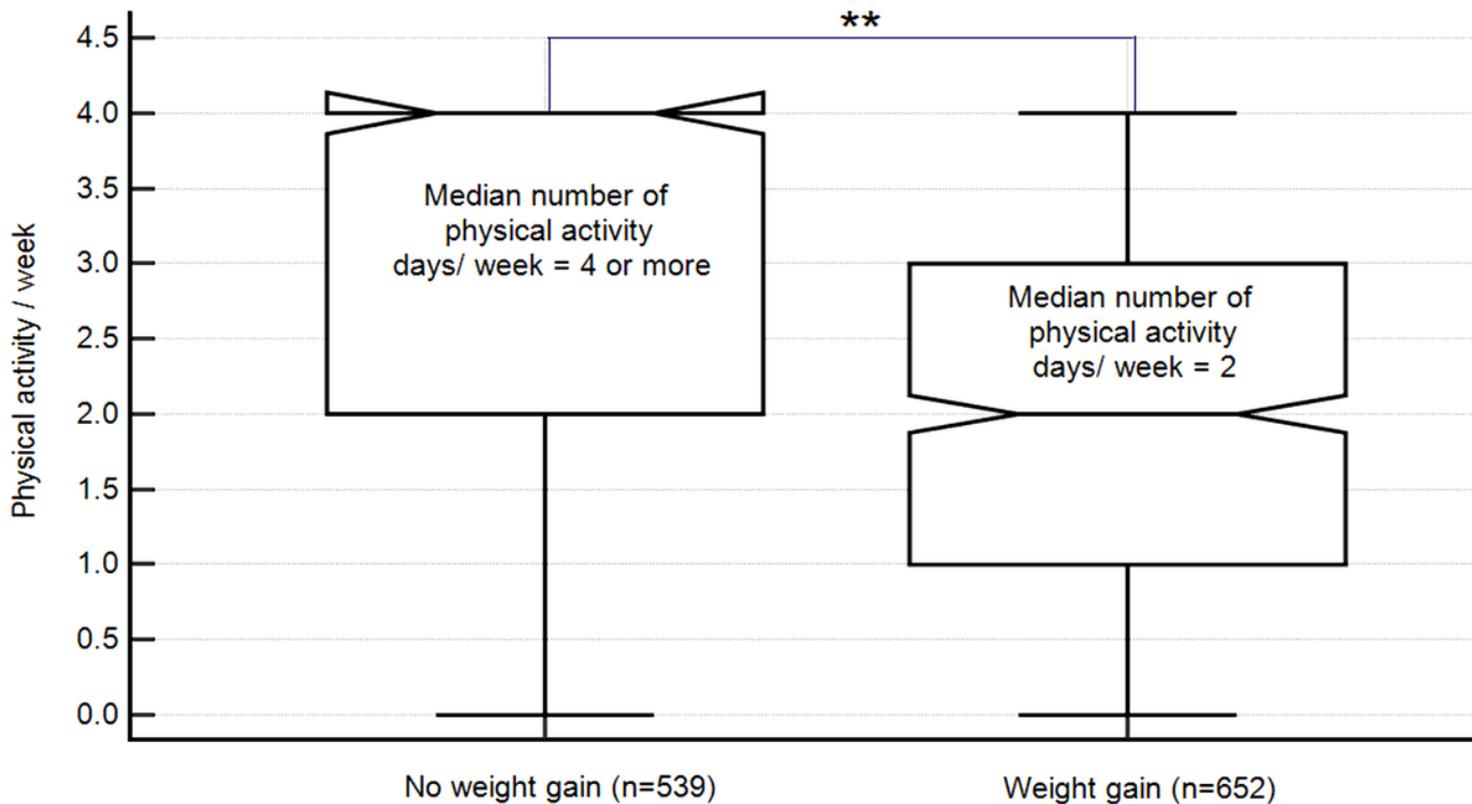


Figure 1

Physical activity level based on weight gain group. ** Significant between-group differences at $p < 0.01$ (Mann-Whitney U test=109800.00); The central box represents the values from the lower to upper quartile (25 to 75 percentile); the vertical line extends from the minimum to the maximum value; the middle line represents the median.

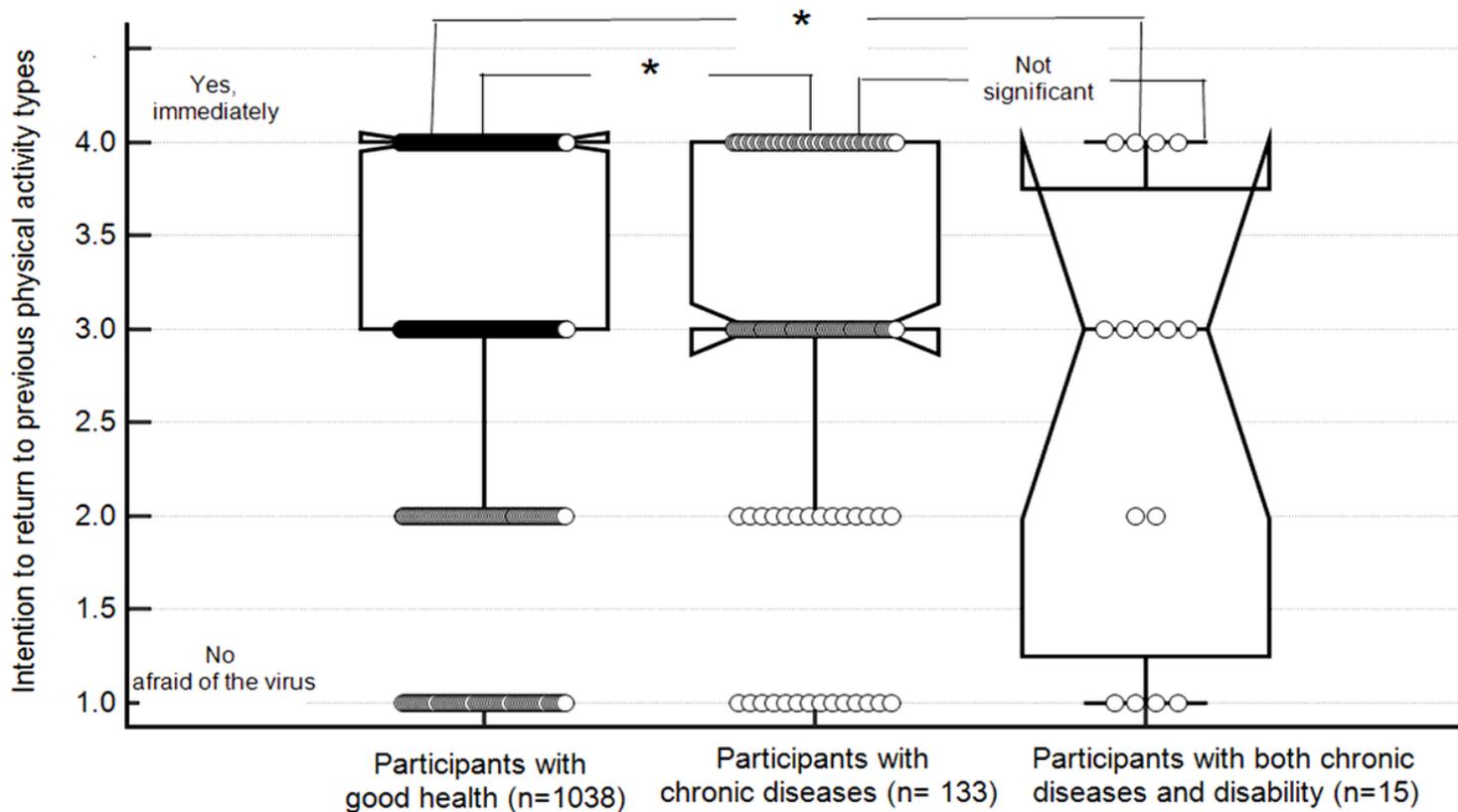


Figure 2

Return to physical activity intentions based on health status. Significant at $p < 0.05$ (Conover post-hoc test); Intention to return to physical activity category 5 (no, because my health deteriorated), was omitted from the analysis as it included only two participants); the central box represents the values from the lower to upper quartile (25 to 75 percentile); the vertical line extends from the minimum to the maximum value, excluding outside values which are displayed as separate points. An outside value is defined as a value that is smaller than the lower quartile minus 1.5 times the interquartile range, or larger than the upper quartile plus 1.5 times the interquartile range; the middle line represents the median.

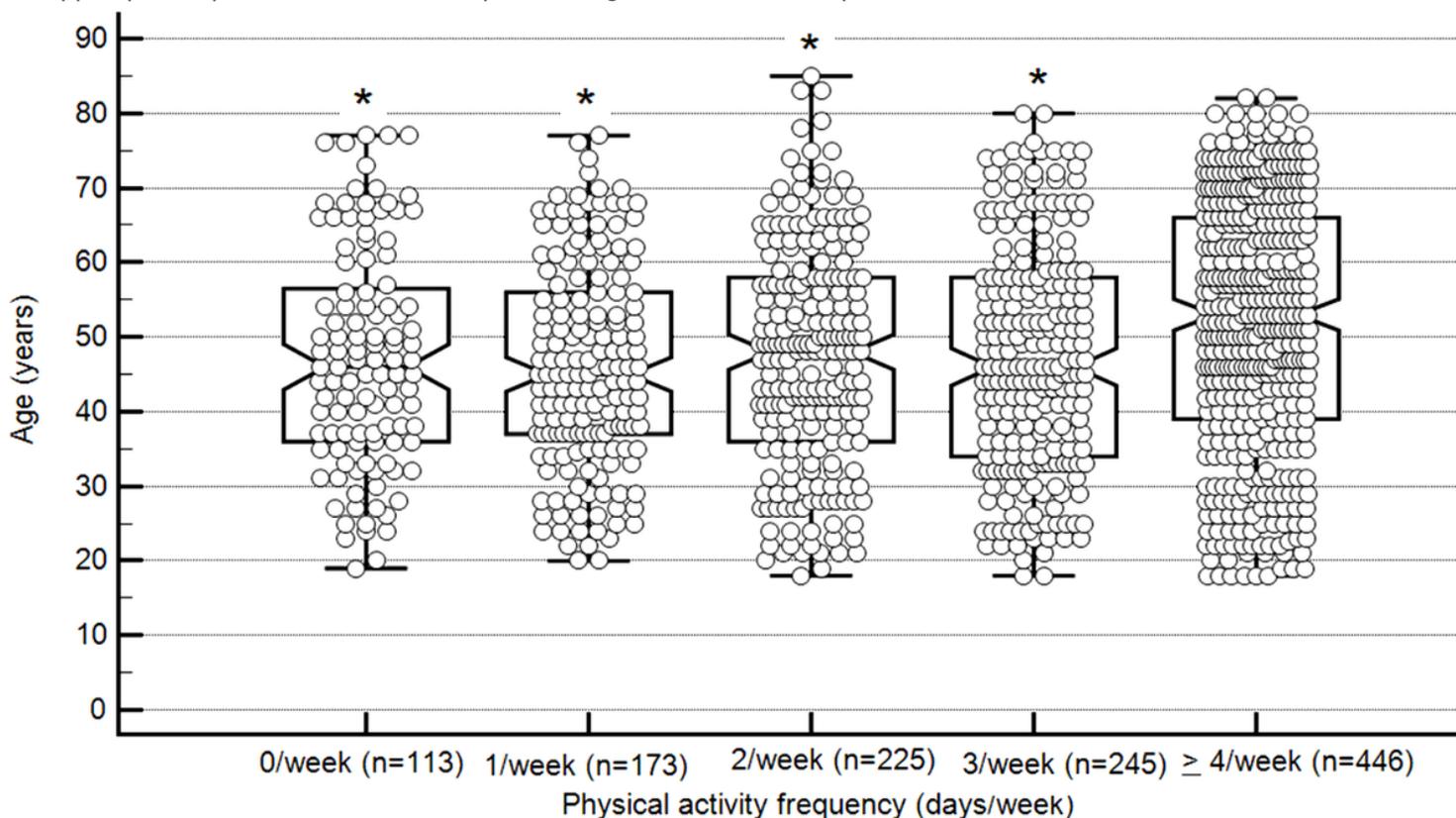


Figure 3

Physical activity frequency - age differences. * significantly different than 4/week group at $p < 0.05$ (Tukey-Kramer test for all pairwise comparisons); the central box represents the values from the lower to upper quartile (25 to 75 percentile); the vertical line extends from the minimum to the maximum value, excluding outside values which are displayed as separate points. An outside value is defined as a value that is smaller than the lower quartile minus 1.5 times the interquartile range, or larger than the upper quartile plus 1.5 times the interquartile range; the middle line represents the median.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [ST1SupplementQuestionnaire.docx](#)
- [ST2CoronaandPARawdata.xls](#)
- [ST3Regressionphysicalactivitylevel.docx](#)
- [ST4Regressionweightgain.docx](#)
- [STROBEchecklistcrosssectionalPACorona.docx](#)