Original Article

RBAFS Revista Brasileira de Atividade Física & Saúde
SOCIEDADE BRASILEIRA DE ATIVIDADE FÍSICA & SAÚDE

rbafs.org.br

Physical activity, depression, anxiety, and stress in adults and elderly in the COVID-19 pandemic in Brazil

Atividade física, depressão, ansiedade e estresse em adultos e idosos na pandemia COVID-19 no Brasil

AUTHOR'S

Milton José de Azevedo[1]
Gabriel Peinado Costa[1]
João Luiz Andrella[1]
Elisângela Aparecida da Silva Lizzi[2]
Átila Alexandre Trapé[1]

1 Universidade de São Paulo, Escola de Educação Física e Esporte de Ribeirão Preto, Ribeirão Preto, São Paulo, Brasil.

2 Universidade Tecnológica Federal do Paraná, Departamento Acadêmico de Matemática, Cornélio Procópio, Paraná, Brasil.

CORRESPONDING

Átila Alexandre Trapé
atrape@usp.br
Escola de Educação Física e Esporte de Ribeirão Preto (EEFERP) - USP
Av. Bandeirantes, 3900 – Monte Alegre, Ribeirão Preto, São Paulo, Brasil.
CEP: 14040-907.

DOI

10.12820/rbafs.28e0323

ABSTRACT

The aim was to verify whether there is a relationship between physical activity habits and the indication of associated risk for depression, anxiety, and stress in adults and the elderly during a period of the COVID-19 pandemic in Brazil. A cross-sectional study, with data collection between October and November 2021, was carried out using an online form, with questions about sociodemographic data, physical activity practice before and during the pandemic, health status, mental health through the Scale of Depression, Anxiety, and Stress (DASS-21), and level of physical activity through the International Physical Activity Questionnaire (IPAQ). Statistical analysis was performed using the chi-square test with a significance level of 5% and multiple correspondence analysis. The were 1044 men and women, aged between 18 and 75, from all over the national territory. Among them, 48.0%, 35.9%, and 61.1% showed an indication of associated risk for depression, anxiety, and stress, respectively. Adult participants 93.4%, female 66.8%, educational level up to undergraduate studies 54.2%, and single 57.5%, as well as those with a low level of physical activity 36.1% and who reported worsening in practice during the pandemic 53.9%, showed a greater risk indication for depression, anxiety and stress ($p<0.05$). In summary, physically active people who managed to maintain or improve their practice during the pandemic showed a lower indication of associated risk for problems related to mental health. It is important to consider the planning of public policies from the perspective of equity to help people with greater vulnerability in accessing physical activity.

Keywords: Mental health; Sedentary behavior; Coronavirus; Mental disorder.

RESUMO

O objetivo foi verificar se há relação entre os níveis de atividade física e a indicação de risco associado para depressão, ansiedade e estresse em adultos e idosos durante um período da pandemia da COVID-19 no Brasil. Estudo transversal, entre outubro e novembro de 2021, foi realizado por meio de um formulário online, com perguntas sobre dados sociodemográficos, prática de atividade física antes e durante a pandemia, estado de saúde, saúde mental - Escala de Depressão, Ansiedade e Estresse (DASS-21) e nível de atividade física - Questionário Internacional de Atividade Física (IPAQ). A análise estatística foi realizada por meio do teste Qui-Quadrado com nível de significância de 5% e análise de correspondência múltipla. Participaram 1044 homens e mulheres, com idade entre 18 e 75 anos, de todo território nacional. Entre os participantes, 48,0%, 35,9% e 61,1% apresentaram indicação de risco associado para depressão, ansiedade e estresse, respectivamente. Os participantes adultos 93,4%, do gênero feminino 66,8%, nível de escolaridade até o ensino superior 54,2% e solteiros 57,5%, bem como os com nível baixo de atividade física 36,1% e que relataram piora na prática durante a pandemia 53,9% apresentaram maior indicação de risco para depressão, ansiedade e estresse ($p<0,05$). Em síntese, pessoas fisicamente ativas e que conseguiram manter ou melhorar a prática durante a pandemia, apresentaram menor indicação de risco associado para problemas relacionados à saúde mental. É importante considerar o planejamento de políticas públicas sob a ótica da equidade, para auxiliar pessoas com maior vulnerabilidade no acesso à atividade física.

Palavras-chave: *Saúde mental; Comportamento sedentário; Coronavírus; Transtorno mental.*

Introduction

The COVID-19 pandemic was and continues to be a matter of great global concern. In Brazil, from January 5, 2020, to May 25, 2023, over 37 million cases and more than 702,000 deaths were recorded, placing the country in third place in the number of cases and second in the number of deaths globally due to the disease[1]. These figures reflect the high transmissibility rate and significant lethality of COVID-19, which decisively forced, at certain times, various countries, including Brazil, to mitigate the virus's circulation and spread. These measures aim to manage contact among

people, mainly by increasing distancing and social isolation. Recently, with vaccination and the consequent reduction in the number of cases, hospitalizations, and deaths, the restrictive measures have been decreasing[2].

The period of greatest restrictions during the pandemic influenced various changes in people's lifestyle habits, leading to more time spent at home, sitting or lying down in front of the television, video games, and cell phones, which had a strong influence on increasing sedentary behavior and physical activity habits[3].

Consequently, this behavior change had an impact on health, particularly on mental health. There was a significant increase in the number of people with a prevalence of anxiety and depression disorders[4]. Before the pandemic, an average of 193 million people reported problems with depression disorder and 298 million with anxiety disorder worldwide. Adjusted data after the pandemic indicate an increase of 27.6% (246 million) in people reporting depression disorder and 25.6% (374 million) anxiety disorder[5]. The World Health Organization (WHO)[6] pointed out Brazil as leading in the prevalence of anxiety disorders with 9.3% of the population, and ranked fifth in depression rates, with 5.8% of the population. A study conducted with adults living in Rio Grande do Sul reported that 3.9% and 4.5% of participants showed symptoms of depression and anxiety before the COVID-19 pandemic, and during the pandemic between June and July 2020, there was an increase to 29.1% and 37.8%, respectively[7].

It is recognized that the impact of sanitary measures affected the different strata of the population unevenly, with certain social groups being more susceptible than others[2]. For example, some sociodemographic characteristics may be related to the risk of mental health-related problems during the pandemic[8], with females being more prone to high levels of anxiety[7].

The reduction in social interaction directly impacted lifestyle habits, especially the time spent on physical activity. People who had the habit of engaging in regular physical activity and had to reduce these activities reported an increase in symptoms of anxiety and depression[9].

There is evidence that regular physical activity habits can help control signs and symptoms related to mental health[10]. In general, people who manage to stay physically active or start engaging in physical activity have reduced mental disorders compared to those who are inactive[7,11]. Public policies could adopt programs and strategies that encourage the provision of physical activity practices as a protective factor against mental health-related problems[7].

Knowing that the prevalence of mental health-related disorders was already high in Brazil and during the COVID-19 pandemic, these numbers increased[4–6], some studies reported that individuals who engage in regular physical activity had fewer mental health problems[3,12]. Therefore, there is a positive relationship between physical activity and the impacts of the pandemic on mental health. This reflects the need to investigate the health. This demonstrates the need for mental health and regular physical activity practice in order to encourage the adoption and maintenance of healthy habits.

In this sense, the objective of this study was to verify the relationship between physical activity levels and the indication of associated risk for depression, anxiety, and stress in adults and the elderly during a period of the COVID-19 pandemic in Brazil.

Methodological Procedures

This is a cross-sectional epidemiological study carried out with the Brazilian population, approved by the Research Ethics Committee of the School of Physical Education and Sport of Ribeirão Preto (EEFERP) of USP (CAAE: 30477320.5.0000.5659). This article followed the guidelines of The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)[13] and the Checklist for Reporting Results of Internet E-Surveys (CHERRIES)[14].

The present work is part of a larger project[15] in which two stages of data collection were carried out. The first stage was conducted at the beginning of the pandemic (April to May 2020), with populations from Ibero-American countries (Brazil, Spain, and Argentina) and with results already published[12]. The second stage was carried out with the Brazilian population in the period between October and November 2021. Brazil was in the vaccination phase during this period, and restrictions had decreased. Therefore, it was possible to assess a different scenario of the pandemic. The data from this study refer to the second stage of the main research.

Participants

In the first stage of the research, all participants responded to the form, registering an email that was stored in a database, allowing contact for the invitation to future research. Through this database, an invitation with the form link was emailed to the same participants from the first stage (n = 3,436), men and women,

aged between 18 and 75 years, with an average age of 36 years and a standard deviation of 13 years. A deadline of three weeks was set for receiving responses. After this period, a new email was sent to those who had not yet responded. Therefore, this is a convenience sample, where the sampling is non-probabilistic, and participants are selected based on ease of access, with the population of this study being the respondents from the first stage.

Form

The form was emailed and created using Google Forms, and participants' responses were automatically saved in a spreadsheet upon submission. Initially, the participant received information about the research and data storage (data stored for up to five years on the study group's computer, protected by a password) before giving consent to the research. The participant had to complete the form entirely to be included in the study. Most of the responses were mandatory, and it was emphasized to participants that they could stop filling it out at any time. Incomplete forms were not analyzed.

Questionnaires

The form (supplementary material A) included questions addressing the following aspects: (a) sociodemographic data; (b) psychological responses in the last seven days – Depression, Anxiety, and Stress Scale (DASS – 21); (c) physical activity level – International Physical Activity Questionnaire (IPAQ) (last seven days); and (d) an additional question regarding physical activity habits during the pandemic (whether they were maintained, worsened, or improved compared to before the pandemic).

Regarding sociodemographic data, questions were asked concerning gender, skin color, age, marital status, education level, and employment situation.

Psychological responses during the COVID-19 pandemic were assessed through DASS21[16,17], which uses a Likert-type scale, self-administered, and validated for the Brazilian population, based on the seven days before application. Participants indicated how much each of the 21 statements applied to them (0 – Did not apply to me at all; 1 – Applied to me to some degree, or some of the time; 2 – Applied to me to a considerable degree or a good part of time; 3 – Applied to me very much or most of the time). The DASS-21 is an adaptation of the DASS-42, which has twice the number of questions. Therefore, the score obtained in the DASS-21 is multiplied by 2 to use the same reference values for classification. The scoring was based on a previous study[18]. This classification was divided into five categories, which were used for the descriptive part of this study. Questions 3, 5, 10, 13, 16, 17, and 21 formed the depression subscale, classified as: no risk/normal (0 – 9), mild risk (0 -12), moderate risk (13 – 20), severe risk (21 – 27), and extreme risk (28 – 42). Questions 2, 4, 7, 9, 15, 19, and 20 formed the anxiety subscale, with the following classification: no risk/normal (0 – 6), mild risk (7 – 9), moderate risk (10 – 14), severe risk (15 – 19), and extreme risk (20 – 42). Questions 1, 6, 8, 11, 12, 14, and 18 constituted the stress subscale, classified into: no risk/normal (0 – 10), mild risk (11 – 18), moderate risk (19 – 26), severe risk (27 – 34), and extreme risk (35 – 42). Later, for the analytical part of the results of this study, the risk classifications, from mild to extremely severe, were combined to maintain the nomenclature risk (higher score). The no-risk classification was kept the same, with the addition of (a lower score).

The short version of the IPAQ, validated for the Brazilian population[19], was used to evaluate the usual level of physical activity. Participants were instructed to consider the last seven days and, if this last week was not typical, to think of a typical week. Participants were classified according to their level of physical activity, obtained by adding the frequency and duration of all activities in a typical week, categorizing them into low, moderate, or high levels of physical activity, as previously proposed[20].

The form was also updated with a supplemental multiple-choice question about physical activity practice and changes in physical activity habits during the pandemic compared to before the pandemic (whether there was maintenance, worsening, or improvement).

Evaluation and Revision of the Online Form Version and Data Processing

Five experienced research group members tasked with this job evaluated and revised the online version of the form. After making changes, the same people re-evaluated the form, receiving unanimous approval. After this stage, the form was shared with five people outside the research group, who evaluated the content, obtaining approval from all.

In the data processing stage, in the case of repeated responses from the same participant, the last record was considered based on identifying email duplication,

and previous responses were deleted. Multiple-choice questions were numerically coded, open questions were normalized in text, duplicate responses were deleted, and inconsistencies in responses were deleted without any analytical detriment. A descriptive data analysis was conducted, providing a global view of the variation of these values, and the data was organized and described through tables and descriptive measures.

Statistical Analysis

For the statistical analysis, the following test was conducted: Chi-square association test to verify the association of aspects related to mental health (depression, anxiety, and stress) with gender, age, skin color, education level, marital status, and physical activity levels. This analysis used the SAS program (version 9.2).

Multiple correspondence analysis was also conducted[21]. It is a technique for flat graphical representation of the relationships between categorical variables, calculated multidimensionally from normalized distances. This analysis is descriptive with a graphical interpretation, that is, through the proximity of the location of categories around the variable of interest. In this study, the variables of most significant interest were defined as the risk indicators for depression, anxiety, and stress. Thus, profiles were created based on the proximity of other variables (physical activity status, skin color, education level, marital status, age category, IPAQ classification, gender, and employment status) around the indication of risk and associated non-risk, using the HOMALS algorithm. This analysis utilized the computational support of SPSS (version 28.0.1.1). In all analyses, a fixed significance level of 5% was considered.

Results

In the sample, female gender was predominant (68.8%), adult (93.4%), white skin color (78.8%), single marital status (57.5%), completed undergraduate education (86.6%), and individuals with employment (46.4%) (Table 1).

The data show that 48.0% of participants presented a risk associated with depression, 35.9% had a risk associated with anxiety, and 61.1% had a risk associated with stress (Table 2). Regarding physical activity, 63.9% had adequate levels, with 35.6% at moderate levels and 28.3% at high levels. During the analyzed pandemic period, more than half, 53.9%, reported a reduction in the time spent on physical activity compared to before the pandemic (Table 2).

Table 1 – Participants characterization based on sociodemographic data (age, gender, skin color, marital status, education, and employment situation)

Variable	F (n = 1044)	%
Age		
< 60 years	975	93.4
≥ 60 years	69	6.6
Gender		
Female	697	66.8
Male	347	33.2
Skin color		
White	823	78.8
Black/Brown	186	17.8
Other	35	3.4
Marital Status		
Single	600	57.5
Married	290	27.7
Separated or divorced	49	4.7
Widowed	7	0.7
Stable relationship	98	9.4
Education		
Elementary school	0	0
High school	140	13.4
Undergraduate	426	40.8
Graduate	478	45.8
Employment situation		
Unemployed	38	3.6
Retired	29	2.8
Student	362	34.7
Employed	484	46.4
Self-employed	131	12.5

n = absolute frequency; % = relative frequency

Table 2 – Participant characterization based on the risk classification proposed by the Depression, Anxiety, and Stress Scale (DASS-21) and physical activity habits

Variable	F (n = 1044)	%
Depression		
Risk	501	48.0
No risk	543	52.0
Anxiety		
Risk	375	35.9
No risk	669	64.1
Stress		
Risk	638	61.1
No risk	406	38.9
Physical activity level (IPAQ)		
Low	377	36.1
Moderate	372	35.6
High	295	28.3
Physical activity during the pandemic		
Worsened	563	53.9
Remained	219	21.0
Improved	262	25.1

IPAQ = International Physical Activity Questionnaire; n = absolute frequency; % = relative frequency

In the results related to depression, a higher frequency of risk compared to no risk was observed in adult participants (96.8% versus 90.2%), females (70.1% versus 63.7%), with high school (16.0% versus 11.1%), and undergraduate studies (42.3% versus 39.4%), and single marital status (65.7% versus 49.9%). Regarding anxiety data, a higher risk frequency was observed in adults (96.8% versus 91.5%), females (76.3% versus 61.4%), individuals with black/brown skin color (22.4% versus 15.3%), with high school education (19.2% versus 10.2%), and single marital status (64.3% versus 53.7%). For stress, as with depression and anxiety, adults (96.4% versus 88.7%), females (74.3% versus 54.9%), with high school (15.4% versus 10.4%) and undergraduate (42.3% versus 38.4%), and single marital status (62.9% versus 49.0%) showed a higher frequency of risk (Table 3).

Participants with a low level of physical activity showed a higher frequency of risk indication compared to those at no risk for depression (42.1% versus 30.6%) and stress (39.0% versus 31.6%). Participants who reported a reduction in physical activity during

Table 3 – Analysis of the association between age, gender, skin color, education, and marital status with the risk for depression, anxiety, and stress

Variable	Depression					Anxiety					Stress				
	Risk (high score)		No risk (low score)		p value	Risk (high score)		No risk (low score)		p value	Risk (high score)		No risk (low score)		p value
	n	%	n	%		n	%	n	%		n	%	n	%	
Age															
< 60 years	485	96.8	490	90.2	< 0.001	363	96.8	612	91.5	0.009	615	96.4	360	88.7	< 0.001
> 60 years	16	3.2	53	9.8		12	3.2	57	8.5		23	3.6	46	11.3	
Gender															
Female	351	70.1	346	63.7	0.029	286	76.3	411	61.4	< 0.001	474	74.3	223	54.9	< 0.001
Male	150	29.9	197	36.3		89	23.7	258	38.6		164	25.7	183	45.1	
Skin Color															
White	392	78.2	431	79.4	0.639	283	75.5	540	80.7	0.006	503	78.9	320	78.8	0.873
Black/Brown	94	18.8	92	16.9		84	22.4	102	15.3		115	18.0	71	17.5	
Other	15	3.0	20	3.7		8	2.1	27	4.0		20	3.1	15	3.7	
Education															
High School	80	16.0	60	11.1	0.013	72	19.2	68	10.2	< 0.001	98	15.4	42	10.4	0.007
Undergraduate	212	42.3	214	39.4		154	41.1	272	40.6		270	42.3	156	38.4	
Graduate	209	41.7	269	49.5		149	39.7	329	49.2		270	42.3	208	51.2	
Marital Status															
Single	329	65.7	271	49.9	< 0.001	241	64.3	359	53.6	0.002	401	62.9	199	49.0	< 0.001
Married	108	21.5	182	33.5		80	21.3	210	31.4		145	22.7	145	35.7	
Separated or Divorced	11	2.2	38	7.0		12	3.2	37	5.5		23	3.6	26	6.4	
Widowed	1	0.2	6	1.1		2	0.5	5	0.8		2	0.3	5	1.2	
Stable relationship	52	10.4	46	8.5		40	10.7	58	8.7		67	10.5	31	7.7	

n = absolute frequency; % = relative frequency; Chi-square Association test.

Table 4 – Analysis of the association between physical activity habits and the associated risk for depression, anxiety, and stress

Variable / Categories	Depression					Anxiety					Stress				
	Risk		No risk		p value	Risk		Não risk		p value	Risk		Não risk		p value
	n	%	n	%		n	%	n	%		n	%	n	%	
PA level (IPAQ)															
Low	211	42.1	166	30.6	0.005	149	39.7	228	34.1	0.119	249	39.0	128	31.6	0.022
Moderate	164	32.7	207	38.2		132	35.2	239	35.8		225	35.3	146	36.1	
High	126	25.2	169	31.2		94	25.1	201	30.1		164	25.7	131	32.3	
PA during the pandemic															
Worsened	311	62.0	252	46.4	< 0.001	237	63.2	326	48.7	< 0.001	379	59.4	184	45.3	< 0.001
Remained	86	17.2	133	24.5		61	16.3	158	23.6		109	17.1	10	27.1	
Increased	104	20.8	158	29.1		77	20.5	185	27.7		150	23.5	112	27.6	

PA = Physical Activity; IPAQ = International Physical Activity Questionnaire; n = Absolute frequency; % = Relative frequency; Chi-square Association test.

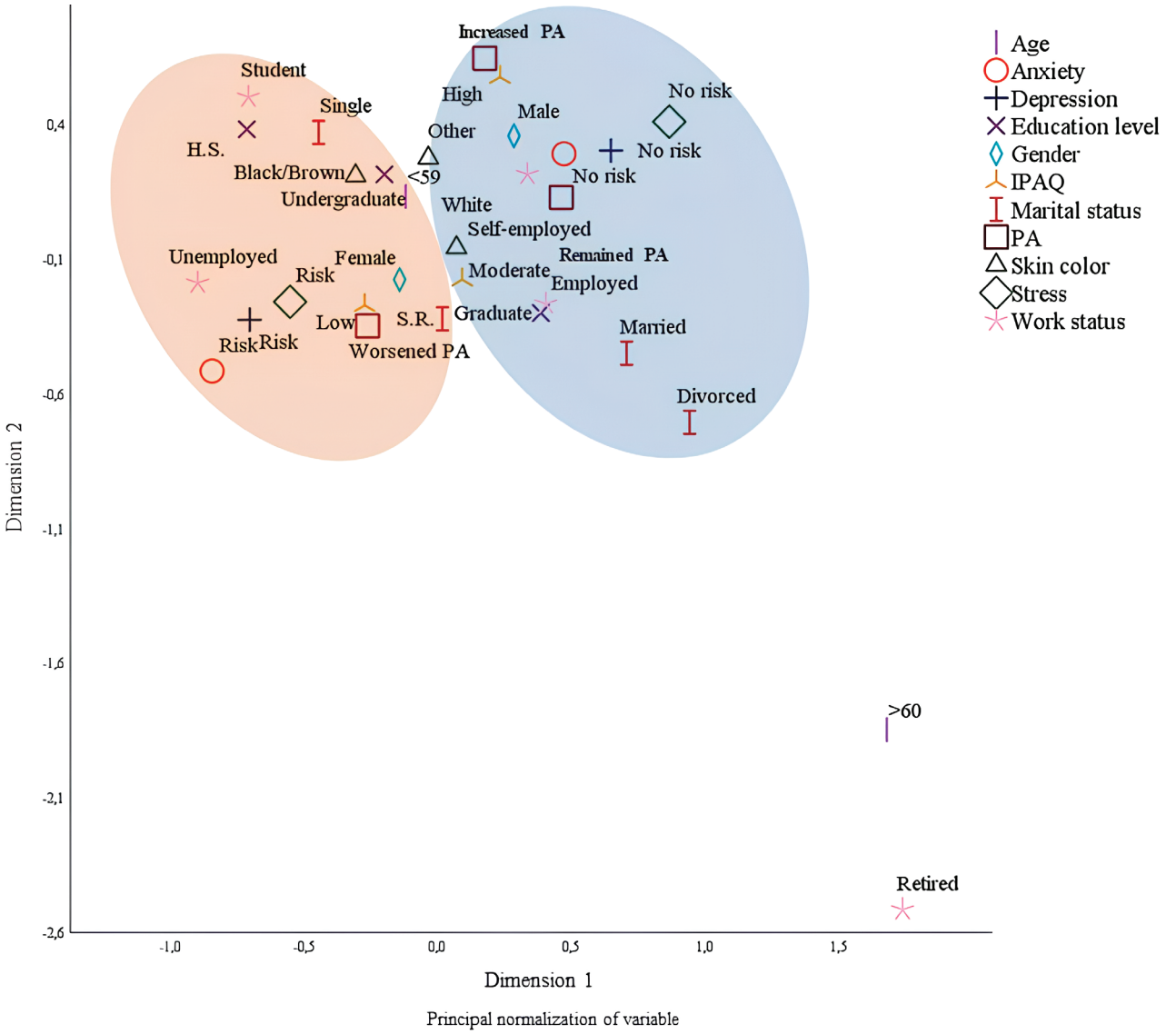

Figure 1 – Multiple correspondence analysis of the associated risk indication for depression, anxiety, stress, sociodemographic variables, and physical activity levels
PA = Physical Activity; IPAQ = International Physical Activity Questionnaire; H.S. = High School; S.R. = Stable Relationship.

dication compared to those at no risk for depression (62.0% versus 46.4%), anxiety (63.2% versus 48.7%), and stress (59.4% versus 45.3%) (Table 4).

Through multiple correspondence analysis, a relationship was observed between the indication of associated risk for depression, anxiety, and stress and the indication of associated non-risk for the same variables, that is, the formation of sets (clusters) in a graphical layout and from this, formed two profiles with variables close to the risk and non-risk indications for depression, anxiety, and stress. The blue profile is formed by variables related to the non-indication of associated risk, assuming the following characteristics: having a high level of physical activity (IPAQ); improved or married or separated; employed or self-employed; and having graduate education. The orange profile is formed by variables related to the risk indication: having a low level of physical activity (IPAQ); worsened physical activity habits; female gender; black/ brown; single or in a stable relationship; unemployed or student; having up to high school education; and being aged 59 years or younger.

Discussion

The present study aimed to verify the association between levels of physical activity and the indication of associated risk for depression, anxiety, and stress in Brazilian adults and the elderly during a pre- and pos-

t-COVID-19 pandemic period. We observed a lower indication of risk for depression, anxiety, and stress among participants with moderate and high levels of physical activity. It was noted that participants who reduced physical activity practice or did not perform any during the pandemic showed a higher indication of associated risk for depression, anxiety, and stress. Similar outcomes have been recently found, indicating physical activity as a mitigating factor for signs and symptoms related to mental health[22,23].

It is noteworthy that in the present study, almost half of the participants showed an indication of associated risk for depression, more than half showed an indication of risk for stress, and a third of participants had an indication of risk for anxiety. Other recent research presented similar results to the present study, highlighting a greater need for attention to mental health-related problems in society[4,7,12]. In the present study, it was observed that approximately one-third of the participants had a low level of physical activity, which could be related to increased screen time (television, video games, and cell phones), plausibly explained by movement restrictions[24], affecting people's lifestyle habits, leading to an increase in physical inactivity[10] and sedentary behavior[3]. A systematic review[24] corroborates these findings, observing an increase in sedentary behavior by 16% and a decrease in physical activity by 17% during the COVID-19 pandemic, with 26% and 20% decreases in light physical activity and moderate to vigorous physical activity, respectively.

A study of over 3000 Americans reported the negative impacts of social isolation caused by the pandemic on depressive and anxiety symptoms. The authors noted that, on average, one-third of active people became less active during the pandemic. Moreover, when physical activity or sitting time was reduced or increased during the initial COVID-19 restrictions, an association with worse mental health outcomes was found[25].

The present study found a positive mental health outcome in the elderly compared to adults. Other studies found similar results, such as a study[12] with over 5000 participants in Ibero-American countries (Brazil, Chile, and Spain) during the initial phase of the pandemic (April to May 2020), which showed a higher indication of risk for depression, anxiety, and stress among younger people, and a study[26] with Brazilian university teachers indicated a higher risk of anxiety among younger teachers. While not universal, hypotheses that might explain these better outcomes in the older population compared to younger ones could relate to economic, cultural, and social aspects. Older individuals may have greater financial stability and professional and personal life stability, while younger people often are still in the process of forming and seeking stability in these areas. Another point is that everyone was forced to reduce their urban mobility, spending more time at home due to social isolation restrictions, which might impact younger people differently[27].

Besides age, it's important to highlight other associations found in the present study, such as the one with the female gender, which showed a higher risk for depression, anxiety, and stress, similar to other studies[5,7,27]. An explanation in terms of vulnerabilities suggests that most single-parent families tend to be led by women, and women also earn less and are more likely to live in poverty than men, besides having a greater representation in healthcare jobs and providing the majority of family and elderly care[28].

This research identified an association of marital status with the indication of associated risk for depression, anxiety, and stress, noting a higher risk for these mental health-related problems among those who declared themselves single. Literature results are divergent, with studies not finding such an association[7,26]. Thus, it can be hypothesized that having or not having a partner can be a positive or negative factor depending on the context and individual. People in a relationship might show greater emotional maturity and stability, but family cohabitation can also foster problems within interpersonal relationships[7,26].

The study's results pointed to an association between education and the indication of risk for depression, anxiety, and stress, with a higher frequency of risk among those with lower education levels. Some studies[4,7,12] identified that years of studies could influence outcomes of anxiety and depression during social isolation periods in the pandemic. In one such study[4], conducted with 1460 Brazilians at the start of the pandemic (March 2020), lower average scores representing a lower risk for depression were observed as education level increased: participants with High School a 60.1 (22.1), Undergraduate studies 51.8 (23.3), Master 43.8 (19.9), and Ph.D. 39.6 (17.2) ($p< 0.05$).

Interestingly, approximately two-thirds of participants reported adequate levels of physical activity (IPAQ), between moderate and high, as recommended by the Physical Activity Guide for the Brazilian Population[29]. However, more than half reported worsening

physical activity practice during the pandemic. The restrictions on people's movement could justify this finding. It is important to note that during the data collection period of this study, social distancing restrictions had been reduced (October to November 2021). Fear and insecurity regarding the resumption of regular physical activity practices were possibly present among participants. Other studies have shown that maintaining regular physical activity during the COVID-19 pandemic contributes to positive health effects, including mental health and controlling signs and symptoms of depression, anxiety, and stress[12,23].

It's worth mentioning that this study does not intend to inform about the importance of physical activity in a way disconnected from the reality and inequities present in Brazil. It is essential to highlight that there are factors that interfere with people's ability to engage in physical activity, such as the lack of locations and access opportunities for practicing activities, whether they are sports (games: volleyball, basketball, soccer), gym workouts (weight training, dance, among others)[29,30], especially in the context of pandemic restrictions. This relates to economic and social factors, as more vulnerable people have difficulty accessing physical activity opportunities. Unfortunately, engaging in physical activity is not a choice for everyone; therefore, public policies must be developed to promote equity in opportunities and access[30].

The results should be contextualized within the limitations and strengths: as the participants in the first phase were selected through the snowball method, with dissemination occurring via email and social networks, and responses were through an online form, some people do not have internet access and did not have the opportunity to respond. The majority of the sample consisted of adults, females, individuals with white skin color, and high educational levels. Thus, these data cannot be extrapolated to reflect the country's population, as they carry this respondent bias. The data of this article present the results only from the second phase (October to November 2021), when restrictions were lifted, and most participants had already been vaccinated against COVID-19. It's also worth noting a variety of instruments used to assess depression, anxiety, and stress, which may also limit the interpretation of some comparisons.

Final Considerations

Relationships were observed between sociodemographic data and physical activity habits with the indication of associated risk for depression, anxiety, and stress. Adult participants, females, those with a single marital status, with a lower level of education, as well as individuals with a low level of physical activity or who reported a decrease in practice during the pandemic, showed worse outcomes in the indication of associated risk for depression, anxiety, and stress. It is important to consider that public policies need to be planned from an equity perspective to assist people with greater vulnerability and promote access to physical activity for the entire population.

Conflict of interest

The authors declare no conflict of interest.

Authors' contributions

Azevedo MJ participated in the conceptualization, methodological procedures, validation of data and experiments, data analysis, research, and design of data presentation and wrote the original manuscript. Costa GP participated in the methodological procedures, data analysis, provision of tools, data curation, and data presentation design. Andrella JL participated in conceptualization and data analysis. Lizzi EAS participated in the methodological procedures, provision of tools, and data curation. Trapé AA participated in conceptualization, methodological procedures, data validation and experiments, data analysis, research, data curation, supervision, and design of data presentation. All authors reviewed and edited the manuscript, as well as approved the final version submitted.

Declaration regarding the use of artificial intelligence tools in the article writing process

The manuscript did not use artificial intelligence tools for its preparation.

Availability of research data and other materials

The data of this study is available on demand from referees.

Acknowledgments

The authors would like to thank the researchers Alba Camacho-Cardenosa, Marta Camacho-Cardenosa, and Javier Brazo-Sayavera (Spain), as well as Eugenio Merellano-Navarro (Chile), who participated in the conception and development of the first stage of this study involving Brazil, Spain, and Chile. They also thank Ester Wiggers for her reading/review of the final version of this article.

References

1. Organização Mundial da Saúde. Weekly epidemiological update on COVID-19 - 25 May 2023. Edition 144, https://www.who.int/publications/m/item/weekly-epidemiological-update-on-COVID-19---25-may-2023 (accessed 30 May 2023).

2. Barbosa TP, Costa FBP da, Ramos ACV, Berra TZ, Arroyo LH, Alves YM, et al. Morbimortalidade por COVID-19 associada a condições crônicas, serviços de saúde e iniquidades: evidências de sindemia. Rev Panam Salud Pública. 2022;46:e6.
3. Botero JP, Farah BQ, Correia M de A, Lofrano-Prado MC, Cucato GG, Shumate G, et al. Impact of the COVID-19 pandemic stay at home order and social isolation on physical activity levels and sedentary behavior in Brazilian adults. Einstein (São Paulo). 2021;19:1–6.
4. Filgueiras A, Stults-Kolehmainen M. Risk Factors for Potential Mental Illness Among Brazilians in Quaran-tine Due To COVID-19. Psychol Rep. 2022;125:723–41.
5. Santomauro DF, Mantilla AMH, Shadid J, Zheng P, Ashbaugh C, Pigott DM, et al. Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID-19 pandemic. Lancet. 2021;398:1700–12.
6. Organização Mundial da Saúde. Depression and Other Common Mental Disorders: Global Health Estimates. 2017, Disponível em: http://apps.who.int/iris/bitstream/handle/10665/254610/WHO-MSD-MER-2017.2-eng.pdf;jsessionid=DF51B150D4484C77B97F6BF1D3AFD556?sequence=1 (2017, acesso 30 July 2021).
7. Feter N, Caputo EL, Doring IR, Leite JS, Cassuriaga J, Reichert FF, et al. Sharp increase in depression and anxiety among Brazilian adults during the COVID-19 pandemic: findings from the PAMPA cohort. Public Health. 2021;190:101–7.
8. Knowles G, Gayer-Anderson C, Turner A, Turner A, Dorn L, Lam J, et al. COVID-19, social restrictions, and mental distress among young people: a UK longitudinal, population-based study. J Child Psychol Psychia-try. 2022;63:1392–1404.
9. Martinez EZ, Silva FM, Morigi TZ, Zucoloto ML, Silva TL, Joaquim AG, et al. Physical activity in periods of social distancing due to COVID-19: a cross-sectional survey. Cien Saude Colet. 2020;25:4157–68.
10. Faulkner J, O'Brien WJ, Stuart B, Stoner L, Batten J, Wadsworth D, et al. Physical Activity, Mental Health and Wellbeing of Adults within and during the Easing of COVID-19 Restrictions, in the United Kingdom and New Zealand. Int J Environ Res Public Health. 2022;19:1792.
11. Meiring RM, Gusso S, McCullough E, Bradnam L. The Effect of the COVID-19 Pandemic Movement Res-trictions on Self-Reported Physical Activity and Health in New Zealand: A Cross-Sectional Survey. Int J En-viron Res Public Health. 2021;18:1719.
12. Camacho-Cardenosa A, Camacho-Cardenosa M, Merellano-Navarro E, Trapé AA, Apolinario T, Brazo-Sayavera J. Influence of physical activity on psychological states in adults during the COVID-19 pandemic. Medicina (Ribeirão Preto).2022;55(2)e192222.
13. Von Elm E, Altman DG, Egger M, Pocck SJ, Gotzsche PC, Vandenbroucke, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for Reporting Obser-vational Studies. PLoS Med. 2007;4:e296.
14. Eysenbach G. Improving the Quality of Web Surveys: The Checklist for Reporting Results of Internet E-Surveys (CHERRIES). J Med Internet Res. 2004;6:e34.
15. Camacho-Cardenosa A, Camacho-Cardenosa M, Merellano-Navarro E,Trapé AA, Brazo-Sayavera J. Influencia de la actividade física realizada durante el confinamiento en la pandemia del COVID-19 sobre el estado psicológico de adultos: un protocolo de estudio. Rev Esp Salud Publica. 2020;94:1–9.
16. Martins BG, Silva WR da, Maroco J, Campos JADB. Escala de Depressão, Ansiedade e Estresse: proprieda-des psicométricas e prevalência das afetividades. J Bras Psiquiatr. 2019;68:32-41.
17. Vignola RCB, Tucci AM. Adaptation and validation of the depression, anxiety and stress scale (DASS) to Brazilian Portuguese. J Affect Disord. 2014;155:104–9.
18. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. Int J Environ Res Public Health. 2020;17:1729.
19. Matsudo S, Araújo T, Matsudo V, Andrade D, Andrade E, Oliveira LC, et al. Questionário Internacional de Atividade Física (IPAQ): Estudo de validade e reprodutibilidade no Brasil. Rev Bras Ativ Fís Saúde. 2001;6:5–18.
20. Organização Mundial da Saúde. Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire (IPAQ) – Short and Long Forms. Ipaq. 2005;1–15.
21. Maluly M, Dal Fabbro C, Andersen ML, Babiloni AH, Lavigne GJ, Tufik S. Sleep bruxism and its associa-tions with insomnia and OSA in the general population of Sao Paulo. Sleep Med 2020;75:141–48.
22. Marashi MY, Nicholson E, Ogrodnik M, Fenesi B, Heisz JJ. A mental health paradox: Mental health was both a motivator and barrier to physical activity during the COVID-19 pandemic. PLoS One. 2021;16:e0239244.
23. Marconcin P, Werneck AO, Peralta M, Ihle A, Gouveia ER, Ferrari G, et al. The association between physi-cal activity and mental health during the first year of the COVID-19 pandemic: a systematic review. BMC Public Health. 2022;22(1);1-14.
24. Wilms P, Schröder J, Reer R, Scheit L. The Impact of "Home Office" Work on Physical Activity and Seden-tary Behavior during the COVID-19 Pandemic: A Systematic Review. Int J Environ Res Public Health 2022;19:12344.
25. Meyer J, McDowell C, Lansing J, Brower C, Smith L, Tully M, et al. Changes in Physical Activity and Se-dentary Behavior in Response to COVID-19 and Their Associations with Mental Health in 3052 US Adults. Int J Environ Res Public Health. 2020;17:1-13.
26. Freitas RF, Ramos DS, Freitas TF, Souza GR, Pereira EJ Lessa A do C. Prevalência e fatores associados aos sintomas de depressão, ansiedade e estresse em professores universitários durante a pandemia da COVID-19. J Bras Psiquiatr. 2021;70:283–92.
27. Barros MB de A, Lima MG, Malta DC, Szwarcwald CL, Azevedo RCS, Romero D, et al. Report on sad-ness/depression, nervousness/anxiety and sleep problems in the Brazilian adult population during the COVID-19 pandemic. Epidemiol e Serv Saude. 2020;29:1–12.
28. Connor J, Madhavan S, Mokashi M, Amanuel H, Johnson NR, Pace LE, et al. Health risks and outcomes that disproportionately affect women during the COVID-19 pandemic: A review. Soc Sci Med. 2020;266:113364.
29. Brasil, Ministério da Saúde. Guia de Atividade Física para a população Brasileira. 2021;54.
30. Vieira LA, Carvalho FFB de. As práticas corporais e atividades físicas nos 15 anos da política nacional de promoção da saúde: a defesa da equidade em um contexto de austeridade. Pensar a Prática. 2021;24.

Received: 07/27/2023
Approved: 03/05/2024

Associate editor
Sofia Wolker Manta
Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina, Brasil.

Quote this article as:
Azevedo MJ, Costa GP, Andrella JL, Lizzi EAS, Trapé AA. Physical activity, depression, anxiety, and stress in adults and elderly in the COVID-19 pandemic in Brazil. Rev Bras Ativ Fís Saúde. 2023;28:e0323. DOI: 10.12820/rbafs.28e0323

Supplementary material

Research Project Form

Comparison of psychological responses and physical activity habits of the adult population in two periods of the COVID-19 pandemic in Brazil

This survey is a continuation of the form you completed in April/May 2020.

We request your voluntary participation in this research by master's student Milton José de Azevedo and coordinated by PH.D. Átila Alexandre Trapé, both from the School of Physical Education and Sport of Ribeirao Preto at the University of Sao Paulo.

Part 1 – Free and Informed Consent Form

Part 2 – Sociodemographic data:

Email (try to enter the same one you entered in the previous form):_____

Gender:
( ) Male
( ) Female

What color is your skin?
( ) White
( ) Black
( ) Brown
( ) other _____

Age (years):_____

Currently

What is your marital status:
( ) Single
( ) Divorced
( ) Married
( ) Widower
( ) Stable relationship

What is your maximum educational level achieved:
( ) No studies
( ) Elementary school
( ) High School
( ) Undergraduate studies
( ) Specialization – graduate studies
( ) Master – graduate studies
( ) Ph.D.

What is your employment situation:
( ) Unemployed
( ) Employed
( ) Self-employed
( ) Retired
( ) Student

Part 3 – Mental Health
Depression, Anxiety, and Stress Scale (DASS – 21)

Please read each statement and circle a number 0, 1, 2, or 3 which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.

0 Did not apply to me at all
1 Applied to me to some degree, or some of the time
2 Applied to me to a considerable degree or a good part of the time
3 Applied to me very much or most of the time

I found it hard to wind down	0	1	2	3
I was aware of dryness of my mouth	0	1	2	3
I couldn't seem to experience any positive feeling at all	0	1	2	3
I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
I found it difficult to work up the initiative to do things	0	1	2	3
I tended to over-react to situations	0	1	2	3
I experienced trembling (e.g. in the hands)	0	1	2	3
I felt that I was using a lot of nervous energy	0	1	2	3
I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
I felt that I had nothing to look forward to	0	1	2	3
I found myself getting agitated	0	1	2	3
I found it difficult to relax	0	1	2	3
I felt down-hearted and blue	0	1	2	3
I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
I felt I was close to panic	0	1	2	3
I was unable to become enthusiastic about anything	0	1	2	3
I felt I wasn't worth much as a person	0	1	2	3
I felt that I was rather touchy	0	1	2	3
I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)	0	1	2	3
I felt scared without any good reason	0	1	2	3
I felt that life was meaningless	0	1	2	3

Part 4 – Physical activity

Para responder as perguntas desta seção é importan-

te que você entenda que: A atividade física pode ser considerada qualquer movimento corporal produzido pelos músculos esqueléticos que resulta em gasto energético. Exemplos: caminhar como deslocamento de um local a outro, subir escadas, varrer a casa, entre outros.

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE – SHORT VERSION

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the last 7 days. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise, or sport.

Think about all the vigorous activities that you did in the last 7 days. Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

1a. During the last 7 days, how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?
Days per week _____ ( ) No vigorous physical activities
1b. How much time did you usually spend doing vigorous physical activities on one of those days?
Hours per day:_____ Minutes per day:_____

Think about all the moderate activities that you did in the last 7 days. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

2a. During the last 7 days, how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.
Days per week _____ ( ) No moderate physical activities
2b. How much time did you usually spend doing moderate physical activities on one of those days?
Hours per day:_____ Minutes per day:_____

Think about the time you spent walking in the last 7 days. This includes at work and home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure

3a. During the last 7 days, how many days did you walk for at least 10 minutes at a time?
Days per week _____ ( ) No walking
3b. How much time did you usually spend walking on one of those days?
Hours per day:_____ Minutes per day:_____

The last question is about the time you spent sitting on weekdays during the last 7 days. Include time spent at work, at home, while doing coursework, and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

4a. During the last 7 days, how much time did you spend sitting on a weekday?
Hours per day:_____ Minutes per day:_____
4b. During the last 7 days, how much time did you spend sitting on a weekend?
Hours per day:_____ Minutes per day:_____

Additional question
In general, how do you consider your physical activity habits during the pandemic?
( ) It got a lot worse
( ) It got a little worse
( ) Remained
( ) Improved a little
( ) Much better