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Anxiety, depression, and stress: Can mental health variables predict panic buying?

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ABSTRACT

The study aims to verify the predictive power of anxiety, depression, and stress over panic buying, and to assess gender differences. Data was collected in Brazil during May 2020 through an online questionnaire which was composed of sociodemographic questions, the Panic Buying Scale (PBS), the General Health Questionnaire (GHQ-12) to assess anxiety and depression, and the Perceived Stress Scale (PSS-10) to assess stress. 2297 Brazilians (520 men and 1777 women) aged between 18 and 85 years ($M = 39.18$ years; $SD = 14.10$ years) answered the questionnaire. Women reported statistically significant higher means' values for anxiety, depression, and stress than men. Though men reported higher panic buying levels than women, the difference was not statistically significant. The regression models revealed that anxiety and stress were panic buying predictors. Comparing gender, the regression models showed that mental health variables (anxiety and stress) explained a higher variance of men's panic buying values than women's values. Hence, there is a significant moderator gender effect between mental health variables and panic buying, as they explained more of the variance of panic buying for men than for women. Psychological support should be provided to individuals, and they should be alerted and educated to the potentially prejudicial outcomes of this type of consumer behavior. Further studies should investigate antecedents and consequences of panic buying.

1. Introduction

In the last months, the world has been facing a public health crisis, with the spread of coronavirus disease (COVID-19). To contain this pandemic, governments from various countries, aligned with the World Health Organization (WHO), implemented containment measures that included work-from-home policies, self-isolation, and social distancing, given how fast the SARS-CoV-2 virus was spreading. Along with this, psychologists began to alert the communities to the potentially harmful effects this pandemic can have on mental health, due to the fear, stress, and anxiety it could trigger in people (Roy et al., 2020).

On May 2020 people in Brazil faced the peak of the first wave of COVID-19 pandemic. Public places such as schools, universities and commerce closed its doors, and people confined in their homes in a period where the news about the virus were continuously updated. Though field hospitals were set up to help in the combat of COVID-19, it did not prevent the rupture of health care services. Individuals also ran to pharmacies, where hand sanitizer became hard to find. The increase of mental health problems began to be more evident, particularly because of social distancing can affect it and lead to mental disorders (Souza et al., 2021).

As some studies conducted in previous pandemics indicate, the levels of anxiety, depression, and psychological distress rise at these periods (Smith et al., 2020). Recent studies from COVID-19 pandemic also demonstrate this kind of symptoms to be most commonly observed – mainly anxiety, panic, and depression (Chatterjee et al., 2020; Özdin and Bayrak Özdin, 2020).

The self-isolation and quarantine recommended by governments and health authorities to help cease the spreading of SARS-CoV-2 possibly are a trigger to mental health problems, given the evidence that emerges demonstrating people who go through a period of isolation and quarantine are more susceptible of experiencing anxiety, anger, confusion, post-traumatic stress symptoms, fear, and panic. These periods can also lead individuals to feel boredom, loneliness, and guilt because they do not have the possibility to be present for their families (Chatterjee et al., 2020; Roy et al., 2020).

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Considering that anxiety, depression, and stress are among the most prevalent mental health problems, both before and during the COVID-19 pandemic period (Smith et al., 2020), this study will focus on them and their relationship with consumer behavior, particularly panic buying, since it is known that negative emotional states can be relieved through the act of purchasing (Sneath et al., 2014).

Anxiety is an emotion (American Psychology Association, n.d.), a response to a situation that is perceived as dangerous or risky (Mental Health UK, 2020b). It can be defined as a constant feeling of tension, worry, intrusive thoughts or concerns, and fear, and can manifest itself through physical symptoms such as sweating, trembling, and racing heartbeat (Mental Health UK, 2020a; Smith et al., 2020).

Another predominant mental health problem is depression, which affects negatively how a person feels, the way she thinks and acts, causing feelings of sadness, loss of interest in activities that were previously enjoyed, and various other emotional and physical problems that negatively alters a person's ability to function both at work and at home (American Psychiatric Association, 2020). Anxiety and depression can be influenced by gender, being more common among women. A study conducted during the COVID-19 pandemic concluded that anxiety and depression scores were higher for females (Özdin and Bayrak Özdin, 2020). In the study of Feter et al. (2021), conducted during the COVID-19 pandemic with Brazilian participants, the authors identified being female as a contributing factor for worse anxiety and depression symptoms. A similar study found a strong association between female gender and anxiety and depression levels (Goularte et al., 2021).

Stress commonly has its origin in an external trigger (e.g., a deadline), and individuals usually present symptoms similar to anxiety such as irritability, fatigue, and trouble sleeping (American Psychology Association, 2020). Recent studies conclude that the stress levels are significantly higher for women than for men during pandemics (Kowal et al., 2020; Wang et al., 2020). People's perception of control over their environment can be reduced due to a health crisis, and individuals may try to gain control over other domains (Yuen et al., 2020). The perceived lack of control over an event can impact stress levels and individuals can engage into a variety of consumer behaviors to compensate emotional distress (Sneath et al., 2009).

A behavior associated with anxiety and depression is compulsive buying, a chronic type of consumer behavior characterized by a repetitive and uncontrollable desire to buy (Lawrence et al., 2014; Williams and Grisham, 2012). Compulsive buying is pathologic, cyclic, and it is sparked by negative emotions of multiple origins, while the negative emotions that lead to panic buying are the result of fear caused by a disruptive event. Besides, one main characteristic of panic buying is to buy more than what one needs to store, while in compulsive buying people do not buy with this intention. Besides the link with compulsive shopping, depression is also usually associated with impulsive shopping, a type of consumer behavior related to emotion, which works as a way for the individual to relieve the feeling of depression and recover the feeling of normality in his life (Sneath et al., 2014).

Given the association of emotional states and some types of consumer behavior, it can be expected that, because of the context of the COVID-19 pandemic the levels of anxiety, depression and stress rising. With the news about shortage of supplies such as food, cleaning and hygiene products, a panic buying wave emerges, since this is also a type of consumer behavior linked with emotional states (Arafat et al., 2020c; Lins and Aquino, 2020). There were several media reports of panic buying waves in countries worldwide, especially when lockdowns were implemented, and while the cases of people infected with the new coronavirus started increasing (Arafat et al., 2020a, 2020d).

The panic buying phenomenon emerges due to the fundamental human need individuals have to be in control of an aspect of their lives (Singh and Rakshit, 2020). If they cannot control the pandemic, they end up stockpiling to assure they will have what is needed to face it and to regain some control of their situation (Ngunjiri, 2020; Sim et al., 2020). These uncertainties can intensify levels of emotional distress and anxiety in individuals. If it affects a lot of people, might consequently result in a panic buying wave. Excessive buying surges then as a coping method, a strategy to reduce tension and deal with these stressful events (Lins and Aquino, 2020; Roy et al., 2020).

According to Lins and Aquino (2020), negative feelings such as fear, panic, and feelings of uncertainty influence behavior, which can lead people to buy more things than usual, resulting in panic buying. This type of consumer behavior is frequently event-induced, occurring during disasters, calamities, and public health emergencies, causing a massive increase in buying behavior (Arafat et al., 2020c), and is usually associated to the purchase of essential products (Lins et al., 2021). Higher levels of panic buying for men than for women were reported in the development study of the Panic Buying Scale, the first psychometrically acceptable scale to assess panic buying so far (Arafat et al., 2020b; Lins and Aquino, 2020). U.

Research about the relationship between anxiety, depression, and stress and panic buying is still scarce, having only a few studies linked anxiety with this consumer behavior (Cooper and Gordon, 2021; Leung et al., 2021). With panic buying being considered a coping response to negative feelings, feelings of uncertainty and anxiety, a maladaptive behavioral response from individuals to deal with uncomfortable situations, it seems pertinent to clinical psychology practitioners to understand which mental health problems can precede the individuals' engagement in panic buying during disruptive events.

Because of the high levels of anxiety, depression, and stress people are experiencing during the COVID-19 pandemic, panic buying is an extensively reported phenomenon worldwide. Women have a higher tendency than men to feel extreme anxiety, depression, and stress, which can be associated with having to comply both with household and family-related tasks and their professional obligations (Souza et al., 2021). Thus, the present study aims to verify the predictive power of anxiety, depression, and stress over panic buying, analyze the moderating role of gender in this relationship, and assess gender differences.

2. Materials and methods

2.1. Participants

This study included 2297 participants from Brazil (520 men and 1777 women, corresponding to 22.6% and 77.4% of the sample, respectively) with ages between 18 and 85 years (M = 39.18 years; SD = 14.10 years). Regarding to their education levels, 0.6% of the participants have elementary school degree; 6.2% have high school degree, 19.3% have incomplete university degree; 24.9% have university degree, and 49.1% have a postgraduate degree.

2.2. Instruments

The questionnaire included sociodemographic questions about age, gender, level of education, income, and employment status (see Table 1). Instruments used to assess panic buying and mental health variables, as described below, were also included in the questionnaire.

2.2.1. Panic Buying Scale (PBS)

The PBS developed by Lins and Aquino (2020) consists of seven items to assess panic buying (e.g., "Fear drives me to buy more than I usually do"; "Fear drives me to buy things to stock at home"; "Panic makes me buy more things than I usually do"; $\alpha = .85$). The participants were asked to point out the level of agreement or disagreement with the items on a 7-point scale (1 = strongly disagree; 7 = strongly agree) according to their recent behavior during the COVID-19 pandemic.

2.2.2. General Health Questionnaire (GHQ-12)

Pasquali et al. (1994) adapted Goldberg's General Health Questionnaire (60 items) for the Brazilian population. This study used the shorter version with 12 items adapted and validated to the Brazilian

Table 1
Sociodemographic characterization – Total sample (n=2297); Men (n=520); Women (n=1777).

		Total sample % (*f*)	Men % (*f*)	Women % (*f*)
Income	No income	11.4% (261)	8.5% (44)	12.2% (217)
	< US$182.2*	6.5% (150)	6% (31)	6.7% (119)
	US$182.4 to US $364.4	13.3% (305)	13.1% (68)	13.3% (237)
	US$364.6 to US $546.6	12.9% (296)	11.9% (62)	13.2% (234)
	US$546.8 to US $728.8	10.1% (232)	10.6% (55)	10.0% (177)
	US$729.0 to US $911.0	9.4% (216)	10% (52)	9.2% (164)
	> US$911.0	36.4% (837)	40% (208)	35.4% (629)
Employment status	Employed	71.3% (1638)	74.8% (389)	70.3% (1249)
	Unemployed	19.6% (450)	18.3% (95)	20% (335)
	Retired	9.1% (209)	6.9% (36)	9.7% (173)

*Note: *On May 1st, 2020, R$1000 were approximately US$182.2. The minimum wage in Brazil at this period was US$190.4 (equivalent to R$1045) per month.*

population by Gouveia et al. (2003). GHQ-12 aim to assess the general health of the participant, including 4 items for measuring anxiety (e.g., "Have you been constantly feeling exhausted and under pressure?"; "Have you been feeling unhappy and depressed?"; "Have you often lost sleep because of your worries?"; α = .70), and 8 items for depression (e.g., "Have you been performing your normal day-to-day activities with satisfaction?"; "Have you been feeling capable of making decisions?"; "Have you been able to face your problems properly?"; α = .82) levels. The participants were asked to answer the 12 items considering the past two weeks of their lives, in a scale of 1–4 (1 = never; 2 = sometimes; 3 = frequently; 4 = very frequently).

2.2.3. Perceived Stress Scale (PSS-10)

The 10-item scale is used worldwide to assess the participant's self-perception of stress (Remor, 2006). The scale was translated and validated for the Brazilian population by Luft et al. (2007). The participants were asked to answer ten questions (e.g. "In the last month how often have you felt nervous or stressed?"; "In the last month, how often have you found that you could not cope with all the things that you had to do?"; α = .87) considering the past month of their lives, in a 5-point Likert scale (0 = never; 1 = almost never; 2 = sometimes; 3 = frequently; 4 = very frequently).

2.3. Procedures and data analysis

This is a descriptive exploratory study carried out in Brazil. The data collection occurred during May 2020, using the snowball sampling technique to recruit participants (Naderifar et al., 2017). The data was collected through an online questionnaire shared on the internet through web links in social media networks (Facebook and Instagram). The participants that were not Brazilians, over the age of 18 years, or who did not fully answer the questionnaire were not included in this sample.

All the procedures were fully explained to the participants, who, at the beginning of the questionnaire, were informed about the aim of the study in a consent form and assured the use of the collected data only for academic and scientific purposes. The present study was approved by the Ethics Committee of the University of Fortaleza (Protocol nº 4.014.996), which assures the ethical principles of research involving human beings were respected. The investigation was conducted according to the latest version of the Declaration of Helsinki. This study was included in a research project focused in understand the impact of COVID-19 pandemic on Brazilians' lives, so the questionnaire also included other scales that were not included in the present manuscript.

The data analysis was conducted using IBM SPSS Statistics (version 26). First, to characterize the sociodemographic variables were used means, frequencies, and standard deviations. The association of the independent variables (anxiety, depression, and stress), and the dependent variable (panic buying) was determined by *r* Pearson's correlation coefficient. Independent samples t-tests were performed to test the means' differences of the predictors, levels of income, and employment status between the gender of the participants.

A multiple linear regression using "Enter" method was used to verify the predictive relationship of mental health variables (anxiety, depression, and stress) in panic buying (outcome variable). A multiple linear regression was also conducted separately for men and women, to test a possible moderator effect of gender. The predictor variables were also tested to assess multicollinearity.

3. Results

Firstly, it was verified the variables anxiety ($Sk = -0.005$; $ku = -0.616$), depression ($Sk = 0.545$; $ku = -0.126$), stress ($Sk = -0.101$; $ku = -0.354$), panic buying ($Sk = 1.382$; $ku = 1.690$), and gender ($Sk = -1.308$; $ku = -0.288$) had a distribution close to normal.

The *r* Pearson's correlation indicated that anxiety, depression, and stress are positively correlated with panic buying (see Table 2) and revealed that mental health variables are highly correlated with each other. The men's *r* Pearson's correlation coefficients were higher than women's *r* Pearson's correlation coefficients for all variables in study (effect sizes for the differences between panic buying and anxiety, depression and stress are, respectively, Cohen's $q = 0.12$, 0.08, and 0.13). Stress is the mental health variable that was more correlated with panic buying (total sample, men, and women), and depression is the variable that was less correlated with panic buying (total sample, men, and women).

The independent samples t-tests showed statistically significant differences between men and women's mean values of income, t (879.02) = 2.79; $p = .007$; $d = -0.14$; 95% CI = [−0.233, −0.038], and employment status, t (919.56) = −2.40; $p = .016$; $d = 0.11$; 95% CI = [0.01, 0.206]. The mean values of income are higher for men ($M = 5.00$; $SD = 2.06$) than for women ($M = 4.71$; $SD = 2.16$), meaning men have higher income than women. The mean values for employment status are higher for women ($M = 1.39$; $SD = 0.66$) than for men ($M = 1.32$; $SD = 0.60$), indicating women can be found more in a situation of unemployment and/or retirement.

The independent samples t-tests showed statistically significant differences between men and women's mean values (see Table 2) for anxiety, t (2295) = 3.77; $p < .001$; $d = 0.19$; 95% CI = [0.09,0.29], depression, t (2295) = 2.67; $p = .008$; $d = 0.13$; 95% CI = [0.03,0.22], and stress, t (2295) = 4.23; $p < .001$; $d = 0.21$; 95% CI = [0.11,0.31],

Table 2
Descriptive Statistics and Correlations for study variables – Total sample; Men; Women.

	Variables	M (SD)	1	2	3	4
Total Sample	1. Panic Buying	1.94 (0.86)	1			
	2. Anxiety	2.41 (0.67)	**.22***	1		
	3. Depression	2.06 (0.62)	**.20***	.71*	1	
	4. Stress	2.09 (0.75)	**.25***	.70*	.74*	1
Men (**n = 520**)	1. Panic Buying	2.00 (0.94)	1			
	2. Anxiety	2.31 (0.68)	**.31***	1		
	3. Depression	1.99 (0.65)	**.26***	.73*	1	
	4. Stress	1.97 (0.77)	**.34***	.71*	.76*	1
Women (**n = 1777**)	1. Panic Buying	1.92 (0.83)	1			
	2. Anxiety	2.44 (0.67)	**.20***	1		
	3. Depression	2.08 (0.61)	**.18***	.70*	1	
	4. Stress	2.13 (0.74)	**.22***	.69*	.73*	1

Note. M = Mean; SD = Standard Deviation; * = p < .001.

with women presenting higher levels than men for this variables. Though men had higher levels of panic buying, t (769.87) = 1.90; p = .058; d = −0.10; 95% CI = [−0.20,0.00], the means' difference was not statistically significant.

The multiple linear regression results indicated that anxiety (β = .10), and stress (β = .18) were statistically significant predictors of panic buying. Depression was not a statistically significant predictor of panic buying. This model was statistically significant and explains 6.6% of the variance of panic buying values, R^2 = .26, F (3,2293) = 53.88, p < .001. The VIF levels were acceptable for every independent variable, indicating there is no multicollinearity (see Table 3).

To understand which independent variables are significant for each gender, two multiple linear regressions were conducted separately for men and women. The two models were statistically significant and explained 12.4% of the variance of panic buying for men, R^2 = .35, F (3,516) = 24.45, p < .001, and 5.2% of the variance of panic buying for women, R^2 = .23, F (3,1773) = 33.35, p < .001. Results indicated that anxiety, and stress were statistically significant predictors of panic buying both for men (anxiety's β = .17; stress's β = .26) and women (anxiety's β = .09; stress's β = .16). Depression was not a statistically significant predictor of panic buying neither for men nor women. The VIF levels were acceptable for every independent variable, indicating no multicollinearity (see Table 4).

Thus, as the explained variance value of men is more than double the variance value for women and β values were also higher for men, there appears to be a possible moderator effect of gender in the regression model.

4. Discussion

As panic buying is a phenomenon that has been recently studied in its various dimensions, the purpose of our study was to verify the predictive power of anxiety, depression, and stress over panic buying during the COVID-19 pandemic. Concerning the gender differences evidenced in previous literature, we also intended to determine if those differences would be detected in a Brazilian sample and analyze the moderating role of gender.

Regarding the r Pearson's correlation coefficients, the correlations between panic buying and anxiety, depression, and stress were positive. Therefore, higher levels of anxiety, depression, and stress were associated with higher panic buying levels. This indicates that as individuals perceived themselves as experiencing moments of stress, their panic buying behaviors intensified. While people more often reported feeling nervous and unable to cope with all the things they had to do, they also more often reported that fear led them to buy more than they usually did. The panic that makes individuals buy more things to stock at home also increases as the degree of anxiety increases.

The means' differences indicated women have higher levels of anxiety, depression, and stress than men. These results are in line with prior findings, which state anxiety and depressive disorders are generally more observed among females and that these states can be intensified in the current pandemic (Feter et al., 2021; Goularte et al., 2021; Özdin and Bayrak Özdin, 2020). Perhaps men can dampen their emotions by ignoring them or not labeling, especially emotions such as fear and sadness. And, in fact, men seem to have experienced less exhaustion and continue to perform normal day-to-day activities without losing sleep and maintaining the ability to face problems and make decisions appropriately.

Regarding stress levels reported during the pandemic, in our findings, gender affects stress levels, as women reported higher levels of stress than men, and the means' difference in stress values was significant. Other studies also show that women have higher levels of stress than men (Kowal et al., 2020; Wang et al., 2020). This influence can occur due to the external trigger, i.e., the COVID-19 pandemic and the uncertainties that come alongside with it, but also because in the period of isolation, women have the tendency to act as a supportive member of the family, and consequently have more home-related and family-orientated tasks under their charge, at the same time they comply with their professional responsibilities (Kowal et al., 2020; Souza et al., 2021).

The regression model with anxiety, depression, and stress as independent variables and panic buying as the outcome variable was significant. Nevertheless, only anxiety and stress were considered significant predictors of panic buying, meaning that higher levels of anxiety and higher stress levels can lead to higher levels of panic buying. So, we can assume that panic buying is driven by anxiety (Ngunjiri, 2020). Other studies also identified panic buying occurs as a response to reduce anxiety (Arafat et al., 2020c, 2020d).

Our results can also establish stress as a predictor of panic buying behavior. Previously, event-induced stress has also been linked with specific types of consumer behavior (Sneath et al., 2009), and purchasing can help ease stress (Yuen et al., 2020). Individuals who, for example, perceive themselves as momentarily nervous and, at some point, unable to cope with their quotidian responsibilities are more likely to engage in a panic buying, motivated by the fear that drives them to buy beyond the usual, for storage at home.

The predictive power of mental health variables on panic buying meets the existing literature on anxiety, stress, and panic buying. High levels of all these variables are all explained by the overwhelming uncertainties existing in the COVID-19 pandemic context. When facing a global pandemic that puts in question several aspects of people's lives that are not in their control, people tend to search for some aspect they can have control over. For that, some people resorted to buying products they thought will be needed in excessive quantities, in order to recoup some control (Arafat et al., 2020c; Ngunjiri, 2020). Perhaps depression causes some physical effects of lack of energy, indisposition, making it difficult to perform normal day-to-day activities, which blocks people with high levels of having panic buying behaviors. So, it is reasonable to assume that this is one reason why the result with depression did not present itself statistically significant in this sample. The social distancing for a long period of time may as well contributed to increase depression levels (Feter et al., 2021; Goularte et al., 2021).

Naturally, panic buying surges as a coping mechanism and a helpful response to reduce anxiety, and fear (Arafat et al., 2020c), becoming a form of regulating negative emotions (Barnes et al., 2020). Though, when panic buying occurs in a large population who is, collectively, dealing with anxiety and fear, it can lead to scarcity of essential products, exhaustion of resources (Roy et al., 2020), and eventual food waste (Wang and Hao, 2020), which turns this type of consumer behavior in a maladaptive behavior (Yuen et al., 2020).

Considering in our study, women report higher values for mental health variables, and as anxiety, and stress are both significant predictors of panic buying, we could expect women also reported higher values of panic buying. However, and despite the mean's difference is not significant, men reported higher levels of panic buying. Also, when we compared the regression models separately according to gender, the results revealed the explained variance of panic buying by the dependent variables was higher for men than for women. Thus, this last regression model evidenced a possible moderator effect of gender between mental health variables and panic buying.

Table 3
Results of multiple linear regression analysis of mental health variables for predicting Panic Buying (total sample).

				95% CI		
	β	t	p	LL	UL	VIF
Anxiety	.10	3.29	.001	0.05	0.21	2.32
Depression	.00	−0.14	.886	−0.09	0.08	2.59
Stress	.18	5.60	.000	0.13	0.28	2.52
Multiple correlation coefficient	.26					
% Explained variance	6.6%					

Table 4
Results of multiple linear regression analysis of mental health variables for predicting Panic Buying (Men, Women).

	Men						Women					
				95% CI						95% CI		
	β	*t*	*p*	LL	UL	VIF	*β*	*t*	*p*	LL	UL	VIF
Anxiety	.17	2.62	.009	0.06	0.41	2.43	.09	2.48	.013	0.02	0.19	2.27
Depression	-.06	0.80	.423	−0.28	0.12	2.86	.00	0.08	.934	−0.09	0.10	2.51
Stress	.26	3.79	.000	0.15	0.48	2.74	.16	4.45	.000	0.10	0.26	2.44
Multiple correlation coefficient	.35						.23					
% Explained variance	12.4%						5.2%					

These results go in the same direction as the ones found in the study of Lins and Aquino (2020), which also indicates men revealed higher levels of panic buying than women, highlighting the aspect that excessive buying can be more associated with men (Lins and Aquino, 2020). A study conducted in lockdown period indicated more men were seen purchasing in supermarket stores and this suggests that they can do it as a way to protect and assure their families' needs, as some families allowed only one member of the family to go shopping because of the risk of infection by SARS-CoV-2 (Kaur and Malik, 2020). Additionally, in our study men, when being compared to women, have higher income and are in a beneficial position regarding the employment status, which indicates men may have greater purchasing power that would enable them to engage more in panic buying behavior.

Other types of consumer behavior differ according to gender (e.g., impulse buying, compulsive buying) (Lins and Aquino, 2020). The study of the influence of demographic variables, by using them as a moderator variable between other factors and panic buying or other types of consumer behavior, is essential to enrich the knowledge regarding the aspects of consumer behavior (Kaur and Malik, 2020). Finding a possible moderator effect of gender between the variables anxiety, depression, and stress and panic buying in the results, especially in an initial stage of research developed about this matter, consists a potentiality of the present study.

Another strength of this research includes the assessment of panic buying levels by an acceptable psychometric scale developed in the Brazilian context, the first one about panic buying able for use in quantitative research in this pandemic context. Also, the data collection was conducted in the period the phenomenon was occurring, avoiding a possible distorted recall of the buying behavior by the participants in a post-pandemic period.

The present study also has limitations, such as the uneven proportion of women when compared to men in the sample. Also, the sample might not represent the reality of the Brazilian population in aspects like education level and personal income, since our sample is highly educated (49.1% have a postgraduate degree) and approximately half of the sample has high income (OECD, 2020).

The limitation of the mostly female sampling bias is a warning that should be highlighted when making inferences here. Vulnerability in mental health, insecurity, fear, uncertainty, and doubts permeate women's lives more than men's (Özdin and Bayrak Özdin, 2020; Wang et al., 2020). But parsimony is necessary when generalizing results, even though this study is theoretically consistent and appropriately contributes to the existing gap in the literature, finding that anxiety and stress can predict panic buying.

The global and local collapse of the COVID-19 pandemic may provoke distinct emotional reactions in people. Therefore, the consequences and the impacts can be different, for example, according to social class, location, or level of education. A non-probabilistic sample, predominantly formed by individuals with high levels of income and education, is not representative of most of the Brazilian population; and we observe this with caution when interpreting the results since the pandemic affected the entire country and different Brazilian social layers.

Additionally, the study did not consider in its analyses the effect of employment status, social isolation, belonging to the risk group, and being infect with SARS-CoV-2 on anxiety, depression, and stress levels, despite studies reveal that these are responsible factors for aggravated mental health (Feter et al., 2021; Goularte et al., 2021; Talevi et al., 2020). Moreover, it is important to point out that the items related to mental health and panic buying may cause some discomfort to the participants, and it can lead to social desirability bias in their responses. The extension of the online study, which included other questionnaires, might have influenced the answers as well as the motivation to participate.

The field of consumer behavior and its explaining factors is relevant so that the general population gains awareness of the effects of their buying behaviors. Specifically, about panic buying, the researchers intend to alert the as consumers about the potentially negative outcomes of excessive buying in disruptive events (Sneath et al., 2014). The governments, policy makers, and health professionals can also benefit from these results and better prepare for similar situations that may happen in the future, as they can opt for decisions based on scientific knowledge. To prevent excessive buying, authority figures of a country should assure people that the essential items supply chains will not be affected.

Different perspectives can arise when analyzing the effects of this behavior. Not only psychological explanations at an individual level, but the study echoes the organization of a preventive system of strategies that manage imminent panic behaviors in the future, should other social emergencies arise. Such perspectives are challenges also for the media spheres in general, which can act educationally; or for the industrial sector which eventually can be affected by shortages and logistic problems in the occurrence of new waves of panic buying. Individuals and society are affected, and studies gain more relevance when they point out effective ways to deal with this.

The psychological science shows high levels of panic buying can likewise be prejudicial because individuals can lose control of their expenses and this combined with e.g., loss of income, can lead to financial debts. Financial concerns have a negative impact on people's mental health (Smith et al., 2020) and to cope with this stressful situation and the anxiety that intensifies, it can lead to an endless cycle of buying to relieve negative feelings.

Mental health care in times of health crisis advanced in importance and visibility with the advancement of the COVID-19 pandemic, specifically in the lockdown and confinement period, when the access to mental health care professionals was limited – because people could not leave their homes to go to therapy –, and the social distancing was imperative. As we have determined, panic buying behavior is motivated by negative feelings, fear, anxiety, and stress that occurs also with the current global pandemic.

Hence, a more robust and incisive psychologic support that encounters the population's needs should be provided, so they will not engage in maladaptive behaviors that are prejudicial to them and to societies (Sim et al., 2020). Crisis periods are also an opportunity to expand mental health care access, by developing alternative ways to seek professional advice or to provide accurate information to the population, e.g., by the use of technology and mental health applications for smartphones, and through social media (Figueroa and Aguilera, 2020).

Our study, on mental health variables associated with a purchase

behavior that typically occurs during disruptive events, also contributes with valuable insights for both the medical, clinical, and therapeutic fields, as well as for public policy. For future studies, we suggest a deeper investigation into the relationships between the mental health variables we included and panic buying in other countries and contexts. The instrument used in this research only indicates people's tendency to engage in panic buying behavior. So, this would be interesting to develop a diagnostic scale for clinical purpose.

We also find important to explore more aspects that can be associated with the increasing or reduction of panic buying behavior, whether they are related or not with psychology (e.g., pre-existing mental illness such as post-traumatic stress disorder, obsessive-compulsive disorders), and both antecedents and consequences of this consumer behavior. Demographic variables (e.g., age, educational level, income) should be assessed in future studies with the purpose to better characterize this buying behavior and measure their impact on panic buying.

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Author statement

Contributors Author Contribution Samuel Lins conceived the research question, participated in the design and coordination of the project, interpretation of the results and revising the draft. Rita Koch contributed to data analyses and wrote the first draft of the manuscript. Cynthia Melo and Icaro Costa contributed to data collection and revising manuscript. Sibele Aquino assisted with revising the manuscript. All authors read and approved the final manuscript.

Declaration of competing interest

None.

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