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# The Impact of Measures Recommended by the Government to Limit the Spread of Coronavirus (COVID-19) on Physical Activity Levels, Quality of Life, and Mental Health of Brazilians

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**Abstract:** To reduce transmission of the coronavirus, the Brazilian government adopted containment measures to control the virus' spread, including limitations to the practice of physical activity. It was aimed to analyze the effects of COVID-19 quarantine on physical activity levels, energy expenditure, quality of life, and level of stress in a sample of the Brazilian population. The sample included 426 participants (7 to 80 years). The International Physical Activity Questionnaire, Short form survey-36 (SF-36), and Stress Perception Scale, were used to assess the level of physical activity, quality of life and stress, respectively. The anthropometric data was used to the assessment of body mass index and basal metabolic rate. Body weight increased significantly in all sample ( $p < 0.05$ ). During the pandemic, 84% of the sample indicated a low level of physical activity. Furthermore, weekly energy expenditure decreased significantly in all age groups during the pandemic (children  $p < 0.0001$ ; adolescents:  $p < 0.0001$ ; adults  $p < 0.001$ , and elderly  $p < 0.0001$ ). All aspects of quality of life, significantly reduced in both sexes in all age groups ( $p < 0.05$ ). With the exception of children, stress levels increased significantly during the pandemic (adolescents: male:  $p = 0.003$ , female:

$p < 0.05$ ; adults: male:  $p = 0.003$ , female:  $p = 0.01$ , and elderly: male:  $p = 0.02$ , female:  $p = 0.03$ ). Findings from the present study suggests that COVID-19 social isolation has negatively affected Brazilian' physical activity and quality of life.

**Keywords:** COVID-19; physical activity; quality of life; stress; public health

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## 1. Introduction

The Chinese Health Authority, on 31 December 2019, alerted the World Health Organization (WHO) to several cases of pneumonia of unknown etiology in Wuhan City, Hubei Province, Central China [1]. This pathogen was referred to as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in the coronavirus Research Group [2] and the disease was referred to as coronavirus disease 2019 (COVID-19) by WHO [1]. At the time of writing, more than 8 million people are infected worldwide resulting in more than 460 thousand deaths. In Brazil, there have been more than one million confirmed cases and more than 100 thousand deaths [1].

Owing to the rapid transmission of the virus and undocumented exposure, the WHO declared a public health emergency due to the lack of effective preventive or therapeutic medical treatments for COVID-19 infection [1]. In order to reduce the rate of transmission, countries have begun to adopt preventive measures recommended by the WHO including social distancing. Though successful in preventing outbreaks, strict exclusion interventions can adversely affect both physical and mental health, for example emerging adults rely on supportive peer experiences for their overall well-being [3]. Therefore, social distancing may have adverse effects with behavioral and clinical consequences.

Social isolation has been previously shown to be associated with both a decrease in physical activity levels and an increase in inactive behavior [4]. Fitbit, Inc. has recently shown data on physical activity before and during COVID-19 from 30 million users demonstrating a decline in steps, in the European population, ranging from 7% to 38% over the weekend of 22 March 2020 compared to the same period last year [5]. Preliminary evidence shows that social distancing has caused a significant decrease in physical activity levels in other confined conditions [6]. Some fields of study, such as epidemiology, indicate that a decline in physical activity as a consequence of a pandemic may have a negative effect on cardiovascular and mental health [4,7].

In this context, it is known that physical inactivity causes more than 5 million deaths worldwide and that it is extremely harmful to the economy of public health systems [8]. For these reasons, government officials should encourage physical activity to promote health and prevent disease [8]. A standardized instrument used to assess levels of physical activity in a population, with a recall effect ("last 7 days" or "usual week"), is the International Physical Activity Questionnaire (IPAQ) [9]. This questionnaire allows to measure the following four intensity levels of physical activity: vigorous; moderate; walking; sitting [9]. Furthermore, from the IPAQ data on the time expended by each physical activity rate, it is possible to measure the levels of physical activity exercise and the corresponding weekly energy expenditure using the respective metabolic equivalent task (MET) of each physical activity [10].

In addition, social distancing has significant and negative implications for mental health including for example severe stress conditions, irritability, depression and depressive symptoms, mood disturbances, apprehension and panic, and anger [11]. Other quarantine-related stressors may include irregular or less frequent supplies, such as food items and medicines, and restrictions on routine daily activities [11]. Consequently, the noticeable decline in physical activity and social contact caused by safety measures may have serious long-term consequences for public health.

Therefore, the aim of this study was to analyze the effects of COVID-19 social distancing on physical activity and stress levels and quality of life in Brazil as well as evaluate the levels of physical activity expressed as energy expenditure (MET-minutes/week) before and during social distancing.

## 2. Methods

The present study employed a cross-sectional online survey using the Google Forms web survey platform (Google LLC, Mountain View, CA, USA). The announcement, which included the link to the online survey, was sent by email as well as disseminated via social media such as Facebook, Instagram and WhatsApp, and shared with the personal contacts of the research group members.

All participants signed an online consent form accepting to participate in the present study. Regarding the sample of children and adolescents, at first the legal guardians were contacted through social media, and after the approval of the online term, the subjects received the link to the study. Those responsible for the children were instructed to follow and assist the entire process of answering and sending the questionnaire.

All participants were informed about the specific objective of the study before proceeding to the questionnaire. Participants were able to complete the survey only once and could terminate the survey at any time they desired. Ethical approval was awarded by The Ethics Committees of the Federal University of Rio Grande do Norte (Opinion: 3.996.317) according to Resolution 466/12 of the National Health Council, strictly respecting the ethical principles contained in the declaration of Helsinki.

## 3. Sample

Initially, 2000 subjects were invited to participate in the research and 1535 responded that they would accept to participate in the research. However, 454 presented the signed consent form (children and adolescents presented the consent of legal guardians). At the end, after removing duplicate and or incomplete responses, 426 responses were readable for the final analysis (Figure 1).

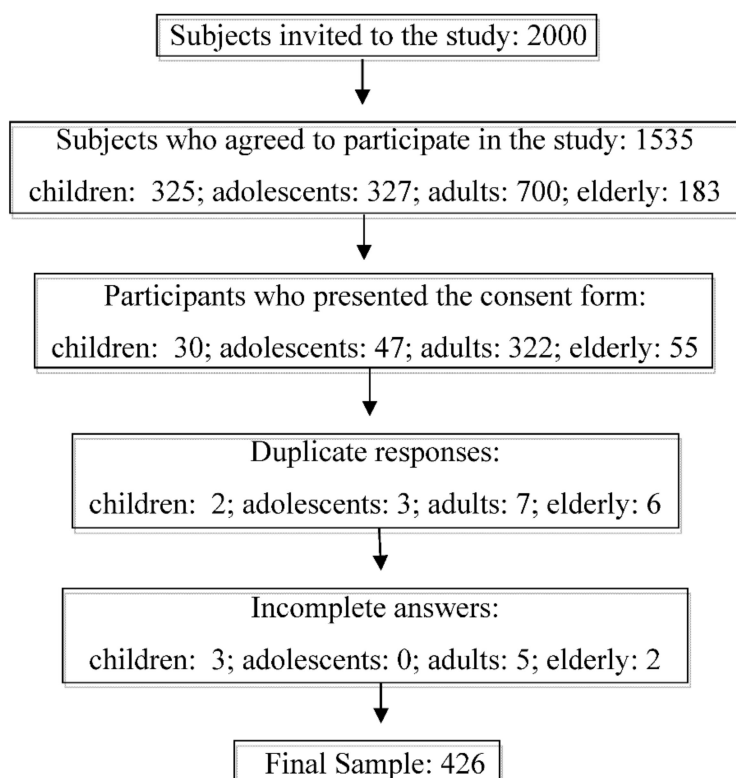


Figure 1. Sample recruitment.

The final sample was composed by 426 participants. The classification of age groups was defined based on the recommendations of Nithyashri and Kulanthavel [12]. The sample was divided into the following groups: (i) children (age:  $9.56 \pm 1.47$ ; 60% male and 40% female), (ii) adolescents (age:

16.3 ± 1.67; 43% male and 57% female), (iii) Adults (age: 36.5 ± 11.4; 49% male and 51% female), (iv) elderly (age: 66.3 ± 5.07; 69% male and 31% female).

Participants completed the online questionnaire between the 12th of June (three months after the beginning of social isolation) and 12th of July 2020. Participants were recruited during the COVID-19 quarantine in Brazil, a period in which the measures taken by the government have limited the access to physical activity practices in all gyms, sports centers, and swimming pools.

To minimize the risk of error, data were cleaned by: removing of ineligible cases and multiple submissions from the same participant and identification and handling of irrelevant data. The latter were deemed invalid responses to the questionnaire, due to the lack of internal consistency of responses.

#### 4. Questionnaire

The questionnaire was divided into four sections which included: (1) anthropometric data; (2) physical activity; quality of life; stress perception before the pandemic of COVID-19; (3) anthropometric data; (4) physical activity; quality of life; stress perception during the pandemic of COVID-19. Initially, through self-recall, the participants answered the questionnaires related to the pre-pandemic period. Then, questionnaires were related to the period during the pandemic.

##### *International Physical Activity Questionnaire (IPAQ)*

The level of physical activity was analyzed by the International Physical Activity Questionnaire (IPAQ), a tool previously validated for Brazilians [13,14]. The questionnaire contained questions related to physical activities performed in the last week prior to the application of the questionnaire. The questionnaire was structured and comprised questions regarding the frequency and duration of physical activities [9]. It attempts to recall physical activity that was performed for at least 10 min at a time. Three characteristics of the physical activity were evaluated a) intensity of the activity (mild, moderate or vigorous), frequency (days/week), and duration (time/day). The individuals were classified as inactive (<600 MET-minutes/week), moderate active (≥600 MET-minutes/week), and high active (≥3000 MET-minutes/week) (<http://www.ipaq.ki.se>).

The weekly activity is recorded in METs (metabolic equivalent of task). The reference METs value used for calculation is: Walking—3.3 METs; Moderate physical activity—4 METs; Vigorous physical activity—8 METs; the final value was derived by multiplying these reference values with the time (minutes) performed in a day and the numbers of days performed in a week.

Total MET – min/week = MET – min = week walking

MET – min = week moderate physical activity

MET – min = week vigorous physical activity

Based on the scores, participants were classified as (a) Inactive—<600 MET-min/week, (b) Insufficiently active—≥600 and <3000 met-min/week, and (c) Active—≥3000 MET-min/week.

#### 5. Short form Survey-36 (SF-36)

The SF-36 is a validated questionnaire for the Brazilian population (all age groups) that measures the subjects' self-reported opinion about their physical and mental well-being [15–17]. It has eight domains of health-related quality of life (HRQOL): general health, physical functioning, role limitations due to physical health, energy/vitality, body pain, emotional well-being, role limitations due to emotional problems, and social functioning. Responses to each question within a domain are combined to generate a score from 0 to 100, where 100 indicates “good health.”

#### 6. Stress Perception Scale

The Stress Perception Scale (EPS-10) is a instrument used to assess the perception of stress. Developed by Cohen et al. [18], it is a global assessment measure, which can be self-reported, allowing one to analyze how the individual's life situations are perceived as stressful factors. Each item is evaluated on a 5-point Likert scale, which ranges from zero (never) to 4 (very frequent). Of the ten

items, six deal with negative aspects and four with positive aspects. To obtain the final score of the evaluation, the positive items (four) must be inversely scored, and then all items must be summed. Scores can range from zero to 40, and the higher the score, the greater the perception of stress.

## 7. Basal Metabolic Rate (BMR)

To find the BMR values, the predictive equations proposed by Harris Benedict [19], were used:

$$\text{BMR - Male: } 066.47 + (13.751 * \text{body weight (kg)}) + (5.003 * \text{height (cm)}) - (6.755 * \text{age (years)}) \quad (1)$$

$$\text{BMR - Female: } 655.09 + (9.563 * \text{body weight (kg)}) + (1.850 * \text{height (cm)}) - (4.676 * \text{age (years)}) \quad (2)$$

## 8. Analyses

The normality of the data was verified by the Kolmogorov–Smirnov and Z-scores for asymmetry and kurtosis (−1.96 to 1.96). Bonferroni’s correction was applied before all comparative analyzes. Comparison analyzes (between pandemic periods) were performed using the Student-dependent t test. The effect size was verified by the Cohen test (d), the magnitude adopted was insignificant: <0.19; small: 0.20–0.49; average: 0.50–0.79; large: 0.80–1.29; very large: >1.30 [20]. All analyses were performed using open source software R (version 4.0.1; R Foundation for Statistical Computing®, Vienna, Austria) using an alpha level of  $p < 0.05$ .

The sample power was subsequently determined based on the results obtained in the present study, considering: (1) age group and (2) sex. A standard of  $\alpha = 0.05$  and an  $\beta = 0.80$  was used [21]. These analyzes were performed using the open source software G \* Power® (version 3.0; Berlin, Germany).

## 9. Results

Table 1 shows the sample characterization data in the pre and during social isolation conditions due to the quarantine of COVID-19. It was observed in all age groups and in both sexes that body weight increased significantly. BMI increased significantly in children, adolescents and adult males. It stands out for the groups analyzed that the sample power was: children of both sexes = between 0.62 and 0.70 (moderate to strong), adolescents of both sexes = between 0.70 and 0.75 (strong), adults of both sexes = between 0.74 and 0.83 (strong) and elderly men and women between 0.67 and 0.77 (moderate to strong).

It was observed that, in relation to the level of physical activity in the total sample: 4% of the subjects were inactive, 48% moderate active and 48% high active in the pre-pandemic period. While in the pandemic period, 84% of the sample was considered inactive, 13% moderate active, and 3% high active. Figure 2 reports the weekly energy expenditure in the sample, segmented by age groups. Thus, in relation to the periods before and during the pandemic, it was observed that: in children (male: ES: 3.02, CI95%: [1.93; 4.12],  $p < 0.0001$ ; female: ES: 3.26, CI95%: [1.82; 4.69],  $p < 0.0001$ ), in adolescents (male: ES: 4.25, CI 95%: [3.06; 5.44],  $p < 0.0001$ ; female: ES: 4.01, CI 95%: [3.02; 5.00];  $p < 0.0001$ ), in adults (male: ES: 2.42, CI 95%: [2.12; 2.72],  $p < 0.0001$ ; female: ES: 1.90, CI 95%: [1.64; 2.17],  $p < 0.0001$ ), and in the elderly (male: ES: 3.53, CI 95%: [2.73; 4.33],  $p < 0.0001$ ; female: ES: 3.77, CI 95%: [2.52; 5.02],  $p < 0.0001$ ) the weekly energy expenditure reduced significantly.

Table 1. Sample Characterization.

Variables	Children's		Adolescents	
Sample (N° (%))	25 (100%)		44 (100%)	
Female (N° (%))	10 (40%)		25 (57%)	
Male (N° (%))	15 (60%)		19 (43%)	
Age (Yrs)	9.56 ± 1.47		16.3 ± 1.67	
Stature (cm)	138.0 ± 8.18		159.8 ± 13.7	
	Male		Male	
	Pandemic Moments			
	Pré	During	Pré	During
Weight (Kg)	34.0 ± 9.18	*38.8 ± 8.61	52.6 ± 15.8	*58.4 ± 15.5
BMI (kg/m <sup>2</sup> )	18.5 ± 7.00	*21.2 ± 7.10	21.2 ± 3.45	23.6 ± 2.97
BMR (Kcal)	1328.4 ± 326.0	1384.5 ± 302.3	1430.5 ± 265.3	1497.9 ± 252.6
	Female		Female	
Weight (Kg)	32.0 ± 5.79	*36.2 ± 4.34	60.4 ± 15.0	*65.8 ± 14.0
BMI (kg/m <sup>2</sup> )	16.5 ± 3.52	18.7 ± 3.13	22.4 ± 3.72	24.4 ± 3.05
BMR (Kcal)	1167.6 ± 54.6	1207.5 ± 39.0	1450.9 ± 158.9	1502.3 ± 150.4
	Adults		Elderly	
Sample (N° (%))	310 (100%)		47 (100%)	
Female (N° (%))	159 (51%)		15 (31%)	
Male (N° (%))	151 (49%)		32 (69%)	
Age (Yrs)	36.5 ± 11.4		66.3 ± 5.07	
Stature (cm)	164.4 ± 12.7		174.0 ± 8.91	
	Male		Male	
Weight (Kg)	67.9 ± 18.1	*72.3 ± 17.4	79.0 ± 9.68	*83.7 ± 9.06
BMI (kg/m <sup>2</sup> )	24.1 ± 3.72	*26.9 ± 8.23	25.7 ± 2.59	27.3 ± 0.54
BMR (Kcal)	1550.7 ± 294.8	1614.9 ± 275.6	1588.5 ± 239.0	1654.9 ± 248.1
	Female		Female	
Weight (Kg)	64.6 ± 13.9	*68.1 ± 13.8	77.6 ± 7.72	*81.9 ± 7.88
BMI (kg/m <sup>2</sup> )	24.1 ± 3.58	25.6 ± 3.57	28.2 ± 2.63	27.6 ± 2.19
BMR (Kcal)	1394.6 ± 139.5	1428.6 ± 139.9	1391.1 ± 81.4	1432.7 ± 88.9

\*  $p < 0.0001$ . BMI = Body Mass Index. BMR = Basal Metabolic Rate. M = Male. F = Female.

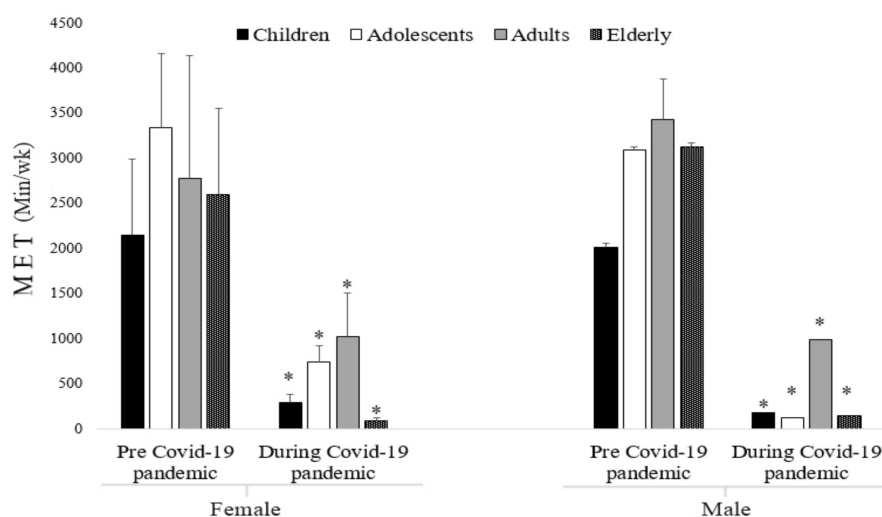


Figure 2. Weekly energy expenditure. \* Statistically significant.

Table 2 is stratified by age, the results referring to aspects of quality of life in the pre- and during social isolation conditions of the COVID-19 pandemic. There was a significant decrease in all aspects of quality of life analyzed by the SF-36 in all age groups analyzed, with the exception of the vitality aspect in female subjects in the elderly group that did not show any difference between the periods analyzed.

Table 2. Quality of life analysis.

Domain—Raw Scale	Children's		Adolescents	
	Pandemic Moments			
	Male		Male	
	Pre	During	Pre	During
FC	90.33 ± 5.81	*30.9 ± 21.6	91.3 ± 3.26	*24.2 ± 8.10
LPA	96.6 ± 12.9	*6.45 ± 1.66	100.0 ± 0.00	*0.00 ± 0.00
Pain	76.5 ± 30.6	*38.3 ± 46.1	78.9 ± 27.9	*40.8 ± 24.3
GHS	61.2 ± 8.96	*49.8 ± 12.5	66.4 ± 17.5	*50.7 ± 14.2
VIT	66.0 ± 17.7	*47.0 ± 19.3	62.6 ± 18.0	*40.5 ± 16.1
AS	57.5 ± 28.2	*32.8 ± 18.3	75.0 ± 28.8	*28.2 ± 13.5
EA	97.7 ± 8.60	*8.60 ± 2.22	94.7 ± 16.7	*15.2 ± 3.50
MH	68.2 ± 14.7	*33.0 ± 23.0	68.2 ± 17.7	*35.3 ± 15.8
	Female		Female	
FC	79.0 ± 9.36	*28.0 ± 14.6	86.2 ± 22.5	*25.8 ± 9.90
LPA	95.0 ± 15.8	*0.00 ± 0.00	100.0 ± 0.00	*27.6 ± 8.00
Pain	65.9 ± 21.2	54.2 ± 20.0	77.0 ± 35.8	*21.6 ± 9.80
GHS	69.1 ± 55.9	*69.1 ± 14.7	68.3 ± 12.8	*47.4 ± 10.6
VIT	56.5 ± 18.4	56.5 ± 12.2	63.2 ± 20.5	*35.8 ± 11.1
AS	56.2 ± 14.7	48.7 ± 16.0	75.0 ± 35.1	*25.0 ± 9.00
EA	96.6 ± 10.5	*21.0 ± 6.66	97.33 ± 9.22	*15.7 ± 5.33
MH	60.8 ± 15.1	*40.4 ± 11.8	67.5 ± 16.7	*21.6 ± 6.30
	Adults		Elderly	
	Male		Male	
FC	89.6 ± 10.0	*29.6 ± 5.19	86.2 ± 10.7	*17.1 ± 7.96
LPA	94.3 ± 18.5	*18.2 ± 5.62	97.6 ± 13.2	*4.41 ± 0.78
Pain	73.3 ± 25.3	*49.4 ± 9.34	79.5 ± 25.2	*33.2 ± 1.06
GHS	63.5 ± 16.1	*55.11 ± 18.7	63.6 ± 15.3	*53.6 ± 10.4
VIT	55.5 ± 20.2	*46.5 ± 15.7	58.1 ± 21.0	*40.3 ± 18.0
AS	66.6 ± 32.4	*36.3 ± 9.37	64.4 ± 32.5	*28.9 ± 7.39
EA	89.1 ± 23.2	*19.2 ± 6.62	94.7 ± 19.1	*8.19 ± 2.08
MH	65.0 ± 14.5	*36.4 ± 3.26	67.2 ± 13.2	25.0 ± 6.31
	Female		Female	
FC	86.3 ± 15.1	*31.1 ± 3.23	82.6 ± 21.1	*29.1 ± 19.6
LPA	90.8 ± 23.6	*26.3 ± 12.1	93.3 ± 25.8	*6.45 ± 166
Pain	75.6 ± 25.8	*49.5 ± 9.97	67.2 ± 23.8	*48.2 ± 5.66
GHS	63.3 ± 16.5	*57.4 ± 17.1	56.8 ± 14.2	*43.2 ± 10.0
VIT	56.4 ± 19.3	*47.1 ± 16.5	49.0 ± 19.8	48.0 ± 20.4
AS	67.3 ± 33.0	*38.2 ± 3.81	61.6 ± 31.1	*25.0 ± 7.54
EA	87.4 ± 22.7	*27.6 ± 14.2	95.5 ± 11.7	*0.00 ± 0.00
MH	65.4 ± 13.8	*40.4 ± 16.22	60.2 ± 19.4	*33.3 ± 13.8

\*  $p < 0.0001$ . FC = Functional Capacity. LPA = Limitation by physical aspect. GHS = General Health Status. VIT = Vitality. SA = Social Aspects. EA = Emotional Aspects. MH = Mental Health. M = Male. F = Female.

Figure 3 shows graphically the data regarding the perceived stress scale in different age groups.

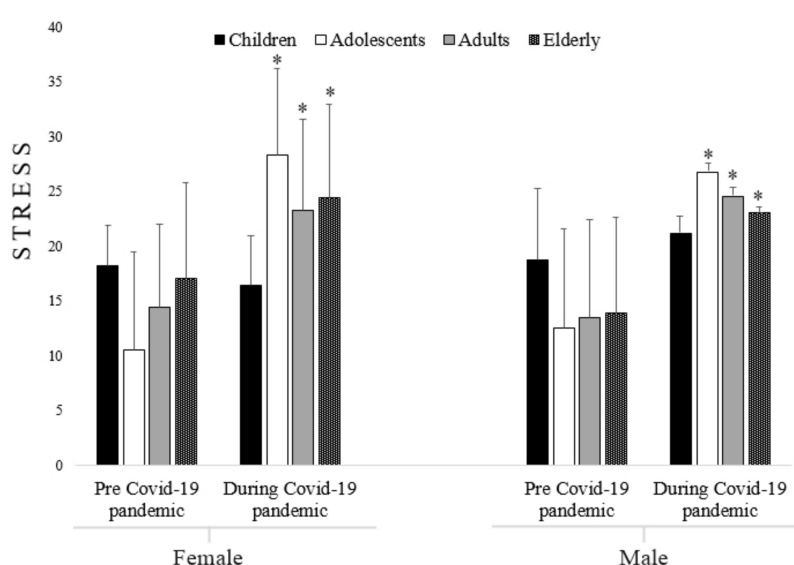


Figure 3. Perceived Stress Scale analysis. \* Statistically significant.

It was observed that, in relation to the periods before and during the pandemic, there were no significant differences in children (male: ES: 0.40, CI 95%: [−0.35; 1.15];  $p = 0.3$ ; female: ES: 0.44, 95% CI: [−0.51; 1.39],  $p > 0.05$ ). While in adolescents (male: ES: 1.49, CI 95%: [0.75; 2.24];  $p = 0.003$ ; female: ES: 2.11, CI 95%: [1.40; 2.82];  $p < 0.05$ ), adults (male: ES: 1.18, 95% CI: [0.94; 1.43];  $p = 0.003$ ; female: ES: 1.10, 95% CI: [0.86; 1.33],  $p = 0.01$ ), and the elderly (male: ES: 1.16, 95% CI: [0.62; 1.70],  $p = 0.02$ ; female: ES: 0.85, CI 95%: [0.07; 1.63],  $p = 0.03$ ) stress levels increased from significantly.

## 10. Discussion

The present study aimed to analyze the effects of COVID-19 quarantine on physical activity levels and mental health in a sample of the Brazilian population as well as evaluate the levels of physical activity expressed as energy expenditure (MET-minutes/week) before and during the social isolation. It is important to note that the results were based on a survey in which respondents had to recall their status before the pandemic. The main results were: (1) The responders reported that their weight was higher during the pandemic compared to before the pandemic. (2) Weekly energy expenditure has largely decreased in the period during the pandemic compared to the pre-pandemic period. (3) The number of subjects who were categorized as inactive in the period during the pandemic increased from 4% to 84% in relation to the pre pandemic period (4). The responders reported lower quality of life in all age groups during the pandemic. (5) Adolescents, adults and the elderly showed greater perceived stress during the pandemic.

Notably, due to the fact of social isolation and the measures taken by the Brazilian government in order to control the spread of COVID-19, the results of the present research show an increase in body weight, BMI, reduction of energy expenditure and level of physical activity in the evaluated group. The COVID-19 pandemic has created a situation that induces decreased levels of routine physical activity due to self-isolation and quarantine conditions, limited opportunity to stay physically active and reduced risk of infection. Due to this fact, Costa et al. [22] showed that during the pandemic, the level of physical activity of Brazilians reduced significantly, becoming harmful to the health of the population. Sustained physical inactivity is usually associated with decreased physical and mental wellbeing and elevated disease-specific behavior and all-cause mortality risk [23].

Despite the preventive strategy to limit COVID-19 infections, social isolation may have unintended negative effects, causing the rise in occupational inactivity and emotional disorders of the population [24]. Social isolation can lead to a reduction in social contact and longer periods of immobility, directly or indirectly due to the increasing use of interactive devices, such as TV, computers and mobile phones [25].



In addition, physical inactivity is known to be a contributing factor for serious non-communicable conditions, such as coronary disorders, certain cancers and diabetes [26], some of the comorbidities linked with severe cases of acute respiratory syndrome attributed to COVID-19 [2] and significant causes of death worldwide [27].

The creation of alternative methodologies that encourage people's autonomy and facilitate the awareness and preservation of physical activity is therefore necessary for health promotion, disease prevention and control [28]. Physical activity provides advantages that are related to the experience of its practice and can have immediate and long-term impacts on wellbeing [4]. In fact, it will reduce the adverse effects of long periods of immobility and improve the immune response to infections [23]. It has a significant effect on the severity of complications and the quality of the clinical image in people with COVID-19 or other communicable diseases [29].

It is noteworthy that the levels of quality of life significantly decreased in children, adolescents, adults and the elderly of both sexes. It is known that the emotional aspect of quality of life is influenced by external factors such as socialization and environmental well-being [30]. In this context, external factors are interpreted intrinsically by the subjects' physiological response and reflect on positive or negative sensations that significantly affect the human body in relation to the enhancement of health or its fall [31].

In this context, social isolation can enhance loneliness and abandonment, which trigger adverse behavioral relationships (i.e., aggressiveness, crying, emotional pain, etc.) [32,33]. Moreover, the absence of social interaction can affect the emotional perception that will influence the feeling of vitality and the perception of general health. This has a direct influence on mental health, and all these interconnected reactions can be harmful to the physical aspects, which can reduce functionality and increase the perception of physical pain [33,34]. Therefore, the self-perceived quality of life tends to suffer negative changes during the isolation period of the COVID-19 pandemic [29,30]. This current scenario can bring complications to public health at regional, national and global scales [35,36].

Regarding perceived stress, the present study found that there was an increase in the adolescent, adult and elderly groups during the pandemic. Bezerra et al. [37], identified that during social isolation due to COVID-19, Brazilians of different age groups, showed a significant increase in the level of stress. Periods of isolation and deprivation away from day-to-day life, decreased exposure to everyday needs/finance, a sense of vulnerability mixed with fear of contagion, as well as potential information overload can all contribute to negative emotions and anxiety [38]. During this time of physical and social constraints, people reported high rates of severe hostility, depression, insomnia and anxiety [39].

Online networking is one of the key platforms for updating COVID-19 knowledge, as 82.0% of the participants in a study were consistently exposed to social media [40]. Nevertheless, access to mass media can lead to "infodemic," which relates to too much confusing information that contributes to people's difficulties in seeking credible sources of information, and can also harm people's physical and mental health [41].

Kowal et al. [42], analyzed more than 50 thousand people of both sexes from 27 different countries and pointed out that the levels of stress during the COVID-19 pandemic are influenced by the age group, especially the younger ones. In addition, the aforementioned authors also showed that female subjects indicated higher levels of stress due to being single, staying with one or more children, and living in collectivistic cultures [42]. It is worth mentioning that, although the authors did not analyze Brazilian people, the present research found similar results in relation to the increase in perceived stress in adolescents, adults and the elderly.

The solution to the COVID-19 outbreak has raised social isolation in unprecedented proportions on a global scale. Although these steps are critical to mitigating disease spread, attention must be paid to future disruption and to alleviating the effect of social isolation on public health.

## 11. Mitigation Strategies to Keep Active

Home physical activity programs are known to be efficient, low cost, and when applied in a structured way, they facilitate improvements in health-related physical activity aspects, based on the physical condition of each person [43,44]. It is also a promising and successful approach to growing and sustaining population rates of physical activity and immune response to COVID-19 to be implemented as a public health strategy. Therefore, some strategies should also be implemented in order to remain active in according to standards of American College of Sports Medicine [45].

## 12. Children and Adolescents

Children and adolescents must be able to perform physical activity of mild to intense strength, or to play for 60 min a day, as time and space permit. For instance, jumping rope is an aerobic exercise, which often strengthens bones and muscles. Another strategy is to include the whole family in a game with them (like Nintendo Wii®), helping to promote contact and social participation. It may help to reduce levels of stress and enhance the quality of life. In children and adolescents who were not involved previous to the COVID-19 pandemic, it is recommended to continue moderate intensity exercise every day for 10 to 15 min. If necessary, seek guidance from a fitness professional (personal trainer) on the progress of exercise [45].

## 13. Adults and Elderly

It can be advised that adults engage in physical exercise for a minimum of 150 min a week of aerobic physical activity with moderate intensity or fewer than 75 min with aerobic physical activity with intense physical ability 2–3h a week in body strength training (e.g., yoga, dumbbells, resistance bands) [45]. Elderly people are advised to follow the same physical activity advice as younger adults. Elderly people who are not active should be advised to practice light activities to avoid the inactive compartment (e.g., sitting and getting up from the chair, lifting food packages) [45].

However, despite the relevance of the results, the present study has some limitations: (1) The sample number was relatively low and may not have been a good estimator of the general population. (2) The assessment of the pre-pandemic questionnaires was based on reports based on memories, which may have had an influence on the completion of the questionnaires.

## 14. Conclusions

We conclude that the current scenario of social isolation has negatively affected the level of physical activity, quality of life and stress level in Brazilians. In addition, implementing an adapted physical training program at home during the period of the pandemic, which may well extend from weeks to months, will decrease the negative physiological and psychological impact of inactive behaviors.

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