

Do Age and Symptoms of Anxiety, Stress and Depression Predict Risk Behaviors for Eating Disorders in Brazilian Men and Women During the Covid-19 Pandemic?

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Abstract

Objective

This study investigated the predicting role of age and symptoms of depression, anxiety and stress on risk behavior for eating disorders in Brazilian adults during the COVID-19 pandemic.

Methods

A web-based cross-sectional survey was administered during the COVID-19 in Brazil. A total of 715 participants were recruited (237 men and 478 women) with a mean age of 29.20 (10.73) years from all regions of Brazil. The instruments used were the depression, anxiety and stress scale (DASS-21) and eating attitudes test-26 (EAT-26). Data analysis was conducted through the independent t-test, Pearson's correlation and multiple regression Analysis ($p < .05$).

Results

The data showed significant differences between men and women for anxiety ($p < .001$), stress ($p < .001$), depression ($p < .001$), total DASS score ($p < .001$) and eating disorders ($p < .001$), indicating that women presented more symptoms in all variables. Depression, stress and DASS total score were significantly and positively associated with eating disorders (EDs) (r range = .16 to .21) for men and EDs was significantly and negatively associated with all dimensions of DASS and DASS total score (r range = -.19 to -.22) for women. Multiple regression showed that DASS total score made the largest positive contribution to eating disorders for men ($\beta = .17$, $p < .01$) and women ($\beta = .22$, $p < .001$).

Conclusion

Our findings show that symptoms of depression, anxiety and stress predict risk behavior for eating disorders in Brazilian adults during the COVID-19 pandemic.

Plain English Summary

This study investigated the predicting role of age and symptoms of depression, anxiety and stress on risk behavior for eating disorders in Brazilian adults during the COVID-19 pandemic. The authors concluded that symptoms of depression, anxiety and stress predict risk behavior for eating disorders in Brazilian adults during the COVID-19 pandemic.

Introduction

The pandemic caused by the new coronavirus (COVID-19), led the World Health Organization (WHO) to take actions to decrease the rapid spread of interpersonal transmission [1], perhaps the one that had the greatest impact on people's lives was social isolation. The situation of social detachment, changed the routine of some people, triggering, in many cases, a reduction in professional activities and a limitation of

personal life in the daily routine, the which can generate a feeling of boredom in the different age groups affected by the disease [2].

According to Usher, Bhullar and Jackson [3], quarantine or imposed isolation is an unknown and unpleasant experience that involves changes in habitual lifestyles, in addition to the forced separation of friends and family and, as a result, can make people more anxious and insecure. In this regard, it is perceived that the reduction of social contact affects processes integrated to mental health [4], which has suffered declines in children and adolescents [5], adults [6] and the elderly [7].

Specifically, in the adult population, Qiu et al. [8] observed that individuals with ages ranging from 18 to 30 years, were the group of Chinese with the greatest symptoms of post-traumatic stress disorder (PTSD) during the most critical period of the pandemic in their country. Although many studies have been conducted in recent months, there is still no consensus on which age group is at greatest risk for the development of mental health problems.

Rajkumar [9] carried out a literature review study on the relationship between COVID-19 and mental health, using the PubMed database with the following descriptors "novel coronavirus", "COVID-19", "nCoV", "Mental health", "psychiatry", "psychology", "anxiety", "depression" and "stress" in various permutations and combinations. This author identified that symptoms of anxiety (16%), depression (28%) and stress (8%) are common psychological reactions to the COVID-19 pandemic. Especially, there were also studies with populations more vulnerable to the impact on mental health during this pandemic, being these older adults [7], homeless [10], immigrant workers [11], pregnant women [12], Chinese students studying abroad [13] and people with mental disorders [14].

The scarcity of social contacts and the fear of contamination (often generated by misinformation) increase anxiety [15]. Another study on this topic, conducted by Wang et al. [16], observed that of the 1210 participants, 29% had symptoms of moderate to severe anxiety. Further, the appearance of other disorders, such as stress, affected, on average, 28% of the population that was confined during major epidemics, such as H1N1 [17]. Thus, it is relevant to understand factors related to increased anxiety and general psychological suffering in this context of a pandemic.

In this same direction, according to Margis, Picon, Cosner, and Silvera [18], stressful life events, such as fear of a serious illness, can accelerate a gradual increase in anxiety symptoms, which can lead to the development of complex disorders. Initial evidence suggests that a considerable proportion of the population (20.1%) [19] and health professionals (22.8%) [20] experience mood disorders, such as depression, during this pandemic. Emphasizing the need to establish ways to mitigate mental health risks and adjust interventions in pandemic conditions. It is noteworthy that depression can affect the most vulnerable individuals, but also those without a psychiatric history [21], especially at the time of social detachment, currently experienced in several regions of Brazil.

Given the above, it is clear that social distance can be accompanied by symptoms of anxiety, depression and negative emotions [22], which are all risk factors for food restriction, emotional eating and

hyperphagic behavior [23]. The recent nature of the pandemic does not allow us to have specific data on the impact of COVID-19 on eating disorders. However, literature suggests a risk of worsening in pre-existing cases and an increased risk of occurrence for new cases [24]. The greater exposure to food advertisements (via increased exposure to the media) can be accompanied in some by more intense cravings, binge eating and weight gain in the short and long term [25]. On the other hand, people may perform less physical activity, be more afraid of gaining weight and develop greater dietary restrictions [2], contributing to the appearance of disorders such as anorexia and bulimia. Touyz, Lacey e Hay [25] warn of both the short-term and long-term consequences of having both an eating disorder and COVID-19 simultaneously, pointing out the urgency of rapidly developing a repository of pertinent literature and empirical papers on this topic. In this scenario, researchers and scientific societies that study eating disorders can promote research to assess the impact of the pandemic on the psychological and clinical status of individuals [26].

All three pillars that define health status as "physical, mental and social well-being" [27] were affected by the COVID-19 pandemic. Leaving confinement will bring new challenges, especially in dealing with the appearance of "post-traumatic" disorders, such as post-traumatic stress and social phobias, for example Mengin et al. [2]. Thus, it becomes relevant to identify specific risk groups in order to develop strategies to reduce the impact of this crisis. Understanding predictive variables for eating disorders may assist in a better indication of treatment, increasing its effectiveness. Thus, this study aimed to analyze the predicting role of age and symptoms of depression, anxiety and stress on risk behavior for eating disorders (EDs) in Brazilian adults during the COVID-19 pandemic. It was hypothesized that women would show higher symptoms of depression, anxiety, stress and high-risk behavior for eating disorders when compared to men. Furthermore, the second hypothesis is that symptoms of depression, anxiety and stress would show positive association with the risk for eating disorders for both men and women. The last hypothesis is that age would positively predict the symptoms of depression, anxiety, stress and risk behavior for eating disorders in Brazilian adults during the COVID-19 pandemic in both sexes.

Methods

Study design

This is a descriptive, methodological research with cross sectional design [28]. The study was developed through the guidelines of the Strengthening the Reporting of Observational Studies in Epidemiology [29]. In order to conduct the study, we developed an anonymous, self-report questionnaire, in Portuguese, using the online platform Google Forms. Participants were recruited through social medias (e.g. WhatsApp, Facebook and Instagram) in Brazil, and asked to share the link of the study with your contacts. The link was also posted on sport and exercise psychology groups on Facebook. The questionnaire was available from April through June of 2020.

Setting and Participants

The procedures adopted in this research are in accordance to the criteria of ethics in research with human beings preconized by the Resolution 466/12 of the National Health Council. Moreover, the Research Ethics Committee of the Federal University of Vale do São Francisco approved the study (protocol 2.442.590). A total of 715 participants were recruited, being 237 men and 478 women with a mean age 29.20 (10.73) years from all regions of Brazil. Only the individuals who signed free and informed consent participated of the study. The questionnaire took approximately 20 min to be completed and responses to all questions were mandatory, to avoid missing values.

Measures

Demographic Information. In order to evaluate the sociodemographic profile of participants, a semi structured questionnaire was developed by the authors with questions about, sex, age, monthly income, marital status and geographical housing region.

Depression, Anxiety and Stress scale (DASS-21). DASS-21 was developed by Martins et al. [30] The DASS-21 is a self-report assessment that contains three subscales scored on a four-point Likert scale, ranging from 0 ("Strongly Disagree") to 3 ("Totally Agree"). Each subscale of the DASS consists of seven items that evaluate the emotional states of depression, anxiety and stress. The individual questions rate how the individual was feeling in the last week. Sum scores are computed by adding up the scores on the items per subscale and multiplying them by 2. Thus, sum scores for the total DASS-total scale range between 0 and 126, and those for each of the subscales may range between 0 and 42. This scale was adapted and validated for the Brazilian population by Vignola and Tucci [31], providing evidences of the validity and reliability of the instrument among Brazilian population. Cronbach's alpha of the instrument for the present study was $\alpha = 0.71$, indicating strong reliability [32].

Eating Attitudes Test-26 (EAT-26). EAT-26 was developed by Garner et al. [33] and it has been frequently used as an outcome measure the frequency of food restriction, binge eating, purging behaviors and environmental pressure for food intake. It is composed of 26 items that are responded using a likert-type scale that varies from 0 to 3 points (always = 3, often = 2, often = 1, rarely = 0, almost never = 0 and never = 0), except for question 4, which has a reversed score (always = 0, often = 0, often = 0, few times = 1, almost never = 2 and never = 3). The total score is calculated from the sum of the responses for each item, ranging from 0 to 78 points. Scores higher than 21 are considered to be indicative of risk behavior for Eating disorders. This test was adapted and validated for the Brazilian population by Bighetti et al. [34]. The instrument demonstrated acceptable factors of internal and external validity. Cronbach's alpha of the instrument for the present study was $\alpha = 0.96$, indicating strong reliability [32].

Data analysis

Data analysis was performed using descriptive and inferential statistics. The independent t-test was conducted to analyze the comparison of symptoms of depression, anxiety and stress, and risk behavior for eating disorders among male and female Brazilian adults. The correlation between all variables was performed using Pearson's coefficient and the following values were adopted to interpret the intensity of the correlations: 0.01 to 0.39 = weak; 0.4 to 0.69 = moderate; and 0.7 to 1.0 = strong [35]. Multiple

regression analysis was used to determine whether age and symptoms of depression, anxiety and stress combined predicted male and female risk behaviors for eating disorders. There were no sufficiently strong correlations between variables that indicated problems with multicollinearity (VIF range = 1.07 to 1.13). Specifically, these VIF values were below the 5 or 10, deemed acceptable by Hair et al. [32]. All analyses were performed using IBM SPSS v.23.0, adopting a significance level of $p < .05$. In addition, a post hoc statistical power analysis in G*Power 3.1.9 [36] revealed our statistical power to be 99.99% based on our sample of 715 participants, a medium effect size (.15) according to Cohen [38] f^2 criteria, and a .05 p value.

Results

Descriptive analysis

The results in Table 1 demonstrate that 715 Brazilian adults, aged 29.20 ± 10.73 years old, participated of the study. There was a prevalence of female individuals (66.9%), with monthly income of 1–3 minimum wages (48,1%), single marital status (71,2%) and from the northeast region (66,2%).

Table 1
 Characterization of research participants (n = 715).

Variables	f (%)
Gender	
Male	237 (33.1)
Female	478 (66.9)
Region	
South	47 (6.6)
Southeast	155 (21.7)
Midwest	18 (2.5)
North	22 (3.1)
Northeast	473 (66.2)
Marital Status	
Single	509 (71.2)
Maried	167 (23.4)
Divorced	35 (4.9)
Widower	4 (0.6)
Income	
1–3 Minimum wage	344 (48.1)
1–5 Minimum wage	154 (21.5)
More than 5 Minimum wage	217 (30.3)

Table 2 demonstrates the minimum, maximum, mean scores, standard deviation, skewness and kurtosis of all dimensions of study. The mean scores of the 0–3 response scale and total score of *DASS-21* revealed that the COVID-19 pandemic did not causing stress, depression and anxiety (M range = 13.30 to 20.99; M total score = 25.24, SD = 16.50). The mean scores on the 0–3 response scale of the *EAT-26* revealed that participants scored were not developing eating disorder during COVID-19 pandemic (M = 17.11, SD = 8.35).

Table 2
Descriptive values (minimum, maximum, mean, standard deviation, skewness and kurtosis) of the variables.

Variables	Minimum	Maximum	M (Sd)	Skewness	Kurtosis
Age	16.00	74.00	29.20 (10,73)	1.313	1.384
Depression	0.00	42.00	16.18 (12.42)	.456	-.967
Anxiety	0.00	42.00	13.30 (11.71)	.752	-.482
Stress	0.00	42.00	20.99 (11.77)	-.005	-1.045
DASS total score	0.00	63.00	25.24 (16.50)	.357	-.888
Eating disorder	1.00	51.00	17.11 (8.35)	.964	.922
Note: M = Mean; Sd = Standard deviation.					

Main analysis

Table 3 presents the comparison of the symptoms of age, anxiety, stress, depression, total DASS score and eating disorders in Brazilian adults during COVID-19 Pandemic according to sex. Significant difference between men and women were found regarding anxiety ($p < .001$), stress ($p < .001$), depression ($p < .001$), total DASS score ($p < .001$) and eating disorders ($p < .001$). Indicating that women presented more symptoms of anxiety, stress, depression, total DASS score and eating disorders than men, and the effect size of this difference was large ($d_{\text{range}} = .38$ to $.62$).

Table 3
Differences in age, symptoms of depression, anxiety and stress, and risk behavior for eating disorders between male and female Brazilian adults during the COVID-19 Pandemic.

Variables	Gender		<i>p</i>	<i>d</i>
	Male (n = 237)	Female (n = 478)		
	M (Sd)	M (Sd)		
Age (years)	28.47 (9.84)	29.57 (11.14)	.198	.10
Depression	13.08 (11.49)	17.71 (12.59)	< .001*	.38
Anxiety	8.79 (9.10)	15.54 (12.21)	< .001*	.62
Stress	16.59 (10.82)	23.17 (11.62)	< .001	.58
DASS total score	19.24 (14.44)	28.22 (16.67)	< .001	.57
Eating Disorder	14.19 (7.02)	18.55 (8.58)	< .001	.55
*Significant difference – $p < 0,05$ (independent t-test).				

The correlations revealed that age was significantly and negatively associated with all dimensions of DASS and DASS total score for both men (r range = $-.16$ to $-.18$) and women (r range = $-.22$ to $-.30$). Depression, stress and DASS total score were significantly and positively associated with EDs (r range = $.16$ to $.21$) for men. EDs was significantly and negatively associated with all dimensions of DASS and DASS total score (r range $-.19$ to $-.22$) for women (see Table 4).

Table 4

Correlation between age, symptoms of depression, anxiety and stress, and risk behavior for eating disorders in male and female Brazilian adults.

<i>Men Women</i>	Age	Depression	Anxiety	Stress	DASS Total score	Eating disorder
Age	-	$-.16^*$	$-.16^*$	$-.17^{**}$	$-.18^{**}$.02
Depression	$-.22^{**}$	-	$.73^{**}$	$.77^{**}$	$.92^{**}$	$.21^{**}$
Anxiety	$-.22^{**}$	$.72^{**}$	-	$.78^{**}$	$.90^{**}$.10
Stress	$-.30^{**}$	$.74^{**}$	$.79^{**}$	-	$.93^{**}$	$.16^*$
DASS total score	$-.27^{**}$	$.90^{**}$	$.91^{**}$	$.92^{**}$	-	$.17^{**}$
Eating disorder	.03	$-.19^{**}$	$-.21^{**}$	$-.21^{**}$	$-.22^{**}$	-

* $p < .05$; ** $p < .01$ – Pearson’s correlation.

Standard multiple regression analyses revealed that the model which included age and all dimensions of DASS explained a significant amount of the variance in EDs ($R^2=.04$; $p = .01$) for men, however, only depression presented positive and significant contribution to EDs ($\beta = .27$, $p < .05$). Regarding women, regression analysis revealed that age and all dimensions of DASS explained a significant amount of the variance in eating disorders ($R^2=.05$; $p < .001$), however, only age presented a positive and significant contribution to eating disorders ($\beta = .10$, $p < .05$) (see Table 5).

Table 5

Age, depression, anxiety and stress as predictors of risk behaviors for eating disorders in male and female Brazilian adults.

Predictors	Eating disorder (Men)	Eating disorder (Women)
	β (CI)	β (CI)
Age	.05 (-.05, .12)	.10 (.01, .15)*
Depression	.27 (.04, .29)*	.05 (-.06, .13)
Anxiety	-.15 (-.28, .04)	.10 (-.03, .18)
Stress	.08 (-.10, .20)	.12 (-.02, .21)
R^2	.04	.05
F	3.462**	7.716***

Note. Only the standardized regression coefficients which were less than our significance level of .05 are highlighted in bold. β = Standardized regression coefficient; CI = 95% confidence interval. * $p < .05$, ** $p < .01$, *** $p < .001$.

In Table 6, standard multiple regression analysis revealed that the model which included only the DASS total score explained a significant amount of the variance in eating disorders for both men ($R^2 = .03$; $p = .01$) and women ($R^2 = .05$; $p = .01$). Moreover, DASS total score presented higher positive contribution to eating disorders for women ($\beta = .22$, $p < .001$) than for men ($\beta = .17$, $p < .01$).

Table 6

DASS total score as predictor of risk behaviors for eating disorders in male and female Brazilian adults.

Predictors	Eating disorder (Men)	Eating disorder (Women)
	β (CI)	β (CI)
DASS total score	.17 (.02, .14)**	.22 (.07, .16)***
R^2	.03	.05
F	7.384**	25.418**

Note. Only the standardized regression coefficients which were less than the significance level of .05 are highlighted in bold. β = Standardized regression coefficient; CI = 95% confidence interval.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Discussion

The present study sought to analyze the predicting role of age and symptoms of depression, anxiety and stress on risk behavior for eating disorders in Brazilian adults during the COVID-19 pandemic. The main findings confirmed both hypothesis: a) women had greater symptoms of anxiety, stress, depression and

eating disorders compared to men; b) The combined age and symptoms of depression, anxiety and stress predict risk behavior for eating disorders in both sexes and our last hypothesis is partially confirmed by demonstrating that age would positively predict the symptoms of depression, anxiety, stress and risk behavior for eating disorders in Brazilian adults during the COVID-19 pandemic in only women.

The first population study to assess the depression and anxiety of people in Hong Kong during the COVID-19 pandemic provided important and timely data on the impact of COVID-19 on individuals' mental health. It was found that 19% of respondents had depression and 14% had anxiety. In addition, 25.4% reported that mental health had deteriorated since the beginning of the pandemic [38]. In individuals with eating disorders, the results are even more worrying, as more than 50% reported comorbid mood and anxiety disorders and had moderate to extremely severe levels of depression, anxiety and stress [39].

The findings that symptoms of depression, anxiety and stress were also significant predictors for Eating disorders, in both sexes, confirmed the second hypothesis in the study. The results demonstrated that psychosocial stressors (depression, anxiety and stress) stemming from the COVID-19 pandemic, may exacerbate ED-related triggers and present a challenging environment for individuals with eating disorders (e.g. anorexia nervosa and bulimia nervosa) or development of risk behavior for eating disorders [25,40]. According to Cooper et al. [40] individuals with eating disorders may be at risk of worsening symptomatology during COVID-19, because they are exposed to specific risks that include food insecurity, fatphobic messaging, and restricted healthcare access, which can help trigger eating disorders.

A study conducted with a significant number of Australians found that 27.6% of the general population reported a higher level of food restriction when compared to before COVID-19, and 34.6% reported an increase in binge eating behaviors. It was also found that, in the group that reported having or already had an eating disorder, 35.5% indicated an increase in binge eating behaviors, while 18.9% reported an increase in purging behaviors [40]. Portuguese adults showed altered eating habits during the pandemic, and a significant percentage of the participants reported that they started to eat more frequently, in greater quantity, and that they did not carry out a careful selection of food [41]. Thus, studies have reported that managing eating disorders properly is crucial to mitigating the potential long-term impacts on individuals who have this disorder or develop this disorder during the pandemic [26, 42] observed that individuals with eating disorders have a higher risk of suicide under normal conditions and situations related to the COVID-19 pandemic can further increase this risk.

With regard to sex, our findings confirmed the first hypothesis of the present study. This finding reveals that the women would show higher symptoms of development of pathologies (e.g. depression, anxiety and stress), such as risk behavior for eating disorders. These results are similar to that of Antunes et al. [41] who identified that females had greater symptoms of development of pathologies (anxiety) compared to males, suggesting that women may be a group of greater vulnerability. Wang et al. [16] demonstrated, in an online survey in China, that 53.8% of respondents rated the psychological impact of

COVID-19 as moderate or severe depression (16.5%), anxiety (28.8%) and stress (8.1%). The authors also noted that women, in special students, were significantly associated with a greater psychological impact of the outbreak and higher levels of stress, anxiety, and depression. In addition to the differences found between the sexes, it is important that the research took into account the age groups, since the pandemic has different impacts depending on the age group analyzed [16, 38, 41].

On the other hand, recent studies conducted in China, Italy and Spain which suffered a severe COVID-19 pandemic, showed a high frequency of development of pathologies (e.g. depression, anxiety and stress) in both sexes [19, 43-46]. Moreover, Huang and Zhao [19] demonstrated, in a cross-sectional research with 7,236 Chinese adults, a high depressive and anxiety symptomatology. In Italy, Casagrande et al. [43] reported a high frequency of anxiety symptoms in 2,291 Italian adults. In Spain, recent online cross-sectional studies observed high frequencies of depressive and anxiety symptoms in the population [43-46].

Regarding the risk behavior for Eating disorders, it can be noted that women reported having a higher risk of developing EDs than men. These findings are similar to other studies in literature which demonstrate a significant proportion of the risk for eating disorders reported in women during the pandemic [39, 47]. Phillipou et al. [39] observed, in Australians represented by a sample composed 80% by women, that binge eating and anorexia nervosa had an increase during the pandemic. According to the authors this may be due to a number of factors, including the availability of specific foods, as well as increased stress, anxiety and depressive symptoms as a result of social distance measures. Papandreou et al. [47] affirmed, in a cross-sectional study with a higher prevalence of women, that eating behaviors can be affected during the pandemic and can thus trigger risks for the development of eating disorders. The authors also noted that the Spanish population suffered less from binge eating when compared to the Greek population.

Variables such as depression, anxiety, stress and eating disorders are psychological dimensions that play a significant role in people's quality of life and well-being and, in this scenario, considering the psychological dimensions, according to sex and age group, is essential for the definition and creation of intervention strategies during and after the period of social isolation. Our results highlight the importance of identifying factors and predictive variables of eating disorders and, by identifying vulnerable groups, intervention strategies can be better targeted, increasing its effectiveness.

Limitations and Future Research Directions

The present study fulfilled its objectives regarding the elucidation of the association of age, depression, anxiety and stress with risk behaviors for eating disorders in Brazil adults of different ages and regions of the country during the COVID-19 pandemic. However, some limitations need to be pointed out, such as the use of a convenience sample, which does not allow us to extrapolate the results, and the use of self-reported instruments applied online. Nonetheless, this does not invalidate the results found, especially because of the number of participants (n=715) and the fact the instruments used present adequate psychometric evidences.

Moreover, understanding how these variables explain the risks for eating disorders in different stages of life should be a topic approached in future studies. Anyhow, studies of this nature can contribute to better understand the impacts of the pandemic in vulnerable groups, such as individuals with higher predisposition to common mental disorders (anxiety, depression and stress), which have more chances of developing eating disorders.

Lastly, the literature available on this topic during the pandemic is originated from countries who suffered with the disease, especially developed ones. Therefore, it may not represent the experience of the population from other countries. In this scenario, the present study brings important contributions regarding mental health disorders during the COVID-19 pandemic in Brazil.

Conclusion

In conclusion, our observational results showed that symptoms of depression, anxiety and stress positively predicted the risk behavior for eating disorders in Brazilian male and female adults during the COVID-19 pandemic. Furthermore, age demonstrated to be a positive predictor for risk behavior for eating disorders among women. From a practical standpoint, the results found here can serve as a basis for adopting intervention strategies, such as encouraging sessions of virtual group therapy and food support for those individuals with predisposition or prior diagnosis of eating disorders, especially women with a history of anxiety, depression or stress, together.

Declarations

Conflict of interest: The authors declare that they have no conflict of interest.

Ethical approval: The procedures adopted in this research comply with the criteria of Ethics in research with human beings according to resolution (466/12) from the National Health Council. Initially, contact was made with the gyms in order to obtain authorization for the data collection. Then, the Research Ethics Committee of the Federal University of Vale do São Francisco approved the study (protocol 2.442.590).

Informed consent: Informed consent was obtained from all individual participants included in the study.

Availability of data and materials- The data supporting the results reported in this article is maintained in the UNIVASF-Universidade Federal do Vale do São Francisco, Department of Physical Education, Petrolina, Pernambuco, Brazil. Please contact author for data requests.

Authors' contributions: JRANJ- assisted in developing the study protocol and the educational interventions, analysed the data and drafting the manuscript. **GLMF-** drafting the manuscript and analysed the data; **MPG-** assisted in developing the study protocol and the educational interventions, recruited the study participants and drafting the manuscript; **DVO** recruited the study participants and drafting the manuscript; **JFVNM-** assisted in developing the study protocol and the educational

interventions and recruited the study participants; **YLF**- drafting the manuscript and analysed the data;
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