The COVID-19 pandemic affects owners walking with their dogs

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ABSTRACT

The COVID-19 pandemic imposed a strict state of emergency on Belgrade residents with a curfew and restriction on movement. Therefore, the aim of this study was to determine how the measures introduced as a consequence of this disease in the capital of Serbia affected the duration of walking time of owners and their dogs. The study allowed for sociodemographics of owners, characteristics of their homes and breeds of dog. The research was conducted in the period from March 22 to April 4, 2020. In general, the COVID-19 pandemic restrictions reduced the duration of dog walks and owners' walking time. Of the 216 adult dog owners, 59% walked their dogs successfully ($\geq$150 min/week) before the state of emergency. The number of owners who walked their dogs for $\geq$150 min/week decreased to only 44% (N = 96) during the state of emergency. The pandemic also decreased the number of owners who achieved total walking times of $\geq$150 min/week, so only 56% of them were successful in total walking time during the state of emergency (100% were successful before the pandemic, as this was one of inclusion criteria). This difference was statistically significant ($P < 0.01$). A Wilcoxon signed-rank test found significant differences in the total walking time before and during the state of emergency, with regard to characteristics of the owner, home and dog, with strong effect sizes for these differences ($P < 0.01$). McNemar's test showed that female owners, owners aged 45-64 years and owners with high income who were previously successful in walking their dogs ($\geq$150 min/week) were more affected by the pandemic in regard to walking time with dogs ($P < 0.01$). Significant correlations ($P < 0.01$) were observed between dog breed and walking time before the state of emergency; age and walking time with the dog during the state of emergency and; age and total walking time during the state of emergency. Comparisons between different categories within the same characteristics (owner demographics, home characteristics and dog breed) by Fisher's exact test found significant differences only between younger and older dog owners in total walking time during the state of emergency ($P < 0.01$). Younger owners were significantly more successful in achieving $\geq$150 min/week total walking time than owners aged 45-64. The COVID-19 pandemic has left some owners jobless and allowed them to spend more time walking dogs. The occurrence of this disease has led to changes in the social structure of households and in the daily habits of household members. These factors have affected on the length of walking time of owners and their dogs in Belgrade.

Introduction

According to World Health Organization recommendations, adults aged 18-64 should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week or an equivalent combination of moderate- and vigorous-intensity activity (WHO, 2011). Walking as a form of physical activity is becoming increasingly important in order to preserve and improve individual and public health. Walking is not only a form of physical activity but also a form of transportation or travel. There are many health benefits for people from walking. It has been found that walking, as the simplest type of physical activity, reduces the risk of heart disease, high blood pressure, overweight and obesity, diabetes, depression and anxiety, cancer and osteoporosis. This means walking improves people's physical and mental health and reduces mortality (Hamer and Chida, 2008;

Heesch et al., 2010; Boisvert and Harrell, 2014). Therefore, walking can be considered as the simplest way to make improvements to public health (Cleland et al., 2008; Hamer and Chida, 2008). Walking is also an ecologically-friendly type of locomotion because it does not produce noise and does not pollute the air (de Nazelle et al., 2011). Research related to human walking is not only focused on individual and public health, but is also focused on walking behavior at individual and group-level and on environmental factors. Construction of better places to walk for physical activity and improved sensorial and experiential pleasure was also studied (Mehta, 2008).

People can decide for themselves when they will walk, where they will walk, how fast they will walk, how long they will walk, in which direction they will walk, with whom they will walk, and what will be the content of their walk. That is why walking behavior includes dimensions and main characteristics such as walking distance, walking direction, walking time, walking speed and walking experience (Azmi et al., 2012). The study of Pun-Cheng and So (2019) indicated that people prefer safe and comfortable walking environments. An individual can walk alone, in a pair, in a group or with one or more dogs. The health benefits from walking with dogs are numerous for both subjects in the activity – the owner and the dog. Owners can walk dogs on a leash or unleashed. This parameter is affected by the type of public place and the dog's age, sex and size (Sediva et al., 2017), and also by dog behavior and on-leash legislation.

Physical activity is also very important for the health of dogs, and the most common form of such activity that owners provide for their pets is dog walking (Degeling et al., 2012). However, there are few sources of data on the needs of specific dog breeds for physical activity, especially walking. Pickup et al. (2017) disclosed that half of the dogs from the UK did not receive the recommended activity level according to the UK Kennel Club recommendation.

Dog walking is influenced by 3 groups of factors: dog-related, owner-related (Westgarth et al., 2015, 2016), and environment-related factors (McCormack et al., 2016; Zijlema et al., 2019). Garcia et al. (2015) estimated that dog ownership is associated with increased physical activity in older women, particularly among women living alone. Reeves et al. (2011) indicated that many adult owners walked their dogs for at least 10 minutes at a time. However, a small proportion of owners walked their dogs at least 150 minutes per week. Among dog-related factors, Westgarth et al. (2015, 2016) recognized dog size, body condition (overweight dogs), health condition, age and attachment to dogs, among others. Owner-related factors can be classified into 2 main groups. The first of them is related to owner cognitive factors and the second relates to owner socio-demographics. Environmental factors that affect dog walking involve the social and physical environment and include proximity of greener areas, pedestrian infrastructure, street connectivity, esthetics, and many others (McCormack et al., 2016; Zijlema et al., 2019). Moreover, many dog owners feel obligated to walk their pets (Westgarth et al., 2015, 2016). This feeling allows them to overcome environmental barriers or conditions that might obstruct dog walking (McCormack et al., 2016). There are some other factors that can negatively affect dog walking. One of them is the local bylaws (Degeling and Rock, 2013). They usually regulate where walking and entry of dogs is prohibited and where dogs have to be leashed. Owners may avoid areas where any dog walking restrictions apply.

On Sunday, March 15, 2020, the Serbian government declared a state of emergency to halt the spread of the new SARS 2 coronavirus – the causative agent of COVID-19. The next day, kindergartens, schools, universities, gyms, restaurants, cinemas, theatres and many other public gathering places were closed. Two days

later, the Serbian government implemented a curfew (5 PM to 5 AM) in an attempt to limit the spread of the coronavirus. Citizens aged 65 and older were forbidden to leave their homes. The use of promenades, picnic areas and parks for all citizens was also prohibited. Owners who walked their dogs in urban areas were the most affected by this order. They had to adapt the walking of their dogs to times when movement was allowed, but also to changes in their work obligations and daily habits that occurred in their households.

These strict measures to restrict the movement of citizens lasted for 2 months. We used that time limit caused by COVID-19 to ask dog owners from Belgrade how and why it changed their walking time with dogs.

Materials and Methods

The survey included 216 owners of adult dogs aged 1 to 7 years who walked their pets before and during the state of emergency in Belgrade. The conditions for participation in the research were that all participants were physically active and that their total walking time was ≥150 min/week before the state of emergency. Participants were adults and volunteered to participate in the research. They were contacted via social networks, mostly Facebook. A previously compiled questionnaire was sent to them, consisting of 3 parts. The first part included socio-demographic data of the dog owners (gender, age, level of education, income, number of household members), data related to homes (home location in Belgrade, owning a garden), and data on dog breed. In order to conduct statistical analysis, these characteristics were considered as independent variables. In the second part, they were asked if they walked their dogs for at least 150 min/week before and during the state of emergency. They were also asked if and how their total walking time had changed during the state of emergency (≥150 min/week or <150 min/week). For the purpose of the statistical analysis, these 3 variables were considered as dependent variables (3 outcomes). In the third part, the owners were asked to describe reasons that led to changes in their dog walking times (durations) during the state of emergency. This question was open-ended. Their responses to the third question were grouped according to similarity based on the textual content of their explanations.

Participants were contacted in the period from March 22 to April 4, 2020.

Statistical analysis

Statistical analysis was performed using the software VassarStats (Lowry, 2021).

In order to compare the number of owners who achieved total walking times of ≥150 min/week before and during the state of emergency, the Wilcoxon signed-rank test based on Z-approximation was used. For each comparison, the sum of ranks (w), signed-rank (Ns/r), Z and P (2 tail) is given in tables. Also, the Wilcoxon signed-rank test gave information on the influence of independent variables on total walking time considered as a dependent variable. To assess dog walking in prepandemic and pandemic timeframes, McNemar's test was used. The 4 pairs studied were: walked before/walked during the state of emergency ≥150 min/week (1/1); walked before/did not walk during the state of emergency ≥150 min/week (1/0); did not walk before/walked during the state of emergency ≥150 min/week (0/1) and; did not walk before/did not walk during the state of emergency (0/0). Participant characteristics, characteristics of their homes and dog breed characteristics were compared for length of walking time with dogs before and during the state of emergency and for owners'

Table 1

Dog owner demographic data

Gender	N	%
Male	55	26
Female	161	74
Age		
18-44	184	85
45-64	32	15
Education		
Medium	117	54
Higher or high	99	46
Number of members in household		
1	36	17
2+	180	83
Income		
Low to medium	153	71
High	63	29
Home location		
Central Belgrade	83	38
Noncentral Belgrade	133	62
Garden		
Yes	60	28
No	156	72
Dog breed		
Mixed breed	115	53
Purebred	101	47
Total	216	100

Table 2

Mean age of the dog owners

Age	Mean ± SD
Male owners	31.07 ± 10.50
Female owners	35.96 ± 10.26
Total	34.71 ± 10.52

SD, Standard deviation.

total walking time during the state of emergency using the Chi-square ($\chi 2$) test. In other words, the Chi-square test was used to access the relationship between 2 independent variables within the same outcome as the dependent variable. For the degree of freedom equal1 (DF = 1), the Chi-square value reported is the Yates Chi-square, corrected for continuity. In cases where the frequencies of certain variables were less than 5, the Fisher exact test was used. Statistical analyses were considered significant at $P < 0.01$ (2-tailed).

In order to measure the strength and direction of the relationship between independent variables and dependent variables, we applied correlation analysis.

Results

The sample of dog owners (N = 216; Table 1) who participated in the study consisted mostly of females (74%), were aged 18-44 years old (85%), had a medium education level (54%), lived in households with 2 or more members (83%) and had low or medium income (71%). Most of the participants reported they lived in noncentral areas of Belgrade (62%), in homes without gardens (72%) and owned mixed breed dogs (53%). The mean age of dog owners who participated in the study was 34.71 ± 10.52 (mean ± standard deviation; Table 2). Female dog owners (35.96 ± 10.26) were slightly older than male owners (31.07 ± 10.50). Dog owners aged 65 and older were not included in this study because they were barred from leaving their homes during the state of emergency.

In the case of dog owners, it is clear that the pandemic and confinement due to the state of emergency reduced the number of those who walked a total of ≥150 min/week. Therefore, the 2 groups can be clearly differentiated, those who spent ≥150 min/week walking their dogs during the pandemic (56%) and those who did not (44%) (Table 3).1

The Wilcoxon signed-rank test showed that these differences were very significant ($P < 0.01$) (Table 4). For all comparisons (gender, age, education, members in household, income, home location, garden and dog breed), the number of owners who walked in total 150 min/week before the pandemic was also significantly higher than during the state of emergency, with a large effect size ($P < 0.01$); effect size = 1. The large effect size indicates the large magnitude of the difference between the number of owners who walked in total ≥150 min/week before and during the pandemic. This result confirmed the negative effect of the pandemic and confinement during the state of emergency, which reduced the number of owners who walked in total ≥150 min/week.

Unlike the owners, who were easy to classify into 2 groups based on their total walking time, it was more difficult for the walking times with dogs. Based on the walking time with dogs, it was possible to distinguish 4 groups (Table 3 and Table 5): the group of owners who walked with dogs ≥150 min/week before the pandemic and during the state of emergency (N = 56; 26%); the group of owners who walked with dogs ≥150 min/week before but not during the state of emergency (N = 72; 33%); the group of owners who walked with dogs ≥150 min/week during the state of emergency but not before (N = 40; 19%) and; the group of owners who did not walk with dogs ≥150 min/week both before and during the state of emergency (N = 48; 22%). In order to compare differences between these 4 groups, McNemar's test for matched pairs was performed. The test showed statistically significant differences between 4 groups of females ($P = 0.0012$); 4 groups of owners aged 45-64 ($P = 0.0001$); groups with high incomes ($P = 0.008$); and groups with purebred dogs ($P < 0.0001$). Also, McNemar's test estimated that the confinement due to the state of emergency was associated with a reduction in the number of owners who walked with dogs ≥150 min/week. In all cases regarding the owner characteristics, the values of the odds ratio indicated the probability of a decrease in the number of owners who walked with dogs ≥150 min/week. Thus, the state of emergency and associated confinement significantly decreased the probability that female owners would achieve ≥150 min/week by 0.46 times. This probability was also reduced in the age group 45-64 (odds ratio was not estimated because one value for groups in the matched pairs was 0), in the group of owners with high income (0.33 times) and in the group with purebred dogs (0.29 times) (Table 5).

In order to compare the association between the independent variables (owner demographic characteristics, home characteristics and dog breed) on dependent variables (walking time with dogs and total walking time) the Chi-square test was used. In our study, most dog owners (59%) reported successful walking of dogs before the state of emergency, achieving ≥150 min/week (Table 6). The occurrence of the pandemic affected the number of dog owners aged 45-64, decreasing significantly those who successfully achieved 150 min/week during the state of emergency ($P < 0.01$) from 62% to 9%. This means that those owners who successfully walked their dogs for ≥150 min/week (51%) during the state of emergency were younger (18-44 years; $P < 0.01$) than owners (45-64 years) who failed to walk dogs for 150 min/week (9%). A similar relation was observed between age categories among dog owners regarding total walking time during the state of emergency. Fisher's exact test revealed that younger dog owners from the age group 18-44 were statistically more successful in total walking time (64%) than those from the age group 45-64 (9%). One hundred and eighty dog owners from the younger age group successfully reached a total walking time of 150 min/week or more.

Table 3

Owners who achieved and did not achieve 150 min/week of walking with their dogs before and during the state of emergency

Walking with a dog 150 min/week				Total walking time 150 min/week			
Before the state of emergency	During the state of emergency	Code	n (%)	Before the state of emergency	During the state of emergency	Code	n (%)
Not achieved	Not achieved	0/0	48 (22)	/	/	/	/
Not achieved	Achieved	0/1	40 (19)	/	/	/	/
Achieved	Not achieved	1/0	72 (33)	Achieved	Achieved	1:1	121(56)
Achieved	Achieved	1/1	56 (26)	Achieved	Not achieved	1:0	95 (44)
Total			216 (100)				216 (100)
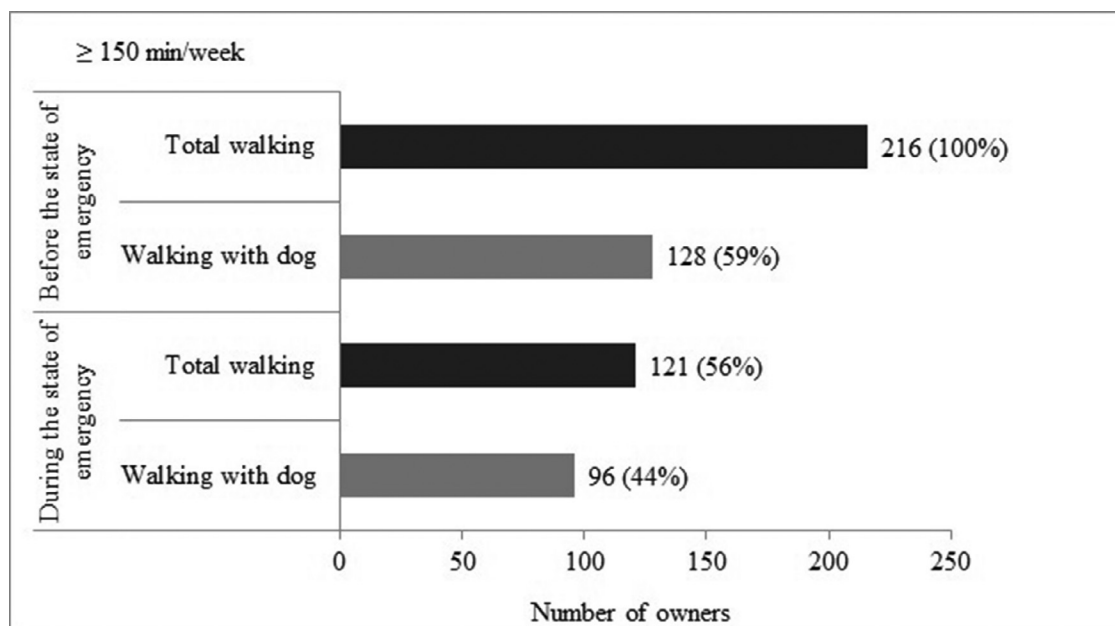
Figure 1.

Table 4

Results of statistical analysis (Wilcoxon signed rank test and effect size) of changes in the total walking time of dog owners due to the state of emergency (≥150 min/week)

Characteristics	≥150 min/week							
	Before N (%)	During N (%)	Difference	W	Ns/r	Z	P (2-tail)	Effect size
Gender								
Male	55 (26)	36 (17)	19 (9)	190	19	3.81	<0.01	1
Female	161 (74)	85 (39)	76 (35)	2926	76	8.71	<0.01	1
Age								
18-44	184 (85)	118 (55)	66 (30)	2211	66	7.06	<0.01	1
45-64	32 (15)	3 (1)	29 (14)	435	29	4.7	<0.01	1
Education								
Medium	117 (54)	72 (33)	45 (21)	1035	45	5.84	<0.01	1
High	99 (46)	49 (23)	50 (23)	1275	50	6.15	<0.01	1
Members in household								
1	36 (17)	15 (7)	21 (10)	231	21	4.01	<0.01	1
2+	180 (83)	106 (49)	74 (34)	2775	74	7.47	<0.01	1
Income								
Low to medium	153 (71)	89 (41)	64 (30)	2080	64	6.95	<0.01	1
High	63 (29)	32 (15)	31 (14)	496		4.86	<0.01	1
Home location								
Central area	83 (38)	44 (20)	39 (18)	780	39	5.44	<0.01	1
Peripheral area	133 (62)	77 (36)	56 (26)	1596	56	6.51	<0.01	1
Garden								
Yes	60 (28)	35 (16)	25 (12)	325	25	4.37	<0.01	1
No	156 (72)	86 (40)	70 (32)	2485	70	7.27	<0.01	1
Dog breed								
Mixed breed	115 (53)	69 (32)	46 (21)	1081	46	5.9	<0.01	1
Purebred	101 (47)	52 (24)	49 (23)	1225	49	6.09	<0.01	1
Total	216 (100)	121 (56)	95 (44)	4560	95	8.46	<0.01	1

Table 5
Results of statistical analysis of changes in owner walking time with dog (McNemar's test for matched pairs)

Characteristics	Before/During the pandemic≥150 min/week				McNemar's statistics			
	Yes/Yes 1/1	Yes/No 1/0	No/Yes 0/1	No/No 0/0	χ2 (DF = 1)	OR	95% CI	P
Gender								
Male	14 (25)	17 (24)	15 (37)	9 (19)	0.03	0.88	0.41-1.88	0.86
Female	42 (75)	55 (76)	25 (63)	39 (81)	10.51	0.46	0.27-0.74	<0.01
Age								
18-44	53 (95)	55 (76)	40 (100)	36 (75)	2.06	0.73	0.472-1.11	0.15
45-64	3 (5)	17 (24)	0 (0)	12 (25)	15.06	/	/	<0.01
Education								
Medium	36 (64)	38 (53)	21 (53)	22 (46)	4.34	0.55	0.31-0.97	0.04
High	20 (36)	34 (47)	19 (47)	26 (54)	3.70	0.56	0.30 – 1.00	0.05
Members in household								
1	8 (14)	14 (19)	4 (10)	10 (21)	4.50	0.29	0.07-0.91	0.03
2+	48 (86)	58 (81)	36 (90)	38 (79)	4.69	0.62	0.40-0.1	0.03
Income								
Low to medium	44 (78)	48 (67)	32 (80)	29 (60)	2.81	0.67	0.41-1.07	0.09
High	12 (22)	24 (33)	8 (20)	19 (40)	7.03	0.33	0.13-0.77	<0.01
Home location								
Central area	22 (39)	29 (40)	14 (35)	18 (37)	4.558	0.48	0.24-0.94	0.03
Peripheral area	34 (61)	43 (60	26 (65)	30 (63)	3.71	0.61	0.36-1.01	0.05
Garden								
Yes	15 (27)	21 (29)	11 (27)	13 (27)	2.53	0.52	0.23-1.14	0.11
No	41 (73)	51 (71)	29 (73)	35 (73)	5.51	0.57	0.35-0.91	0.02
Dog breed								
Mixed breed	27 (48)	31 (43)	28 (70)	29 (60)	0.07	0.9	0.52-1.56	0.79
Purebred	29 (52)	41 (57)	12 (30)	19 (40)	14.79	0.29	0.14-0.57	<0.01
Total	56 (100)	72 (100)	40 (100)	48 (100)	8.58	0.56	0.37 – 0.83	<0.01

Table 6
Chi square and Fisher exact test for owner sociodemographics, characteristics of homes and dog ownership

Groups	Before the state of emergency				During the state of emergency				During the state of emergency			
	Time (min/week)		Chi square test		Time (min/week)		Chi square test		Time (min/week)		Chi square test	
	< 150 n (%)	≥150 n (%)	χ2	P	< 150 n (%)	≥150 n (%)	DF = 1 χ2	P	<150 n (%)	≥150 n (%)	DF = 1 χ2	P
Categories												
Total (N = 216)	88 (41)	128 (59)			120 (56)	96 (44)			95 (44)	121 (56)		
Gender												
Male (N = 55)	24 (44)	3 1 (56)	0.12	0.73	26 (47)	29 (53)	1.62	0.20	19 (34)	36 (66)	2.18	0.13
Female (N = 161)	64 (40)	97 (60)			94 (58)	67 (42)			76 (47)	85 (53)		
Age												
18-44(N = 184)	76 (41)	108 (59)	0.04	0.84	91 (49)	93 (51)	Fisher	<0.01	66 (36)	118 (64)	Fisher	<0.01
45-64 (N = 32)	12 (38)	20 (62)			29 (91)	3 (9)			29 (91)	3 (9)		
Education												
Medium (N = 117)	43 (37)	74 (63)	1.34	0.25	60 (51)	57 (49)	1.53	0.22	45 (38)	72 (62)	2.69	0.10
Higher or high (N = 99)	45 (45)	54 (55)			60 (61)	39 (39)			50 (51)	49 (49)		
Members in household												
1 (N = 36)	13 (36)	23 (64)	0.19	0.66	24 (67)	12 (33)	1.65	0.20	21 (58)	15 (42)	2.95	0.09
2+ (N = 180)	75 (41)	105 (59)			96 (53)	84 (47)			74 (41)	106 (59)		
Income												
Low to medium (N = 153)	61 (40)	92 (60)	0.06	0.80	77 (50)	76 (50)	5.11	0.02	64 (42)	89 (58)	0.71	0.04
High (N = 63)	27 (43)	36 (57)			43 (68)	20 (32)			31 (49)	32 (51)		
Location of home												
Central area (N = 83)	32 (39)	51 (61)	0.14	0.71	47 (57)	36 (43)	0.01	0.92	39 (47)	44 (53)	0.32	0.57
Non central (N = 133)	56 (42)	77 (58)			73 (55)	60 (45)			56 (42)	77 (58)		
Garden												
Yes (N = 60)	24 (40)	36 (60)	0.00	1.00	34 (57)	26 (43)	0.00	1.00	25 (42)	35 (58)	0.07	0.79
No (N = 156)	64 (41)	92 (59)			86 (55)	70 (45)			70 (45)	86 (55)		
Dog breed												
Mixed breed (N = 115)	55 (48)	60 (52)	4.51	0.03	60 (52)	55 (48)	0.87	0.35	46 (40)	69 (60)	1.26	0.26
Purebred (N = 101)	33 (33)	68 (67)			60 (59)	41 (41)			49 (49)	52 (51)		

Spearman correlation was conducted between independent variables related to characteristics of owners, their homes and dogs, and the length of walking time with a dog before and during the state of emergency and total walking time during the state of emergency (Table 7). It was observed that all correlations were very weak or weak and insignificant, except the correlations between: the dog breed and walking time with the dog before the state of emergency (r = 0.19; P < 0.01); age and walking time with dog during the state of emergency (r = -0.29, P < 0.01), and; age and total walking time during the state of emergency (r = -0.39, P

Table 7
Correlation between independent and dependent variables in the study

Dependent variables	Walking with the dog						Total walking time during the state of emergency		
	Before the state of emergency			During the state of emergency					
Independent variables	r	P 2-tailed	99% CI	r	P 2-tailed	99% CI	r	P 2-tailed	99% CI
Gender	0.03	0.62	-0.14 -0.21	-0.10	0.15	-0.27-0.08	-0.11	0.10	-0.28-0.06
Age	0.03	0.69	-0.15 -0.20	-0.29	<0.01	-0.44-0.12	-0.39	<0.01	-0.53-0.23
Education	-0.09	0.19	-0.26-0.09	-0.09	0.17	-0.26-0.09	-0.12	0.08	-0.29-0.05
Members in the household	-0.02	0.80	-0.19-0.16	0.10	0.14	-0.08-0.27	0.13	0.06	-0.05-0.30
Income	-0.03	0.69	-0.20-0.15	-0.16	0.02	-0.33-0.02	-0.07	0.32	-0.24-0.12
Home area	-0.04	0.61	-0.21-0.14	0.02	0.80	-0.16-0.19	0.05	0.48	-0.13-0.22
Garden	-0.12	0.89	-0.29-0.06	-0.01	0.84	-0.18-0.16	0.03	0.67	-0.15 -0.20
Dog breed	0.19	0.005	0.02-0.35	-0.07	0.28	-0.24-0.11	-0.09	0.21	-0.26-0.09

Table 8
Reasons given by owners who walked with the dogs during the state of emergency more than before

No	Reasons given by owners	n	%
1	Excess free time due the lost of the job	8	20.0
2	The walk calms me down and I don't think about COVID-19 when I'm walking with my dog	8	20.0
3	I want to stay in good physical/health condition	6	15.0
4	I walk the dog now because I walked before the state of emergency and I have extra time, and I am replacing a family member who has a chronic illness and is not allowed to leave the household during the state of emergency	5	12.5
5	I want my dog to stay in good health	5	12.5
6	Excess free time during the state of emergency	4	10.0
7	I walk the dog now because I walked before the state of emergency and I have extra time, and I am replacing an older family member who is not allowed to leave the household during the state of emergency	2	5.0
8	Other family members went have moved away from Belgrade, so only I walk the dog during the state of emergency	2	5.0
	Total	40	100.0

Table 9
The reasons given by dog owners who walked their dogs less during a state of emergency than before

No	Reasons given by owners	n	%
1	I respect the decision to ban the movement of citizens, including those who walk dogs	33	46
2	I don't have enough time to walk the dog at a time when dog walking is allowed	19	26
3	I avoid spending time outside the house to avoid getting infected	15	21
4	Other family members also want to walk the dog	5	7
	Total	72	100

= 0.01). While dog breed positively correlated with walking time before the state of emergency, owner age negatively correlated with both walking time with the dog during the state of emergency and total walking time during the state of emergency. However, although these variables were highly significantly correlated with walking time before and during the state of emergency, their strength of influence was weak. This strength was related to the association between independent and dependent variables, not to the influence of independent variables on walking time.

Dog owners who successfully walked their dogs ≥150 min/week during the state of emergency compared to the time durations before the state of emergency listed 8 reasons for changing their dog walking habits (Table 8). Twenty percent of dog owners walked their dogs more during the state of emergency than before due to excess free time because they had lost their jobs. The same percentage of owners extended their dog walking times during the state of emergency compared to the times before, claiming

that walking with dogs relaxes them, i.e. calms them down. Fifteen percent of owners walked their dogs for longer times than before the state of emergency, wanting to maintain good physical/health condition. The replacement of other household members who participated in walking dogs before the state of emergency was the reason for extending the walking time for 17.5% of owners. Out of these, 12.5% of owners extended the dogs' walking time because household members, who walked dogs before the state of emergency, were unable to walk dogs during the state of emergency due to chronic diseases conducive to COVID-19 infection. The other 5% of owners extended the dogs' walking time because they had members in the household who were 65 years of age and older who were forbidden to leave their homes or to walk the dogs during the state of emergency. Also, 12.5% of owners walked dogs for longer because they wanted to maintain the good physical condition and health of their pets. Some owners walked dogs for longer because those family members who had participated in walking of the dogs before the state of emergency had left the household (5%).

Among those who walked dogs longer before the state of emergency than during the state of emergency (Table 9), the majority answered that they shortened the walk for legal reasons, that is, to adhere to the restraining order (46%). Some of them did not have as much time to walk the dogs as before (26%), and some were outside less so as not to become infected with COVID-19 (21%). Seven percent of dog owners shortened walking times because other household members were actively involved in pet walking during the state of emergency.

Discussion

On March 15, 2020, a state of emergency was declared in Serbia due to the outbreak of the COVID 19 pandemic. This was a new

and unknown situation for the citizens of Serbia. Many citizens were mostly focused on news about the pandemic consequences, the fear of the virus, the purchase of food made more difficult by restrictions on freedom of movement and compliance with the emergency containment procedures recommended by epidemiologists from the Crisis Unit. Citizens over 65 were allowed to leave the house only on Saturdays from 04:00 to 07:00, exclusively to go shopping in the stores that remained open especially for them. Even the times when it was possible to walk the dog were changed constantly. Only the allowed duration of the walk remained unchanged: maximum 20 minutes, with the obligation not to move more than 200 meters away from home. For many citizens, and especially for dog owners, the decision to ban dogs from walking was rather unreasonable. Dog owners had to adapt, as they were prohibited from using places they had previously used for dog walking such as walkways and dog parks. Not only were the dogs deprived of the usual physical activity to which they were accustomed, but their owners were also deprived. There were also days when residents could not leave their homes at all. Weekday curfew lasting from 5 PM to 5 AM was also introduced in Serbia. During the weekends, citizens were allowed to walk their pets twice a day for 20 minutes and leave home due to an urgent health need. On weekends, citizens were forbidden to leave their homes until the early hours of Mondays. It is clear that such measures reflected in the reduction of physical activity by some owners and their dogs. Fortunately, these measures did not last longer than 2 months. It was interesting that during the state of emergency, the services of professional dog walkers seemed to be more frequently advertised (authors' personal observations). Also, many experts who deal with the modification of dog behavior shared tips via social networks on how owners could spend time together with their pets at home. They selflessly shared videos showing exercises for physical and mental activity of dogs confined at home together with their owners. Many researchers found that the quality of life of pet owners was strongly affected by the pandemic and that pets supported them to mitigate the negative effects of the pandemic (Bowen et al., 2020; Bowen et al., 2021; Holland et al., 2021). These authors pointed out the negative effects of confinement due to the pandemic on dog behavior. Moreover, the strict rules regarding dog walking were valid in Serbia but not in other Balkan countries, so Belgraders had few models to follow. Holland et al. (2021) suggested intervention strategies to support dog welfare and help dog owners teach dogs to cope with conditions caused by the pandemic confinement.

Women made up a larger proportion of the sample in our study than did men, as did owners aged 18-44 years than older owners. Similar results to ours were previously obtained by Degeling et al. (2012), who studied the association between socio-demographic factors of dog owners, dog-exercise requirements, and the number of walks dogs received. Their sample consisted mainly of female owners as was the case in our study. However, our participants were younger compared with theirs. This difference could be due to the way participants were chosen for the studies. We searched for participants mainly through social networks, while Degeling et al. (2012) contacted participants by phone and via post. We can assume that mostly younger people use social networks, although in our sample there were also a few older people over 60 years of age. Contrary to our study, Koohsari et al. (2020) enrolled participants for their study via a postal survey. Their sample of dog walkers also consisted mainly of female dog owners. However, their participants were also older than ours. In the study conducted in Australia by Powell et al. (2018), dog owners were enrolled using an online survey from a website. In that study (Powell et al., 2018), 88% of dog owners were women, while in our study, 74% of dog owners were women; these are relatively similar proportions

of female dog ownership for study participants. Also, dog owners in the study conducted by Powell et al. (2018) were predominantly younger (18-44 years old). In our study, this age group accounted for 85% of dog owners.

In our research, more than half of the owners managed to walk their dogs for 150 min/week or more before the state of emergency was declared in Serbia. Also, Degeling et al. (2012) and Koohsari et al. (2020) found more than half of the owners walked their dogs for more than 150 min/week. The owners who walked dogs in our study consisted mainly of younger people with an average age of 34.71 ± 10.52 years. We consider this was the main reason for the number of owners who achieved a time of 150 min/week for walking their dogs before the state of emergency was declared in Serbia.

After the state of emergency was introduced, the number of owners who reached the level of physical activity (by walking their dogs) recommended by WHO (2011) decreased by approximately 15%. Therefore, during the state of emergency, only 44% of owners achieved this length of time of walking with their dogs. Among those who were aged 44-64 years, only 9% of owners reported they achieved this time when walking with their dogs. Prior to the introduction of the state of emergency, more than 60% of owners in this age category managed to achieve this time walking with their dogs. Therefore, the age of the owner was the demographic characteristic significantly associated with a shortening of the walking time of dogs during a state of emergency.

The results of our research clearly show the proportion of owners who walked their dogs for ≥150 min/week decreased during the state of emergency in Belgrade. Different factors act as barriers and motivators to walking with dogs in public places. Cutt et al. (2008) classified them in the 3 following groups: dog-related, social environmental and physical environmental. The results of our study clearly demonstrate that COVID-19 and the resultant state of emergency were the main causes for some dog owners to change their habits regarding walking dogs. Specific reasons were a consequence of the pandemic, the state of emergency and the curfew imposed due to the pandemic. These changes of dog walking habit also occurred in a certain number of dog owners due to changes in the social environment in the same household during the pandemic. The COVID-19 pandemic caused temporary changes among household members and in the habits of household members. Some members of the household had more time to walk the dogs than in prepandemic times, while others had less time at their disposal. Some members of the household temporarily lost their jobs and, therefore, had more time to spend walking the dogs. Some family members were motivated by time constraints during the state of emergency to walk more in order to maintain good physical condition and health. Some dog owners felt it was important their dogs stayed in good physical condition and maintained good health.

Among owners who reduced their physical activity during the state of emergency were those who did so out of fear of illness, but also those who did so for legal reasons, respecting the decision to ban movement during the curfew and the advice that they spend less time in the external environment. Some owners walked dogs more because some members of their households temporarily moved to less populated rural areas or stopped walking dogs because they were limited by age (65+) or chronic diseases. This means there were households in which a larger number of members participated in walking the dogs before the pandemic and before the introduction of the state of emergency. There were also those dog owners who relegated their dog walking time to other family members so they too would have a chance to spend more time outside the home.

Mass unemployment is just one of the consequences of the COVID-19 pandemic, with devastating effects on the psychological, economic, and social well-being affecting all age categories of individuals, families and society as a whole (Blustein et al., 2020). This consequence did not spare the inhabitants of Serbia either. That is one reason why, in our research, there were dog owners who had excess free time to walk their pets because they stopped working or lost their jobs. There were also dog owners who stated they had more free time during the state of emergency. It is possible that their work obligations were also temporarily interrupted during the state of emergency, although they did not particularly emphasize this. In our research, a number of dog owners who walked more with dogs during the state of emergency than before stated that walking calmed them down and that they did not think about COVID-19 when they walk with their dogs. This claim probably means that while walking the dogs, they did not think about the consequences of COVID-19 on their life, health and financial status, or on the health of other family members, among other consequences, and that they were less nervous and worried about future uncertainty. Everyday thinking about one's own health, family health, financial stability, the sustainability of the household budget, sources and risk of infection or the unknown future dictated by a hitherto unknown disease is strong pressure on people's mental health. We assume that some dog owners felt more emotionally stable while walking with their pets. Recently, Talyor et al. (2020) and Schimmenti et al. (2020) identified the following factors and domains of stress and fear relating to the coronavirus pandemic: danger and contamination, fears about economic consequences, coronavirus-related xenophobia, compulsive checking and reassurance seeking, traumatic stress symptoms, fear for the body, fear for significant others, fear of not knowing and fear of inaction. Our results show that in dog owners who participated in the study, fear of inaction, fear for the body and fear of infection was clearly manifested. Fear for the body as a factor influencing the walking of dogs occurred in 2 forms. In the first form, it was manifested through the concern that reduced physical activity during the movement restrictions could affect physical fitness and health. We assume that in this case, the concern/fear for the body is a consequence of fear of inactivity. This concern has likely motivated some owners to walk more with their dogs. In its second form, fear for the body was manifested through the fear of infection during time spent in the external environment. This form of concern demotivated some owners from walking dogs during the state of emergency for as long as they walked before the pandemic.

Among those who walked more with their dogs during the state of emergency were owners who did so for their own physical health, but also for the health of their pet. This reason has previously been well studied by Westgarth et al. (2014, 2017) and Powell et al. (2018). Dog owners can feel obligated to walk their pets, and walking together with dogs makes them happy (Westgarth et al., 2014, 2017). Moreover, this is supported by the results of Powell et al. (2018), who found that prospective owners expect dog ownership will increase walking, happiness and companionship and decrease stress and loneliness. Among the challenges, they expected increases in responsibilities and dog training. One of the responsibilities is clearly walking their dog. During the pandemic, the responsibility of a number of owners from our study increased because they had to walk their pets instead of the animals being walked by those family members who could not now leave their homes due to chronic diseases or old age. This also indicates that our survey participants respected the habits and needs of their household's pets enough to devote their free time to dog walking.

It is very interesting that a small number of owners reduced their walks with dogs because other family members also wanted to be more active during the pandemic. If these family members wanted to be more physically active, they could walk without dogs at a time when walking was allowed. However, during the curfew, it was quite normal that some wanted to be more actively involved in dog walking, because there was a strict ban on the movement of all citizens, except those who walked dogs. Moreover, we are of the opinion that these household members wanted, rather, to socialize with other dog owners from their neighborhoods while respecting physical distancing, since the citizens of Belgrade were forbidden to gather in larger groups, or to use promenades, parks and dog parks. Therefore, we assume the role of dogs as a catalyst for social contact is expressed here (Wood et al., 2015). We are of this opinion because for a short time during curfew on weekends, only dog walkers could be seen on the streets of Belgrade. On the other hand, it is probable some of these family members feared inactivity as well. Studying factors associated with daily walking of dogs, Westgarth et al. (2015) estimated that having more people in the same household was negatively associated with this activity. If a larger number of household members participate in daily or weekly pet walking, then it is less likely that each of these members will reach 150 min/week when walking the dog.

Our study revealed that the COVID-19 pandemic reduced the number of owners who were successful in achieving the WHO-recommended total walking time per week. From the aspect of health and welfare of both subjects in our study – owners and dogs, reducing the walking time can increase the risk of developing diseases related to physical inactivity, as recently confirmed by Bowen et al. (2020). It is well known that physical inactivity can affect the development of diseases such as heart disease, hypertension, diabetes, obesity, musculoskeletal disorders, respiratory diseases, brain damage and behavioral disorders (Woods et al., 2020). The studied characteristics of owners, households and dogs had an affect on the length of walking time of owners before and during the state of emergency declared due to the COVID-19 pandemic. Some owners also reduced their total walking time. Characteristics such as age and income were negatively associated with success of achieving ≥150 min/week during the state of emergency, while dog breed positively related to enough successful walking time (≥150 min/week) before the outbreak of the pandemic. Our results show that owners of purebred dogs rather than mixed breed dogs were more successful in walking their pets before the state of emergency, achieving times of ≥150 min/week. Previously, it was estimated that different types of dogs have specific exercise requirements to maintain optimal health (Degeling et al., 2012). Turcsán et al. (2017) indicated that mixed breed dogs differed from purebred dogs and that they were less calm, less sociable toward other dogs and had more problematic behavior than purebreds. This could be a reason why owners were able to walk purebreds longer than mixed breed dogs with moderate-intensity activity. In our study, greater owner age decreased the likelihood of achieving ≥150 min/week of owner total walking and walking with dogs during the state of emergency. The previous study by Ghani et al. (2016) indicated that elderly people were less likely to walk for a journey/transport and more likely to walk for recreation. During the state of emergency due to the COVID-19 pandemic and the curfew, citizens of Belgrade were denied time for recreation. They were also totally forbidden to enter parks, promenades and picnic areas. These are favorite gathering places for older citizens. This could be one of the reasons why older owners of dogs reduced their walking time during the state of emergency. The second potential reason could be the fear of illness due to longer times outside and long walks with dogs. It was interesting that the owner's income affected successful walking time during the state of emergency but not significantly. Lower income was associated with increased success in walking with dogs ≥150 min/week during the

state of emergency. This could be in accordance with Weill et al. (2020), who showed that social distancing decreased with income following the US state-level emergency declaration. Also, these authors found people with lower incomes were more mobile than people from areas with higher incomes.

Conclusion

Based on the results obtained in this study, we conclude that the imposition of a state of emergency significantly reduced the walking time for dogs and their owners during the COVID-19 pandemic in Belgrade. Therefore, the consequences of the COVID-19 pandemic can be seen at many levels of social organization, including in the human activity of dog walking. This pandemic has led to a temporary change in the social composition of some households and their activities, reducing or increasing the physical activity of some dog owners, increasing or shortening their free time, leaving some dog owners unemployed, and frightening some of them. Some dog owners complied with movement restriction legislation. Finally, there were many reasons that led to changes in the length of time dogs were walked during this pandemic in Belgrade. These reasons can be grouped in different ways. Although social, financial, legal and other reasons can be identified among them, fear of illness and concern for personal and pet health were also present. While some owners shortened their time spent walking dogs due to fear of COVID-19, others used their increased free time to extend the time spent walking their dogs to maintain their good physical and health condition, but also the condition and health of their pets. Significant correlations between independent variables and walking time with dogs and total walking time during the state of emergency were estimated between: dog breed and walking time before the state of emergency; owner age and dog walking time during the state of emergency and; owner age and total walking time during the state of emergency. Purebred dogs walked for longer than mixed breed dogs during the state of emergency, while greater owner age significantly reduced walking time with dogs and total walking time of owners during the state of emergency (younger owners walked their dogs for longer). The total walking time of owners was affected only by their age. Younger owners walked for longer, and a larger number of them achieved total walking times of $\geq$150 min/week during the state of emergency. This strict ban on movement did not last long, so it probably did not leave major consequences on the health of owners and their dogs.

Authorship Statement

All authors equally were participated in the design of the study, conceived of the study, and participated in its design and coordination and helped to draft the manuscript. All authors read and approved the final manuscript.

Conflict of Interest Statement

The authors declare they have no conflict of interest.

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