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Age, Anxiety, Stress, and Depression Associated with Eating Problems During COVID-19

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Abstract

This cross-sectional web-based study investigated the association of age, gender, and symptoms of depression, anxiety, and stress with eating problems in Brazilian adults during the COVID-19 pandemic. A total of 715 participants (237 men and 478 women) were recruited from all regions of Brazil. The instruments used were the Depression, Anxiety and Stress Scale-21 (DASS-21) and the Eating Attitudes Test − 26 (EAT-26). Data analysis was conducted through the independent t test, Pearson's correlation, and multiple regression analysis. Multiple regression showed that DASS total score made the largest positive contribution to EP for men (β = .17, p < .01) and women (β = .22, p < .001). The data showed significant differences between men and women for all variables (p < .001), indicating that women presented more symptoms in all variables. Our findings show that symptoms of depression, anxiety, and stress were associated whit risky behavior for EP in Brazilian adults during the COVID-19 pandemic.

Keywords: coronavirus, COVID-19, eating problems, mental health, psychology

IDADE, ANSIEDADE, ESTRESSE E DEPRESSÃO ASSOCIADOS A PROBLEMAS ALIMENTARES DURANTE A COVID-19

Resumo

Este estudo transversal baseado na *web* investigou a associação de idade, sexo e sintomas de depressão, ansiedade e estresse com problemas alimentares (PAs) em adultos brasileiros durante a pandemia da *coronavirus disease 2019* (Covid-19). Um total de 715 participantes (237 homens e 478 mulheres) foram recrutados em todas as regiões do Brasil. Os instrumentos utilizados foram a Escala de Depressão, Ansiedade e Estresse − 21 (*Depression, Anxiety and Stress Scale-21* [Dass-21]) e o Teste de Atitudes Alimentares − 26 (*Eating Attitudes Test − 26* [EAT-26]). A análise dos dados foi realizada por meio de teste t independente, correlação de Pearson e análise de regressão múltipla. A regressão múltipla mostrou que a pontuação total na Dass-21 contribuiu positivamente para PAs em homens (β = 0,17, p < 0,01) e mulheres (β = 0,22, p < 0,001). Os dados mostraram que as mulheres apresentaram mais sintomas em todas as variáveis (p < 0.001). Assim, os sintomas da Dass-21 foram associados a comportamentos de risco para PAs em adultos brasileiros durante a pandemia da Covid-19.

Palavras-chave: coronavírus, Covid-19, transtorno alimentar, saúde mental, psicologia

EDAD, ANSIEDAD, ESTRÉS Y DEPRESIÓN ASOCIADOS CON PROBLEMAS ALIMENTARIOS DURANTE LA COVID-19

Resumen

Este estudio transversal basado en la *web* investigó la asociación de edad, sexo y los síntomas de depresión, ansiedad y estrés con los problemas alimentarios (PAs) en adultos brasileños durante la pandemia del coronavirus *disease 2019* (COVID-19). Se reclutó un total de 715 participantes (237 hombres y 478 mujeres) de todas las regiones de Brasil. Los instrumentos utilizados fueron la Escala de Depresión, Ansiedad y Estrés − 21 (*Depression, Anxiety and Stress Scale-21* [DASS-21]) y el Teste de Actitudes Alimentarias − 26 (*Eating Attitudes Test − 26* [EAT-26]). El análisis de los datos se realizó mediante la prueba t independiente, la correlación de Pearson y el análisis de regresión múltiple. La regresión múltiple mostró que la puntuación total en DASS-21 contribuyó positivamente a los PAs en hombres (β = 0.17, p < 0.01) y mujeres (β = 0.22, p < 0.001). Los datos mostraron que las mujeres tenían más síntomas en todas las variables (p < 0.001). Los síntomas de DASS-21 se asocian con conductas de riesgo para PAs en adultos brasileños durante la pandemia de COVID-19.

Palabras clave: coronavirus, COVID-19, trastorno por atracón, salud mental, psicología

The pandemic caused by the new coronavirus (COVID-19) led the World Health Organization (WHO) to take actions to decrease the rapid spread of the disease (World Health Organization, 2020b), with social isolation being, perhaps, the one that had the greatest impact on people's lives. The situation of social isolation changed the routine of some people, triggering, in many cases, a reduction in professional activities and a limitation of daily routine in the personal life (Mengin et al., 2020).

According to Usher et al. (2020), quarantine or imposed isolation was an unfamiliar and unpleasant experience that involved changes in everyday routines, in addition to the mandatory distancing from family and friends. As a result, it can make people more anxious and insecure. In this regard, the reduction of social contact affects processes integrated into mental health (White et al., 2020), which have declined in children, adolescents (Bobo et al., 2020), adults (Ozamiz-Etxebarria et al., 2020), and the elderly (Yang et al., 2020).

Specifically, in the Chinese adult population, Qiu et al. (2020) observed that individuals with ages ranging from 18 to 30 years were the group with the greatest symptoms of posttraumatic 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 the greatest chance for the development of mental health problems.

Rajkumar (2020) carried out a literature review study on the relationship between COVID-19 and mental health, using, on the PubMed database, the descriptors "novel coronavirus", "COVID-19", "CoV", "mental health", "psychiatry", "psychology", "anxiety", "depression", and "stress" in various permutations and combinations. The author identified that symptoms of anxiety (16%), depression (28%), and stress (8%) are common psychological reactions to the COVID-19 pandemic. There were also studies with populations more vulnerable to the impact on mental health during this pandemic, like older adults (Yang et al., 2020), homeless (Tsai & Wilson, 2020), immigrant workers (Liem et al., 2020), pregnant women (Rashidi et al., 2020), Chinese students studying abroad (Zhai & Du, 2020), and people with mental disorders (Yao et al., 2020; Zhu et al., 2020).

The scarcity of social contacts and fear of contamination – often generated by misinformation – increase anxiety (Jung & Jun, 2020). Another study on this topic, conducted by Wang et al. (2020), observed that 29% of the 1,210 participants had symptoms from 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 the H1N1 flu (Sprang & Silman, 2013). Thus, it is relevant to understand factors related to increased anxiety and general psychological suffering in the context of a pandemic.

In this same direction, according to Margis et al. (2003), 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%) (Huang & Zhao, 2020) and health professionals (22.8%) (Pappa et al., 2020) experienced mood disorders, such as depression, during this pandemic. We must

emphasize the need to establish ways to mitigate mental health risks and to adjust interventions in pandemic conditions. It is noteworthy that depression can affect the most vulnerable individuals but also those without a psychiatric history (Cullen et al., 2020), especially during social isolation, which was experienced in several regions of Brazil.

Given the above, it is clear that social distancing can be accompanied by symptoms of anxiety, depression, and negative emotions (Brooks et al., 2020), which are all risk factors for food restriction, emotional eating, and hyperphagic behavior (Puccio et al., 2016). The recent occurrence of the pandemic does not allow us to have specific data on the impact of COVID-19 on eating problems (EP). However, the literature suggests a risk of worsening in preexisting cases and an increased risk of occurrence of new cases (Mengin et al., 2020). The greater exposure to food advertisements – via increased exposure to the media – can be accompanied, in some cases, by more intense cravings, binge eating, and weight gain in the short and long term (Boswell & Kober, 2016). Besides, people may perform less physical activity, be more afraid of gaining weight and develop greater dietary restrictions (Mengin et al., 2020), contributing to the appearance of disorders such as anorexia and bulimia. Touyz et al. (2020) warn about the short-term and long-term consequences of having both an eating disorder and COVID-19 simultaneously, pointing 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 EP can promote research to assess the impact of the pandemic on the psychological and clinical status of individuals (Davis et al., 2020).

All three pillars that define health status as physical, mental, and social well-being (World Health Organization, 2020a) were affected by the COVID-19 pandemic. Leaving confinement will bring new challenges, especially in dealing with the appearance of posttraumatic disorders, such as PTSD and social phobias, for example (Mengin et al., 2020). Thus, it becomes relevant to identify specific risk groups, in order to develop strategies to reduce the impact of this crisis. Understanding associated factors for EP may assist in a better prescription of treatment, increasing its effectiveness. Thus, this study aimed to analyze the association of age, sex, and symptoms of depression, anxiety, and stress with risky behavior for EP in Brazilian adults during the COVID-19 pandemic. The first hypothesis was that women would show higher symptoms of depression, anxiety, stress, and high-risk behavior for EP when compared to men. The second was that symptoms of depression, anxiety, and stress would show a positive association with the risk for EP for both men and women. The third and last hypothesis is that age would positively influence symptoms of depression, anxiety, stress, and risky behavior for EP in Brazilian adults during the COVID-19 pandemic for both sexes.

Method

Study design

This is a descriptive, methodological research with a cross-sectional design (Ato et al., 2013). The study was developed according to the guidelines of the Strengthening the Reporting

of Observational Studies in Epidemiology (STROBE) (Malta et al., 2010). 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 media (e.g., WhatsApp, Facebook, and Instagram) in Brazil and asked to share the link to the study with their contacts. The link was also posted on sports and exercise psychology groups on Facebook. The questionnaire was available from April to June 2020.

Setting and participants

The procedures adopted in this research are in accordance with the criteria of ethics in research with human beings established 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 under the protocol No. 2.442.590. 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. Only the individuals who signed the Free and Informed Consent Form participated in the study. The questionnaire took approximately 20 minutes to be completed, and responses to all questions were mandatory to avoid missing values.

Instruments

- Demographic Information: in order to evaluate the sociodemographic profile of participants, a semi-structured questionnaire was developed by the authors with questions about gender, age, monthly income, marital status, and housing region.
- Depression, Anxiety and Stress Scale (DASS-21): it was developed by Martins et al. (2019). The DASS-21 is a self-report assessment that contains three subscales scored on a four-point Likert scale, ranging from zero (strongly disagree) to three (totally agree). Each subscale of the DASS-21 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 previous week. Sum scores are computed by adding up the scores on the items per subscale and multiplying them by two. Thus, the sum scores for the total DASS-21 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 (2014), providing evidences of the validity and reliability of the instrument among the Brazilian population. Cronbach's alpha of the instrument for the present study was $\alpha = .71$, indicating strong reliability (Hair et al., 2019).
- Eating Attitudes Test-26 (EAT-26): it was developed by Garner et al. (1982), and it has been frequently used as an outcome measure of the frequency of food restriction, binge eating, purging behaviors, and environmental pressure for food intake. It is composed of 26 items that are responded to using a Likert-type scale that varies from 0 to 3 points (3 = always, 2 = often or sometimes, 1 = rarely or almost never, 0 = never), except for question 4, which has a reverse score. 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 indicative of risky behavior for EP. This test was adapted and validated for Brazilian adolescents by Bighetti et al. (2004), showing acceptable evidence of internal and external. Nunes et al. (2005) assessed the validity and reliability of the instrument among Brazilian adults and found acceptable results. Cronbach's alpha of the instrument for the present study was α = .96, indicating strong reliability (Hair et al., 2019).

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 risky behavior for EP 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: .01 to .39 = weak, .4 to .69 = moderate, and .7 to 1.0 = strong (Mukaka, 2012). Multiple regression analysis was used to determine whether age and symptoms of depression, anxiety, and stress combined were associated with male and female risky behaviors for EP. There were no sufficiently strong correlations between variables that indicated problems with multicollinearity (variance inflation factor [VIF] range = 1.07 to 1.13). Specifically, these VIF values were below 5 or 10, deemed acceptable by Hair et al. (2019). All analyses were performed using Statistical Package for the Social Sciences (SPSS) version 23.0, adopting a significance level of $p < .05$. In addition, a post hoc statistical power analysis in G*Power version 3.1.9 (Faul et al., 2007) revealed our statistical power to be 99.99% based on our sample of 715 participants, a medium effect size (.15), according to Cohen (1992) f^2 criteria, and a .05 *p* value.

<div align="center">Results</div>

Descriptive analysis

The results demonstrate that 715 Brazilian adults, aged 29.20 ± 10.73 years old, participated in the study. There was a prevalence of female individuals (66.9%), with a monthly income between one and three minimum wages (48.1%), single marital status (71.2%), and from the Northeast region (66.2%).

The descriptive values demonstrate the minimum, maximum, mean scores, standard deviation (SD), skewness, and kurtosis of all dimensions of the study. The mean scores of the three-point Likert scale and total score of the DASS-21 revealed that the COVID-19 pandemic was 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 three-point Likert scale of the EAT-26 revealed that participants' scores were not correlated to EP during the COVID-19 pandemic (*M* = 17.11, *SD* = 8.35).

Main analysis

Table 1 presents the comparison of the symptoms of age, anxiety, stress, depression, total DASS-21 score, and EP in Brazilian adults during the COVID-19 pandemic according to sex. A significant difference between men and women was found regarding anxiety ($p < .001$), stress ($p < .001$), depression ($p < .001$), total DASS-21 score ($p < .001$), and EP ($p < .001$), indicating that women presented more of these symptoms, total DASS-21 score, and EP than men, and the effect size of this difference was large (d_{range} = .38 to .62).

Table 1

Differences in Age, Symptoms of Depression, Anxiety and Stress, and Risky Behavior for Eating Disorders Between Male and Female Brazilian Adults During the COVID-19 Pandemic

Variables	Gender		p	d
	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

Note. Only the standardized regression coefficients, which were less than our significance level of .05, are highlighted in bold.
* Significant difference − $p < .05$ (independent *t* test).

The correlations revealed that age was significantly and negatively associated with all dimensions of DASS and DASS-21 total score for both men (*r* range = −.16 to −.18) and women (*r* range = −.22 to −.30). Depression, stress, and DASS-21 total score were significantly and positively associated with EP (*r* range= .16 to .21) for men. EP were significantly and negatively associated with all dimensions of DASS and DASS-21 total score (*r* range −.19 to −.22) for women (see Table 2).

Table 2

Correlation Between Age, Symptoms of Depression, Anxiety and Stress, and Risky Behavior for Eating Disorders in Male and Female Brazilian Adults

Participants	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****	–

Note. Only the standardized regression coefficients, which were less than our significance level of .05, are highlighted in bold.
*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 EP (R^2 = 04, *p* = .01) for men. However, only depression presented a positive and significant contribution to EP (β = .27, *p* < .05). Regarding women, regression analysis revealed that age and all dimensions of DASS explained a significant amount of the variance in EP (R^2 = .05, *p* < .001), however, only age presented a positive and significant contribution to EP (β = .10, *p* < .05) (Table 3).

Table 3

Age, Depression, Anxiety, and Stress as Associated Risky Behaviors for Eating Disorders in Male and Female Brazilian Adults

Variables	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 4, standard multiple regression analysis revealed that the model that included only the DASS total score explained a significant amount of the variance in EP for both men (R^2 = 03, *p* = .01) and women (R^2 = .05, *p* = .01). Moreover, the DASS total score presented higher positive contribution to EP for women (β = .22, *p* < .001) than for men (β = .17, *p* < .01).

Table 4

DASS Total Score Associated with Risky Behaviors for Eating Disorders in Male and Female Brazilian Adults

Variable	Eating disorder (men)	Eating disorder (women)
	β (CI)	β (CI)
DASS total score	**.17 (.02, .14)****	**.22 (.07, .16)*****
R²	.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 association of age, sex, and symptoms of depression, anxiety, and stress with risky behaviors for EP in Brazilian adults during the COVID-19 pandemic. The main findings confirmed two hypotheses: a) women had greater symptoms of anxiety, stress, depression, and EP compared to men; b) the combination of age and symptoms of depression, anxiety, and stress were associated with risky behaviors for EP in both sexes. Our last hypothesis was partially confirmed by demonstrating that age is positively associated with symptoms of depression, anxiety, stress, and risky behaviors for EP in Brazilian adults during the COVID-19 pandemic only in women.

The first population study to assess the depression and anxiety in people in Hong Kong during the pandemic provided important and timely data on the impact of COVID-19 on the 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 (Choi et al., 2020). In individuals with EP, the results were 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 (Phillipou et al., 2020).

Regarding the sex, our findings confirmed the first hypothesis of the present study. This finding reveals that the women show higher symptoms of pathologies such as depression, anxiety, stress, and risky behavior for EP. These results are similar to that of Antunes et al. (2020), who identified that females had greater symptoms of the development of pathologies (anxiety) compared to males, suggesting that women may be a group of greater vulnerability. Wang et al. (2020) demonstrated, in an online survey in China, that 53.4% of the 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 highlight that the research considered the age groups, since the pandemic has

different impacts depending on the age of the group analyzed (Wang et al., 2020; Choi et al., 2020; Antunes et al., 2020).

In turn, recent studies conducted in China, Italy, and Spain, countries that suffered severely from the COVID-19 pandemic, showed a high frequency of development of pathologies (e.g., depression, anxiety, and stress) in both sexes (Casagrande et al., 2020; González-Sanguino et al., 2020; Huang & Zhao, 2020; Muñoz-Navarro et al., 2020; Odriozola-González et al., 2020). Moreover, Huang and Zhao (2020) demonstrated, in a cross-sectional study with 7,236 Chinese adults, a high symptomatology of depression and anxiety. In Italy, Casagrande et al. (2020) reported a high frequency of anxiety symptoms in 2,291 Italian adults. In Spain, recent online cross-sectional studies observed a high frequency of symptoms of depression and anxiety in the population (González-Sanguino et al., 2020; Muñoz-Navarro et al., 2020; Odriozola-González et al., 2020).

The fact that symptoms of depression, anxiety, and stress were also significantly associated with EP in both sexes confirmed the second hypothesis of the study. The results demonstrated that psychosocial stressors (depression, anxiety, and stress) stemming from the COVID-19 pandemic may exacerbate eating disorders-related triggers and present a challenging environment for individuals with EP (e.g., anorexia nervosa and bulimia nervosa) or association with risky behaviors for EP (Touyz et al., 2020; Cooper et al., 2020). According to Cooper et al. (2020), 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 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 a period before the COVID-19 pandemic, and 34.6% reported an increase in binge-eating behaviors. It was also found that, in the group that reported having or already having had an eating disorder, 35.5% indicated an increase in binge-eating behaviors, while 18.9% reported an increase in purging behaviors (Phillipou et al., 2020). 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 (Antunes et al., 2020). Thus, studies have reported that managing EP properly is crucial to mitigate potential long-term impacts on individuals who have these disorders or have developed them during the pandemic (Touyz et al., 2020; Fernández-Aranda et al., 2020). Smith et al. (2018) observed that individuals with eating disorders have a higher risk of suicide under normal conditions, and situations related to the COVID-19 pandemic can increase this risk.

Regarding risky behaviors for EP, it can be noted that women demonstrated having a higher risk of developing EP than men. These findings are similar to other studies' in the literature that demonstrated a significant proportion of the risk for EP in women during the pandemic (Phillipou et al., 2020; Papandreou et al., 2020). Phillipou et al. (2020) observed, in an Australian sample 80% composed of women, that binge eating and anorexia nervosa had an increase during

the pandemic. According to the authors, this may be due to several factors, including the availability of specific foods, as well as increased stress, anxiety, and depressive symptoms as a result of social distancing measures. Papandreou et al. (2020) affirmed, in a cross-sectional study with prevalence of women, that eating behaviors can be affected during the pandemic, and it can, thus, trigger risks for the development of EP. 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 EP 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 variables that are associated with EP, and by identifying vulnerable groups, intervention strategies can be better targeted, increasing their effectiveness.

The last hypothesis was partially confirmed since age was positively associated with symptoms of depression, anxiety, stress, and risky behaviors for eating disorders among Brazilian women during the COVID-19 pandemic. This result can be, at least, partially explained by the fact that women suffer more body and hormonal changes throughout life, which can cause higher levels of depression, anxiety, stress, and risky behaviors for eating disorders (Casagrande et al., 2020; González-Sanguino et al., 2020; Huang & Zhao, 2020; Muñoz-Navarro et al., 2020; Odriozola-González et al., 2020). Further, women may be more influenced by sociocultural and psychological factors, such as the pressure of social media and judgment of other people (Souza et al., 2018). Thus, during the COVID-19 pandemic, age seems to be an intervening factor in depression, anxiety, stress, and risky behaviors for EP, particularly among women.

The present study fulfilled its objectives regarding the elucidation of the association of age, depression, anxiety, and stress with risky behaviors for EP in Brazilian adults of different ages and regions of the country during the COVID-19 pandemic. However, some limitations need to be pointed, such as the use of a convenience sample, which does not allow us to infer the results, and the use of self-reported instruments applied online. In addition, the cross-sectional design of the study does not allow us to identify the causality between the variables. Nonetheless, this does not invalidate the results found, especially because of the number of participants (n = 715) and the fact that the instruments used presented adequate psychometric evidence.

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

Lastly, the literature available on this topic originated especially from developed countries, therefore, it may not represent the experience of the populations from other countries.

In this scenario, the present study brings important contributions regarding mental health disorders during the COVID-19 pandemic in Brazil.

Final considerations

In conclusion, our observational results showed that symptoms of depression, anxiety, and stress were positively associated with risky behaviors for EP in Brazilian male and female adults during the COVID-19 pandemic. Furthermore, age was demonstrated to be positively associated with risky behaviors for EP among women. From a practical standpoint, the results found here can serve as a basis for the adoption of intervention strategies, such as encouraging sessions of virtual group therapy and food support for those individuals with a predisposition or prior diagnosis of EP, especially women with a history of anxiety, depression, and/or stress.

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