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Physical activity during the COVID-19 pandemic: a survey with adults in Northern Brazil

Atividade física durante a pandemia de COVID-19: uma pesquisa com adultos do norte do Brasil

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ABSTRACT

The aim of this study was to analyze the impact of the social distancing recommendations during COVID-19 pandemic on the physical activity behavior in adults living in the Northern Brazil region. A final sample of 654 adults (386 women) aged 33 ± 10 years old participated in this study. A questionnaire with 45 questions concerning sociodemographic characteristics, self-perception of health and characteristics of physical activity behavior before and after the recommendations of social distancing was applied in an online format. Comparisons between levels of physical activity before and after pandemic were conducted applying a McNemar test. A binary logistic regression was applied to analyze the factors associated to being physically active during the pandemic. Analyzing the percentage levels of physical activity before and during social distancing, we observed an increase of physically inactive behavior (19% vs. 36.7%), as well as a decrease in active (32.6% vs. 18.6%) and very active (16.7% vs. 6.6%) behaviors, respectively. Among participants, 59.2% of them became sedentary during pandemic. Walking and running activities continued to be among the most practiced, although they showed a reduction during social distancing. Social distancing recommendations due to the COVID-19 pandemic caused a decrease in the overall levels of physical activity in adults living in the Amazonas State and specifically in the practice of individuals who were physically active and very physically active before pandemic.

Keywords: Social isolation; Sars-CoV2; Motor active; Cross-sectional study.

RESUMO

O objetivo deste estudo foi analisar o impacto das recomendações de distanciamento social durante a pandemia COVID-19 sobre os níveis de prática de atividade física em adultos residentes na região Norte do Brasil. Uma amostra final de 654 adultos (386 mulheres) com idade de 33 ± 10 anos participou deste estudo. Foi aplicado, em formato online, um questionário com 45 questões sobre características sociodemográficas, autopercepção de saúde e características do comportamento de prática de atividade física antes e após as recomendações de distanciamento social. As comparações entre os níveis de atividade física antes e depois da pandemia foram realizadas aplicando um teste de McNemar. Uma regressão logística binária foi aplicada para analisar os fatores associados à atividade física durante a pandemia. Analisando os níveis percentuais de atividade física antes e durante o distanciamento social, observamos um aumento do comportamento fisicamente inativo (19% vs. 36,7%), bem como uma diminuição dos comportamentos ativo (32,6% vs. 18,6%) e muito ativo (16,7%) vs. 6,6%). Entre os participantes, 59,2% deles se tornaram sedentários durante a pandemia. As atividades de caminhada e corrida continuaram entre as mais praticadas, embora tenham apresentado redução durante o distanciamento social. As recomendações de distanciamento social devido à pandemia COVID-19 causaram diminuição nos níveis gerais de atividade física em adultos residentes no Estado do Amazonas e especificamente na prática de indivíduos que eram fisicamente ativos e muito ativos antes da pandemia.

Palavras-chave: *Isolamento Social; SARS-CoV-2; Atividade motora; Estudo transversal.*

Introduction

The coronavirus (COVID-19) was classified as pandemic on March 2020, due to its rapid and uncontrollable dissemination throughout the world[1]. Specifically,

in Brazil, the number of infected people has increased throughout the territory[2]. Although São Paulo State is the center of the pandemic in Brazil, the COVID-19 has spread throughout the country and Amazonas State is one of the most affected parts of the northern region, also becoming the virus epicenter and presenting an incidence of 998.4/100.000 inhabitants and a mortality rate of 49.5/100.000 inhabitants in the region[2].

The recommendation of social distancing and the fear of being infected may have impacted different aspects of health behaviors, such as regular physical activity practice[2]. This impact has the potential to accelerate the old well-known pandemic of physical inactivity that has been confronted for the last years[3]. Moreover, considering the unquestionable positive effects of a non-pharmacological intervention such as a physically active behavior on immune responses[4,5], it is pivotal that during a pandemic viral infection, individuals must at least keep their usual physical activity level.

It is well established in the literature that the practice of physical activity has shown to be an effective therapy for most of the chronic diseases with direct effects on both mental and physical health[6,7]. Therefore, there is a strong rationale for continuing physical activity at home to stay healthy and maintain immune system function in the current conditions[8]. Data from Surveillance of Risk and Protective Factors for Chronic Diseases by Telephone Survey (VIGITEL-2019)[9], indicated that only 39% of adults practice physical activity regularly, moreover, overweight affects 55.4% of adults in the country. Among the cities surveyed, Manaus (capital and the biggest city of Amazonas State) presented data with the highest rates of overweight (60.9%), when compared to the other cities and the third city with the highest rate of insufficient physical activity (49%)[9].

Thus, it is important to extend the knowledge about the physical activity behavior during this new moment when gyms are closed and outdoor physical activity also involves some infection risk. Therefore, the aim of this study was to analyze the impact of the pandemic social distancing on the physical activity behavior in adults living in Amazonas State. We hypothesized that social distancing would lead to lower levels of physical activity.

Methods

This study sought to achieve a relevant range of adults residing in the state of Amazonas. Therefore, we considered eligible all individuals aged 18 years or more who lived in the state of Amazonas. Considering that Manaus is the Capital and the biggest city of the State, we expected that the most part of respondents would be from Manaus. However, we adopted this procedure aiming to reach representativeness of the geographical regions of the state in the sample.

Sample size was estimated according to Raggio & Magnanini[10] considering the four million of citizens living in Amazonas State, 1.96 of confidence interval (95%), an estimate prevalence of 0.5 and a tolerable sampling error of 0.04, a minimum of 600 respondents were necessary. Predicting possible missing data, we aimed to achieve 10% more respondents, thus, 660 respondents. We adopted a snowball method to achieve a higher number of respondents. This method is applied when it is difficult to access subjects with the target characteristics[17].

Thus, considering that the state of Amazonas has 1.559.167,889 km^2 [11], we consider this approach to be the most suitable. Data collection occurred between 01 and 30 of June 2020 (30 days collecting data). During June, several actions imposed by Amazonas government aiming to control de virus spread were still in effect in the state. During this period, only essential services as hospitals, markets and drugstores kept service to the public. However, on May-27, the state government published the strategies to reopen commerce and others activities. In this gradual planning, gyms and public parks were allowed to reopen only on June-29.

All respondents were identified by codes and they were also informed that their data would be kept confidential. Prior starting to answer the questionnaire, participants were informed concerning potential risks, benefits and study procedures, which was approved by the institution's Local Ethics Committee (CAAE: 34099320.7.0000.5020) in accordance with the Helsinki Declaration.

To measure the main outcome, we constructed a questionnaire based on specific questions that allow measuring the level of physical activity in the leisure domain only. The questionnaire comprised 45 questions and was self-administered through an online format (Google Forms) and was sent online via social media. The online questionnaire was disseminated through the researchers on social networks and messaging applications, and made available through its own link for access. When opening the link to access the questionnaire, the individual had access to the Informed Consent Form and only those who consented to participate in the research had access to the questionnaire.

The sections and items of the questionnaire were organized as follow: The first part contained questions measuring socio demographic characteristics (city where live, age,

sex); behavioral - smoking (smoker, non-smoker); Health – Self-perception of health (excellent/good, good, fair, poor; independent variable), medication use (open-ended question. i.e. answers: antihypertensive drugs; medication for diabetes or anxiety), diagnosed diseases (open-ended question. i.e. answers: hypertension, depression) and alcohol consumption.

In the second part of the questionnaire, we aimed to obtain the main variable of interest - the physical activity behavior before and after the recommendations of social distancing in Amazonas. Thus, 13 questions were asked considering two moments, before and during the social distancing recommendations (i.e.: "Did you practice physical activity before the recommendations for social distancing"? and "Do you practice physical activity currently"? Answer options: yes or no). Individuals who reached at least 150 minutes of moderate physical activity, 75 minutes of vigorous physical activity or the equivalent combination of both intensities, were considered physically active[12]. Concerning exercise intensities, three questions were included to assess the behavior before social distancing and the same questions were repeated after to assess the information during social distancing [i.e.: How many days of the week did you practice physical activity of light intensity for at least 10 minutes on a continuous basis? Here it is worth remembering that light intensity activities are those that require little physical effort and that make breathing slightly stronger than normal or that lightly increase your breathing or heartbeat (for example: walking naturally, walking)]. Same question structure was repeated, however, changing the terms (light, moderate, vigorous and the activities examples).

Questions concerning customs during physical activity practice were also included, such as be accompanied by a friend/family member (answer: yes/no), be monitored by a physical education professional (answer: yes/no; if yes, presential or in virtual mode?). Specifically, for this question we included a response option "I am a physical education professional". This was important since normally, a physical education professional do not need to be accompanied by another professional. These were classified as independent variables. Be a physical education professional was also included in this category. At the end of the questionnaire, one item on the level of anxiety ("Do you consider yourself an anxious person?" Answer options: "very anxious, not very anxious, not at all anxious") were included.

To assess and categorize the physical activities practiced by respondents, we proposed an open-ended question "Do you practice physical activity for at least 10 minutes continuous?" (answer: yes/no). If yes: "Which physical activity do you practice?". Despite several answers could emerge from this question, we only grouped in categories the answers that were exactly the same among participants (i.e.: strength training = only respondents who reported practice with weights in a gym; running = only respondents who reported the practice run).

Data analyses were conducted on Statistical Package for Social Sciences (SPSS 22). Descriptive analyses were conducted for categorical variables (absolute and relative frequencies) and for numerical variables (position and dispersion). Comparisons between levels of physical activity, modalities and places of practice before and during social distancing recommendations were conducted applying a McNemar test. The odds ratios (95% CI) were estimated using binary logistic regression to verify the associated factors to being physically active during social distancing recommendations. In the adjusted model, all variables that presented association with the outcome (i.e., physically active/very physically active) and socio-demographic variables (i.e., sex, age and family income) were inserted. The level of significance was set at $p = 0.05$.

Results

The absolute and relative frequency of socio-demographic variables and health indicators are presented in Table 1. Overall, 654 people living in 21 municipalities in the State of Amazonas accepted to answer the questionnaire and were included in analyses. Three respondents did not answer the question concerning physical activity level during social distancing recommendations. Considering that we did not have to exclude any respondent, this number achieved our *a priori* sample estimate. The majority of participants lived in Manaus (85.5%; n = 559). The mean (± standard deviation) age of the participants was 33 ± 10 years.

Among the main chronic diseases reported, anxiety disorder (6.1%; n = 40), respiratory diseases (6%; n = 39) and hypertension (5.4%; n = 35) were the most reported. The main drugs used were antihypertensive drugs (5%; n = 33) and anxiolytics (3.2%; n = 21). Regarding anxiety, before the social distancing recommendation 52.9% (n = 346) considered themselves to be little anxious; 52.1% (n = 341) considered themselves to be little anxious during social distancing recommendation. Further, during social distancing recommendation, 52.6% (n = 344) perceived that they increased their body mass.

Regarding the time spent sitting at work/school before the COVID-19 pandemic, 28.4% (n = 186) re-

Table 1 – Participants sociodemographic characteristics and health indicators.

Variable	n	%
Sex		
Male	268	41.0
Female	386	59.0
Occupation		
Unemployed	147	22.5
Self-employed	145	22.2
Formal Employee	116	17.7
Public Agent	195	29.8
Others	51	7.8
Family Income		
Less than 1 minimum wage	51	7.8
From 1 to 3 minimum wage	219	33.5
From 4 to 6 minimum wage	178	27.2
7 or more minimum wage	206	31.5
Education		
Complete elementary school/incomplete high school	6	0.9
Complete high school/incomplete higher education	212	32.4
Undergraduate Degree	196	30.0
Graduated	240	36.7
Health self-perception		
Bad	11	1.7
Regular	129	19.7
Good	367	56.1
Very good/excellent	147	22.5
Smoking		
No	622	95.1
Yes	32	4.9
Alcohol consumption		
No	348	53.2
Yes, less than 1/week	233	35.6
Yes, 1-3/week	64	9.8
Yes, 4-5/week	9	1.4
Chronic non-communicable diseases		
No	548	83.8
Yes	106	16.2
Medication consumption		
No	498	76.1
Yes	156	23.9

mained seated for 6 or more hours per day and during free time 72.8% (n = 476) stayed seated up to four hours per day. During social distancing period, 25.8% (n = 169) remained seated for 6 or more hours per day for work/college activities and 22.9% (n = 150) remained seated for 6 or more hours per day in free time (Table 2).

The levels of physical activity before and during the COVID-19 pandemic are presented in Table 2. With the social distancing recommendations, we detected an increase in the proportion of adults who were physically inactive and a decrease in the proportion of adults who were active and very active.

Regarding the physical exercise modalities, strength training (n = 213; 28.1% vs. n = 65; 16.2%), running/jogging (n = 117; 15.5% vs. n = 72; 17.9%) and walking (n = 105; 13.9% vs. n = 87; 21.6%) decreased when comparing the moments before and during COVID-19 pandemic, respectively.

Table 2 – Modalities practiced before and during social distancing recommendations.

Modality	Before social distancing		During social distancing		p-value
	n	%	n	%	
Strength Training	213	32.6	65	9.9	<0.001
Running	117	17.9	72	11.0	<0.001
Walking	105	16.1	87	13.3	0.130
Functional Training	44	6.7	41	6.3	0.798
Futsal/Soccer	41	6.3	6	0.9	<0.001
Dance	32	4.9	21	3.2	0.052
Others Activities	175	26.8	99	15.1	<0.001
Sitting Time					
Work/school					<0.001
no work study	29	4.4	43	6.6	
< 4 hours	247	37.8	290	44.3	
4-6 hours	192	29.4	152	23.2	
6 hours or more	186	28.4	169	25.8	
Free-time					<0.001
< 4 hours	476	72.8	340	52.0	
4-6 hours	119	18.2	164	25.1	
6 hours or more	59	9.0	150	22.9	

Table 3 presents the main locations used to practice physical activity listed by respondents. Clearly gyms and public spaces appeared as the main places before distancing recommendations. During the pandemic, indoor exercise (home-based) was the main place.

Table 4 presents the descriptive analysis and the gross odds ratios (OR) and adjusted to be active during social distancing recommendations due to the COVID-19 pandemic. We detected that practicing physical activity with a family member/friend, monitored by a physical education professional online, being a physical education professional and having good/excellent health self-perception increased the chances of being active during COVID-19 pandemic.

Table 3 – Descriptive data of physical activity places of practice before and during social distancing recommendations.

Location	Before pandemic		During pandemic		p-value
	n	%	n	%	
Gym	269	41.1	5	0.8	<0.001
Public spaces (street/parks/ squares)	155	23.7	83	12.7	<0.001
Home-based	58	8.9	266	40.7	<0.001
Outdoor field	57	8.7	5	0.8	<0.001
Clubs/Sports center/Training center	40	6.1	2	0.3	<0.001
Others Places	74	11.3	28	4.3	<0.001

McNemar Test

Discussion

The main objective of this study was to analyze the effects of the social distancing recommendations due to the COVID-19 pandemic on the levels of physical activity behavior in adults living in Amazonas State. Our hypothesis was confirmed, since a decrease in the levels of physical activity practice was observed. During the COVID-19 pandemic, we also found an increase in physically inactive behavior and a decrease of the physically active/very physically active behavior. Nevertheless, factors as physical activity practice with a family member, friend or monitored by a physical education professional online; professional occupation and a good/excellent health self-perception were associated with physical active behavior during the social distance recommendations.

Corroborating with previous studies with other populations as Canadians[13], Germans[14], and other profiles as athletes[15] and elderly[16], the participants evaluated in this study also decreased the levels of physical activity during the COVID-19 pandemic. In a national study that aimed to analyze the factors associated with people's behavior in social isolation during the COVID-19 pandemic[17], the percentage of people who were *able to* practice some physical activity was 40%, a number compatible with the national average of 38% of people who, in a regular context, practiced some physical activity.

However, *being able to* is different from actually starting or continuing to practice physical activity. The fact that many people in Amazonas state are socially vulnerable, suggests they would not even consider engaging in physical activity during the COVID-19 pandemic since their thoughts were focused on meeting their essential basic needs first[18]. Moreover, considering that 40% of our sample reported a family income between less than one and three minimum wage (the current minimum wage in Brazil is R$ 1,045.00; US$ 188) and Amazonas is in the lowest developed region of Brazil, it is possible

Table 4 – Descriptive analysis and factors associated with being active/very active during social distancing recommendations.

Variables	Sedentary n (%)	Active/very active n (%)	OR ($CI_{95\%}$) Gross	OR ($CI_{95\%}$) Adjusted ¥
Physical activity practice with Family/friend				
No	250 (79.6)	64 (20.4)	1	1
Yes	110 (52.9)	98 (47.1)	3.48 (2.36-5.12)	2.75 (1.81-4.17)
Physical activity practice with a physical education professional				
No	229 (77.1)	68 (22.9)	1	1
Yes, in person	17 (53.1)	15 (46.9)	2.97 (1.41-6.26)	1.94 (0.87-4.36)
Yes, virtual mode (online)	44 (52.4)	40 (47.6)	3.06 (1.84-5.08)	2.34 (1.33-4.10)
I am a physical education professional	61 (60.4)	40 (39.6)	2.21 (1.36-3.58)	1.83 (1.07-3.10)
Anxious/restless				
No	191 (69.5)	84 (30.5)	1	1
Yes	296 (78.7)	80 (21.3)	0.61 (0.43-0.88)	0.76 (0.49-1.17)
Laziness /Unwilling				
No	229 (69.8)	99 (30.2)	1	1
Yes	258 (79.9)	65 (20.1)	0.58 (0.41-0.84)	0.72 (0.46-1.12)
Health self-perception				
Bad/regular	128 (91.4)	12 (8.6)	1	1
Good/excellent	359 (70.3)	152 (29.7)	4.52 (2.43-8.41)	3.28 (1.61-6.70)

¥= Adjusted for sex, income, age group and all variables in the table.

to speculate that our findings concerning the decreased levels of physical activity during the social distancing might reflect the reality of Amazonas population.

At the time of this study, many places that promote opportunities to be physically active were temporally closed, which represented a decrement in infrastructure for people to be physically active[18]. We have observed that the quantity of individuals who performed physical activity in environments such as gym and health club showed a strong reduction during the social distancing. Recently, data from a national surveillance indicated that the most population living in Manaus was classified as overweight individuals[11], thus we cannot assume that people would practice physical activity at home when they did not have practiced elsewhere. This may be an indication that perhaps this population is worsening their behavior in relation to physical activity and we are facing multiple pandemics that can have important interfaces and prognosis: physical inactivity, overweight/obesity and COVID-19[19].

Despite some authors advocating in favor of indoor training, considering the feasibility, safety and effectiveness in the primary and secondary disease prevention[4,19,20], arising as an important strategy to mitigate the increase of physical inactivity behavior, our data do not support this idea. Although an increase in physical activity performed at home during social distancing, our data presented that a part of those participants who were once physically active/very active before social distancing became sedentary during the COVID-19 pandemic. In addition, there was also a decrease in the number of team sports practitioners during the period of social distancing.

Notwithstanding, a discussion has emerged in the literature. Carvalho et al.[20] raised a discussion concerning the essentiality of gyms for health in the face of the COVID-19 pandemic in Brazil[20]. When comparing risks and benefits, the authors affirm that physical activity at home is more appropriate for this moment. Conversely, Sallis et al.[21] argued that popular places for physical activity (i.e., gyms) should be retained as much as possible, as its closures may be counter-productive if the effect is decreased physical activity. Analyzing our data, more than 50% of the individuals who were physically active before social distancing practiced physical activity at privative spaces (i.e., gym's, health clubs).

Despite the fact that the most part of our sample decreased their physical active levels during social distancing, some individuals managed to stay active. Factors as the company of a family member/friend, being online monitored by a physical education professional, being a physical education professional and having good/excellent health self-perception were significantly associated to maintaining a physical active behavior during social distancing recommendations due COVID-19 pandemic.

One possible explanation may be based on behavioral psychology. According to the self-efficacy theory, individuals who feel efficacious are more likely to perform at a higher level, try new behaviors, expend more effort on those behaviors, and persevere longer when they face challenges[22]. Furthermore, task, barrier, and scheduling self-efficacy refer to one's confidence to participate in physical activity, overcome physical activity related barriers, and organize time and responsibilities around physical activity, respectively[23,24].

In view of this, our findings suggest that individuals who were physically active before social distancing recommendations may have kept their practices focusing on being active at indoor settings (task), overcoming the challenge to readapt the exercise protocols (barriers) and keeping an agenda among others commitments (scheduling). In this sense, Jung & Brawley[24] proposed that efficacious beliefs are one possible social-cognitive mechanism that can influence the self-regulation of goal-directed behaviors. Thus, in day-to-day circumstances, where individuals need to concurrently achieve more than one goal (i.e., increase of work at home during due the pandemic), self-regulation of exercise does not occur in isolation. Rather, exercise must be managed in conjunction with other valued activities, such as family and work. Nevertheless, the motivational presence of family/friends, the online monitoring of a physical education professional and having good/excellent health self-perception corroborates the theories already proposed in the behavioral psychology literature[22,24].

Recently, Pitanga et al.[19] recommended a set of exercises that may be performed at home, such as muscle strengthening (squats, push-ups, abdominal exercises, among others), stretching, balance and climbing stairs, preferably with the aid of technological procedures and online guidance of a physical education professional. Our findings corroborate this possibility, as mentioned above; this guidance with a professional was associated with a physically active behavior during COVID-19 pandemic. Finally, our sample is mostly composed by well-educated middle-aged people, which were already referred as a profile with higher interest in online

health services and resources[18,25].

Our findings allow us to endorse the message that people must be active during social distancing recommendations. We can add efforts with previous studies[3,5,21] and organized health societies from Brazil[26] and other countries[27] to send a message promoting focus on the maintenance of healthy performance in populations. Furthermore, during the coronavirus crisis, maintaining regular physical activity in a domestic environment is an important strategy for a healthy life, but we recognize that at the same time it is challenging, due to the restriction of space, lack of materials, self-motivation or professional orientation for a secure practice of indoor physical activity[5].

This research presents some limitations. The design adopted by the study (cross-sectional) is capable to offer short-term information. Thus, future research should apply a follow-up approach to understand the physical activity behavior in a long-term social distancing scenario as at the time of this writing, several cities were still adopting the social distancing recommendations to prevent COVID-19 from spreading further. The online format that we adopted may be considered a limitation. Depending on the social strata of the individual receiving the form (i.e.: internet access, grammatical comprehension level), other more important concerns may have affected individuals when taking the time to answer the questionnaire. Therefore, it is possible that the distribution of our sample had more respondents from medium or higher socio-economic level than those in the population.

It can be concluded that the social distancing recommendations due to the COVID-19 pandemic caused decrease in the overall levels of physical activity in adults living in the Amazonas State and specifically in the practice of individuals who were physically active and very physically active before pandemic. Concomitantly, the social distancing provoked an increase of the physically inactive behavior. However, practicing physical activity with other people (family, friend, physical education professional) and having good/excellent health self-perception could lead to a better chance of being physically active during social distancing recommendations.

Conflicts of interest

The authors declare no conflict of interest.

Authors Contribution

Marques M, research concept, data collection, data analyzes, manuscript draft, critical review. Gheller R, research concept, data collection, data analyzes, manuscript draft, critical review. Henrique N: data collection, manuscript draft, tables and figures creation. Menezes EC, data analyzes, manuscript draft, critical review. Streit I, survey conception, critical review. Franchini E, research concept, final review, critical review. Autran R, research concept, survey conception, final review, critical review.

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