Factors Associated with PA Level during the COVID-19 Outbreak in Serbia

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Objective: The novel coronavirus (SARS-CoV-2) has had an influence on almost the entire world and has become a major public health problem. Many countries have introduced measures that restrict the movement of the population and that may negatively influence the physical activity (PA) levels. The aim of this study was to examine the factors associated with changes in PA in Serbia during the COVID-19 outbreak.

Methods: The cross-sectional study was conducted from the 9th through the 13th of April 2020. A total of 340 people, all contacted using Viber, were invited to participate in the study. The study instrument was a questionnaire that gathered information regarding social characteristics, PA during the outbreak, PA before the outbreak, and fear of COVID-19.

Results: A total of 50 participants (14.7%) had low levels of PA in the 7 days prior to the study, while 133 (39.1%) had moderate and 106 (31.2%) had high levels of PA. The participants with high levels of PA had significantly higher energy expenditures before than after the COVID-19 outbreak (*P* < .001). There were no significant differences between the participants with different levels of PA in the scores on the Fear of COVID-19 scale (low: 13.4 ± 5.2; moderate: 12.6 ± 4.4; high: 13.8 ± 5.5; P = .204).

Conclusion: One-sixth of the participants had low PA levels, and as restrictive measures are still in place in many countries, the lack of PA in high proportions of the general population may cause significant public health concerns. [*P R Health Sci J 2022;41(2):63-67*]

Key words: COVID-19, Fear of COVID-19, Physical activity, Physical activity level, Sedentary time

Since the appearance (in December 2019) in Wuhan, China, of a new type of coronavirus (Sars-CoV-2), which is associated with novel coronavirus disease (COVID-19) (1), the latter—COVID-19—has become, globally, a major public health problem and a serious infectious disease. In addition to causing respiratory problems, the new virus may indirectly cause panic and anxiety because it spreads very quickly. The World Health Organization (WHO) declared the coronavirus to be a pandemic on March 11, 2020, as the virus had already affected the populations of a total of 113 countries and territories by that time (2).

The spread of the infection forced governments around the world to take measures and issue official directives aimed at slowing—stopping, if possible—the diffusion of the virus. In many countries, such as Serbia, drastic measures were introduced, such as the closure of borders, the declaration of a state of emergency, and the closure of schools (3). In Serbia, these measures went into effect on March 15, 2020. Some countries introduced restrictions of movement for entire populations and absolute bans on leaving home for anyone over 65 (4). In Serbia, face masks became mandatory in all indoor spaces, and in some countries, masks must be worn outdoors, as well. Also in Serbia, mandatory social distancing was instituted, private visits were restricted, and cafes and restaurants were closed. In those parts of the country where the virus was more prevalent, people were forbidden from traveling more than 15 km from their residence (a restriction that was also instituted in Germany) (5). In the United States, states, counties, and even cities have been subject to wildly varying recommendations and mandates (6).

All this has caused people the world over to significantly change their lifestyles and previous physical activity (PA) routines, and the closure of sports centers and gyms, which has also been part of the preventive measures instituted in Serbia, has led to exercise reduction. Even in countries in which restrictive measures were not imposed, there have been recommendations to minimize social contacts and to work from and stay at home.

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Despite the fact that various European governments have promoted going to and returning from one's job as significant forms of PA for the members of the labor force, this kind of mobility has been only barely possible under current conditions.

Worryingly, increased stays at home lead to sedentary lifestyles, which are associated with chronic non-communicable diseases, the worsening of the condition of the already ill, or both (7). Physical inactivity is a significant factor in the morbidity and mortality of cardiovascular, metabolic (8), and other diseases (9–11). Based on our current experience with COVID-19, we know that (COVID-19) patients who suffer from 1 or more of these diseases are the most vulnerable group, especially those with hypertension, and COVID-19 patients with type 2 diabetes mellitus (8,12,13) have very high mortality rates, as do elderly patients with the virus (14). In addition, obese COVID-19 patients form a vulnerable group, as well, with obesity being a strong predictor of negative disease outcome and carrying with it the increased risk of serious illness, hospitalization, and death (15).

From a public health perspective, the promotion of staying physically active under our current circumstances is of extreme importance—as is the prevention of COVID-19 infection—in order to prevent the chronic non-communicable diseases and conditions that are associated with physical inactivity: coronary heart disease, hypertension, stroke, high cholesterol, triglyceride, obesity, type 2 diabetes mellitus, osteoporosis, decreased immunity, reduced cardiorespiratory fitness, metabolic syndrome, anxiety, and depression (16–19). Additionally, PA boosts the immune system and can reduce the effects of eventual infection. As COVID-19 is still not well researched, and as it has a high infection rate and relatively high mortality rate, there is a high level of distress and fear among members of the general population (20). This pronounced fear can, along with the preventive measures enforced, such as social distancing and curfews (21), have a negative influence on the practice of PA in the general population.

The aim of this study was to examine the factors associated with the changes in PA during the COVID-19 outbreak in Serbia.

Materials and Methods

The cross-sectional study was conducted from the 9th through the 13th of April 2020 in Serbia via an online questionnaire. The questionnaire was distributed to the members of 10 Viber (an app that allows users to send text messages and make both audio and video calls) groups with diverse followers. A total of 700 people were invited to participate in the study, of whom 340 filled in the questionnaire, yielding a response rate of 48.6%.

The study instrument consisted of 4 sections: socio-demographic and socio-economic characteristics, PA levels during the 7 days prior to the survey (during the COVID-19 outbreak, with the preventive measures enforced), PA levels 4 weeks before the study (prior to the COVID-19 outbreak and the subsequent declaration of a state of emergency in Serbia), and fear of COVID-19.

Physical activity in the 7 days prior to the survey was assessed using the Serbian version of the International Physical Activity Questionnaire (IPAQ), which had previously been validated and used in Serbian (22,23). Physical activity in the 4 weeks prior to the study (before the COVID-19 outbreak) was assessed with the modified version of the IPAQ. The IPAQ questionnaire refers to PA in the 7 days prior to taking the questionnaire, but with this version, we explored the participants' PA levels 4 weeks before said completion. Energy expenditure (EE) (in metabolic equivalent of task [MET] minutes/week), which is used in the IPAQ questionnaire, was calculated according to the following formula:

EE = time spent in vigorous PA x days with vigorous PA x 8 + time spent in moderate PA x days with moderate PA x 4 + time spent walking x days with walking > 10 min x 3.3

Based on their EE in the 7 days prior to the survey, participants were classified in 3 groups: low level of PA (<600 MET minutes/week), moderate level of PA (601–3000 MET minutes/week), and high level of PA (>3000 MET minutes/week) (22).

Changes in EE (PA in the time before the COVID-19 outbreak vs. PA in the 7 days prior to the survey) were calculated as the difference between the 2 EEs (EE before the outbreak – EE during the outbreak). Changes in sedentary time were calculated as the differences in average minutes spent sedentary per day during the outbreak and before the outbreak.

Fear of COVID-19 was assessed using the Fear of COVID-19 scale (20). The scale was translated into Serbian and the resulting text assessed for accuracy using back translation, a method that is recommended by the WHO (24). Pilot testing was done on 10 participants, and the results of said testing helped us to determine whether the questions were understandable and ordered correctly; we were also able to determine the time needed to fill in the questionnaire (approximately 5–7 minutes). Test–retest reliability was assessed with 10 participants (intraclass coefficient > 90). The internal consistency of the scale was assessed with Cronbach's alpha ($\alpha = .829$).

The Fear of COVID-19 scale is a 7-item questionnaire that assesses feelings related to the COVID-19 pandemic. The answers are given on a 5-point Likert scale and range from "strongly disagree" to "strongly agree." The possible score on this particular scale ranges from 7 to 35 (20).

The following 13 variables were analyzed: sex, age, place of residence, self-rated economic status, self-rated family relationships, self-rated health, changes in self-rated health, PA level in the 7 days prior to the survey, average total daily sedentary time in the 7 days prior to the survey, total EE before the COVID-19 outbreak, average total daily sedentary time before the COVID-19 outbreak, changes in EE, and score on the Fear of COVID-19 scale.

All the participants were given written information about the study, its processes, and its aims, after which they were asked to

participate in the study. The ethical committee of the Faculty of Medicine, University of Belgrade, approved the study (No. 1322/V-18 from 28.05.2020).

Statistical analyses were done using descriptive and analytical statistical methods. The differences between the groups of participants with low, moderate, and high PA levels were assessed using the chi-square test and univariate variance analysis. All analyses were done using the Statistical Package for Social Sciences SPSS Version 22.0 (IBM Corp., Armonk, NY, USA).

Results

A total of 50 participants (14.7%) had low levels of PA in the 7 days prior to the study, 133 (39.1%) had moderate levels, and 106 (31.2%) had high levels of PA; 51 participants did not fill-in the questionnaire properly, so their EEs could not be computed. The average EE of the participants was 2956 (±2822) MET minutes/week.

There were significant differences in the percentages of participants with low, moderate, and high levels of PA living in urban and rural areas ($P < .001$). There were no significant differences in terms of the other socio-demographic and socio-economic characteristics of the participants with different levels of PA.

The socio-demographic and socio-economic characteristics of the participants are shown in Table 1.

Table 1. Socio-demographic and socio-economic characteristics of the participants

Characteristics	Low PA	Moderate PA	High PA	*P* value
Male	22 (44.0)	62 (46.6)	56 (53.3)	
Female	28 (56.0)	71 (53.4)	49 (46.7)	.455
Age (years)				
(X ± SD)	42.5 ± 10.2	40.4 ± 11.0	39.1 ± 12.4	.210
Type of residence				
Urban	47 (95.9)	129 (97.7)	93 (87.7)	
Rural	2 (4.1)	3 (2.3)	13 (12.3)	< .001
Self-rated economic status				
Poor	2 (4.0)	6 (4.5)	5 (4.7)	
Average	18 (36.0)	68 (51.1)	45 (42.5)	
Good	30 (60.0)	59 (44.4)	56 (52.8)	.370
Self-rated family relationships				
Poor	0 (0)	3 (2.3)	2 (1.9)	
Average	4 (8.0)	16 (12.0)	19 (17.9)	
Good	46 (92.0)	114 (85.7)	85 (80.2)	.382
Self-rated health				
Poor	0 (0)	1 (0.8)	0 (0)	
Average	10 (20.0)	17 (12.8)	13 (13.2)	
Good	40 (80.0)	115 (86.5)	92 (86.8)	.589

Values as N (%). Abbreviations: PA: physical activity.

The participants with high levels of PA had significantly higher EEs before the COVID-19 outbreak than did those with low or moderate levels of PA ($P < .001$) and experienced, for the most part, increases in EE during the outbreak, while the participants with low or moderate levels of PA prior to the outbreak experienced decreases in EE during the outbreak. The average EEs of the participants before the COVID-19 outbreak and the average changes in those EEs are presented in Figure 1.

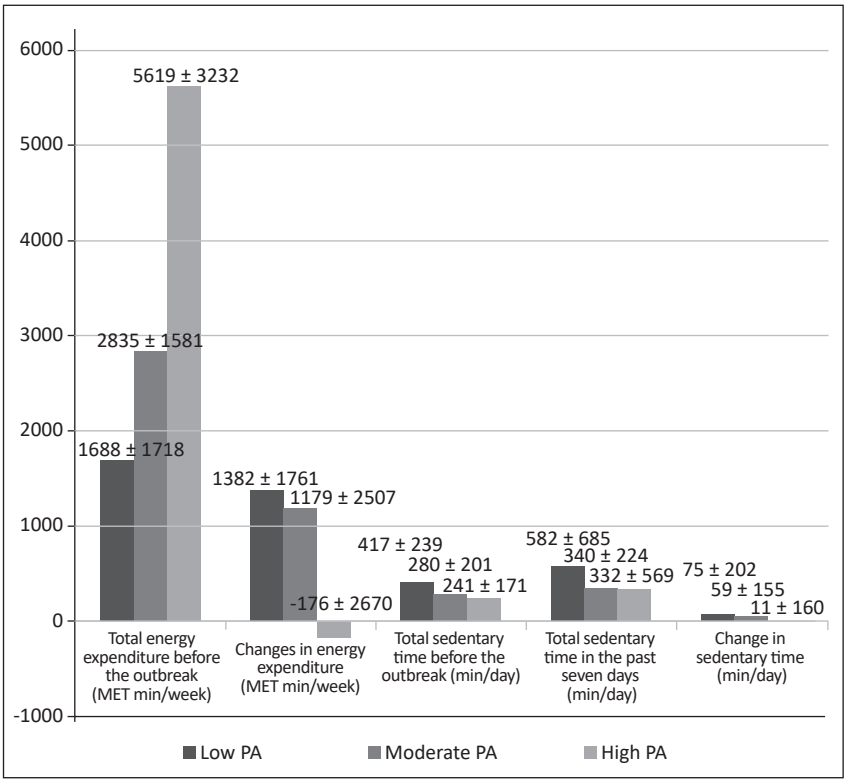

Figure 1. Total energy expenditure 4 weeks before the study (before the outbreak) and changes in energy expenditure Values as (X ± SD). Abbreviations: PA: physical activity.

Post hoc analysis revealed that the differences in EEs before the COVID-19 outbreak were statistically significant ($P < .001$) between all groups: low vs. moderate, low vs. high, and moderate vs. high. In addition, there were significant differences in the changes in the average EE between these groups, as well: low vs. high ($P < .001$) and moderate vs. high ($P < .001$). The difference between the groups of low and moderate PA was not significant ($P = 1$). Post hoc analysis for the average sedentary time before the outbreak showed that there were significant differences between the groups with low and moderate levels of PA, and between the groups of low and high levels of PA ($P < .001$).

Regarding the scores on the Fear of COVID-19 scale, there were no significant differences between the participants with different levels of PA (low: 13.4 ± 5.2; moderate: 12.6 ± 4.4; high: 13.7 ± 5.5; $P = .204$).

Discussion

The aim of this study was to examine the factors associated with changes in PA during the COVID-19 outbreak in Serbia. From the beginning of the COVID-19 outbreak, as recommendations and bans on leaving one's home came into play, it was expected that this would be reflected in the population, with an overall decrease in PA and an overall increase in sedentary time. Commentary papers, opinions, and interviews soon emerged, all discussing the importance of PA and how to comply with the quarantine and stay-at-home orders (25–27).

Our study revealed that less than one-third of the participants had high levels of PA and almost two-fifths of the participants had moderate levels of PA. Worryingly, almost 1 in 6 of our participants had low levels of PA in the week before the study and did not fulfill the recommendations from the WHO on the minimal PA for all adults (at least 150 to 300 minutes of moderate intensity PA or at least 75 to 150 minutes of vigorous intensity aerobic PA) (28). Our study also showed significant differences in PA levels between the participants from rural areas and those from urban settlements. These differences may be due to differences in the daily routines of people in rural compared to urban areas and the outdoor spaces in rural areas that allow people to be physically active even during curfew, or both. On the other hand, people living in urban areas are mostly confined to their homes during curfew, which hinders PA. Additionally, some measures were loosened in the rural areas: In Serbia, farmers were allowed to work in their fields, even during curfew. Only residents aged 70 years and over were strictly forbidden to leave their homes in the rural areas, compared to all residents aged 65 years and over in urban areas.

Our results proved that the impact of COVID-19 together with life under the associated restrictive measures initiated a significant decrease in PA and EE in those who already had low or moderate levels of PA prior to the outbreak. It is interesting to note, however, that those who had high levels of PA before the onset of the outbreak, maintained those high levels, even with the restrictions imposed by the state of emergency. In fact, some even increased their PA levels, which can be attributed to good organization and an excess of free time during lockdown. The results also demonstrate a significant increase in sedentary time during the COVID-19 outbreak, even in those individuals with high levels of PA. We did not find any significant differences among participants when it came to their fear of COVID-19 and their levels of exercise activity. The reason may be the history of the people in this country, which ranges from the Yugoslav Wars and sanctions in the 1990s to the 1999 NATO-directed bombing campaign, all of which may have contributed to the population's apparent increased tolerance for fear.

Our study has a few possible limitations. The study design was cross-sectional, and it did not allow for the establishment of causal relationships between the variables. The study was conducted online and consequently is not representative of the population without internet access or knowledge of internet use, but at this point, this was the only viable method of distributing our survey. All data were self-reported and are subject to bias. However, to the best of our knowledge, this is the first Serbian study to examine both PA levels and the factors associated with the maintenance of PA during the COVID-19 outbreak, while also taking into account the strict, restrictive measures that influenced the population's usual levels of PA.

Our research revealed that participants who had high levels of PA were those who also had the highest EEs resulting from PA before the outbreak of COVID-19. Unlike these individuals, who increased their levels of PA in the pandemic, the participants with low or moderate levels of PA were less active. One-sixth of the participants did not follow the recommendations of the WHO about minimum PA. As the outbreak of COVID-19 has had the greatest impact on the daily routines of people around the world, and as restrictive and social distancing measures have remained in place in many countries for some time after vaccination, the lack of PA in a large percentage of the general population can cause significant public health concerns, especially in places where the populations have high levels of chronic non-communicable diseases, which would include various European and North American countries.

Resumen

Objetivo: El nuevo coronavirus (SARS-CoV-2) ha influido en casi todo el mundo y se ha convertido en un importante problema de salud pública. Muchos países han introducido medidas que restringen el movimiento de la población y que pueden influir negativamente en los niveles de actividad física (AF). El objetivo de este estudio fue examinar los factores asociados con los cambios en la actividad física en Serbia durante el brote de COVID-19. Métodos: El estudio transversal se realizó del 9 al 13 de abril de 2020. A un total de 340 personas se invitó a participar en el estudio, todas contactadas mediante Viber. El instrumento de estudio fue un cuestionario que recopiló información sobre características sociales, AF durante el brote, AF antes del brote y miedo a la COVID-19. Resultados: Un total de 50 participantes (14,7%) tenían niveles bajos de AF en los 7 días previos al estudio, mientras que 133 (39,1%) tenían niveles moderados y 106 (31,2%) altos. Los participantes con altos niveles de AF tenían gastos de energía significativamente más altos antes que después del brote de COVID-19 ($P < 0,001$). No hubo diferencias significativas entre los participantes con diferentes niveles de AF en las puntuaciones de la escala de miedo a la COVID-19 (baja: 13,4 ± 5,2; moderada: 12,6 ± 4,4;

alta: 13,8 ± 5,5; p = 0,204). Conclusión: Una sexta parte de los participantes tenían niveles bajos de AF y, dado que todavía se aplican medidas restrictivas en muchos países, la falta de AF en altas proporciones de la población general puede causar importantes problemas de salud pública.

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