

# Eating Behaviour of University Professors during COVID-19 Pandemic

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## Abstract

This study aimed to verify the possible impacts of the pandemic scenario on the eating behavior of university professors in Brazil. This is an epidemiological, descriptive-exploratory, cross-sectional study. A total of 525 questionnaire responses were received. The data collection instrument was built on the Google® Forms platform, on which questionnaires of sociodemographic, economic, health and work conditions, physical activity, eating behavior, and personality data were applied. Of these, 519 professors from 48 higher education institutions met the inclusion criteria; after exclusion of four ineligible participants (one duplicate response, one retired individual, and two self-employed individuals), the final analytical sample comprised 515 professors from 48 higher education institutions. Most participants are female participants, aged between 40 and 45 years and with family income between R\$8001.00 and R\$16,000.00. Regarding weight gain, a statistical association was found with females (OR: 1.67; 95% CI: 1.13 - 2.49), age between 40 and 54 years (OR: 1.88; 95% CI: 1.10 - 3.23), income up to R\$8000 (OR: 2.18; 95% CI: 1.23 - 3.88), and binge eating (OR: 4.25; 95% CI: 1.80 - 10.07). Regarding increased food intake, a statistical association was found with female gender (OR: 1.52; 95% CI: 1.17 - 4.02), age between 25 to 39 years (OR: 2.17; 95% CI: 1.17 - 4.02) and between 40 to 54 years (OR: 2.38; 95% CI: 1.33 - 4.28), income up to R\$8000 (OR: 2.33; 95% CI: 1.28 - 4.23), and binge eating (OR: 9.11; 95% CI: 3.13 - 26.53). Also note that

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participants who do not have children (OR: 0.64; 95% CI: 0.42 - 0.97) presented a protective factor for increasing food intake. Finally, the variables related to sociodemographic characteristics, occupational profile and general health during the COVID-19 pandemic were significantly associated with changes in professors food intake.

## Keywords

COVID-19, Mental Health, Professor, Eating Behavior

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## 1. Introduction

We are currently facing the COVID-19 pandemic. It is a respiratory infection caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that has impacted the most diverse segments of our society (Pereira et al., 2020). During the pandemic period, predicting the course of virus-related anxiety, with greater anxiety about health and risk prevention behaviors in the early stage, which decreases over time, is possible. Thus, the early stages of a pandemic cause an increase in anxiety, related to suffering and psychosocial malfunction (Coulthard et al., 2021).

Studies have shown higher levels of occurrence of psychosomatic disorders in the face of the scenario caused by the COVID-19 pandemic (Ozamiz-Etxebarria et al., 2020; Mazza et al., 2020; Moccia et al., 2020; Moreira et al., 2020; Wang et al., 2020), justified by the drastic change in lifestyle and in personal, social, and eating behaviors (Araújo et al., 2017; Steinsbekk et al., 2017). Isolation generates a stressful situation, mainly influencing the meal routine, with an increase in the number of meals, consumption of snacks, appetizing meals, and alcoholic beverages (Sumalla-Cano et al., 2022; Sidor & Rzymiski, 2020; Marty et al., 2021; Deschasaux-Tanguy et al., 2021; Sánchez-Sánchez et al., 2020; Scarmozzino & Visioli, 2020).

Unhealthy eating behaviors cause health damage, increasing the incidence of chronic non-communicable diseases. In Brazil, chronic non-communicable diseases are among the main causes of hospitalizations. Moreover, studies show that most comorbidities were associated with worsening clinical picture and increased risk of mortality of patients with COVID-19 (Steele et al., 2020; Ministério da Saúde, 2011; Williamson et al., 2020; Emami & Akbari, 2021; Gao et al., 2021).

Alongside the context of the pandemic, several professionals had their way of acting and interacting professionally altered, undergoing changes and challenges, including professors (Daniel, 2020; Araújo et al., 2020). The changes were unprecedented, which required a set of skills from professors to transition from face-to-face teaching to remote emergency education, needing immediate support and professional development for professors. In addition to the scenario and feelings of insecurity and uncertainty of the pandemic, professors adapted their teaching practice the ability to teach outside physical classrooms (Araújo et al., 2020;

Almhdawi et al., 2021; Abaci et al., 2021).

The teaching profession is linked to different levels of occupational stress, which can have consequences on physical and mental health and on quality of life. Negative eating behaviors and insufficient practice of physical activities contribute to these issues (Conceição et al., 2019; Agai-Desmjaha et al., 2015; Sanchez et al., 2019). Furthermore, evidence to evaluate the effect of blockages and restrictions linked to the COVID-19 pandemic on changes in eating behaviors among university professors is limited. This study aimed to verify the possible impacts of the pandemic scenario on the eating behavior of university professors in Brazil.

## 2. Methodology

It is an epidemiological, descriptive-exploratory, cross-sectional study involving a sample of research professors of both sexes, professionally active, from various higher education institutions in Brazil.

The research was submitted to the Research Ethics Committee Involving Human Subjects, number 36642020.3.0000.0107. All professors of public and private universities who accepted to participate in this research by signing the Informed Consent Forms were included. Participants who did not fit as professors and the duplicated answers were excluded.

Data collection occurred from October 2020 to January 2021. The professors were invited to participate in the research by e-mail; it is estimated that 8779 professors from 79 higher education institutions were invited, and the Informed Consent Forms and the link to the questionnaires were sent together.

The Sociodemographic, Economic, Working Conditions and Health data questionnaire, developed by the researchers, addresses 27 (twenty-seven) identification issues, economic situation, education, and information about professional aspects such as knowledge area, workload, and working time in the institution. Concerning health conditions, the questionnaire portrays preexisting diseases, diagnosed psychic disorders, psychological follow-up, or psychiatric and sleep.

The International Physical Activity Questionnaire—IPAQ, short version, was used to evaluate the physical activity. The IPAQ is an instrument that allows estimating the weekly time spent in physical activities of moderate and vigorous intensity in different daily contexts, namely: work, transport housework, and leisure, and also the time spent in passive activities, performed in the sitting position (Benedetti et al., 2007). For the physical activity levels classification, the IPAQ was used first (Benedetti et al., 2007). Subsequently, there was a grouping into Active and Insufficiently Active. For Active, it grouped participants classified by the IPAQ into very active and active. As for the Insufficiently Active group, those classified as irregularly active as A and B, and sedentary.

To evaluate the food intake, the researchers developed two tools. Initially, to investigate the eating behavior, the Nutritional Screening Questionnaire (NSQ) was used, containing questions about changes in weight, food intake, and bev-

erage intake.

Three instruments were used to assess nutrition. Initially, in order to investigate eating behavior, the Nutritional Screening Questionnaire, modified by the researchers was used. This questionnaire is based on the Nutritional Care Protocol for Hospitalized Patients of the University Hospital of the Federal University of Goiás, and consists of 7 (seven) questions about weight change, changes in food intake, and changes in beverage intake. In addition, the Binge Eating Scale (BES) was also used. This instrument is cited as useful for screening possible cases of binge eating and is widely used. This questionnaire consists of 16 items on a self-administered scale with an internal consistency of 0.85 (Cronbach's alpha). The instrument is answered on a scale ranging from 0 (absence of severity) to 3 (maximum severity). The final score is the result of the sum of the points for each item, with the results classified according to the score as severe binge eating disorder (score  $\geq 27$ ), moderate (score between 18 and 26) and absence of binge eating disorder (score  $\leq 17$ ) (Bolognese, 2018; França et al., 2012). Finally, in order to assess dietary intake, the Food Frequency Questionnaire was used, an instrument considered the most practical and informative method for assessing dietary intake and of great importance in epidemiological studies (Ribeiro et al., 2006). The Food Frequency Questionnaire used consists of 15 questions and was adapted by the researchers. The responses obtained from the Food Frequency Questionnaire were compared with the number of servings recommended by the Brazilian Dietary Guidelines. They were then grouped into four categories: consumption 2 to 5 times a day, consumption once a day, consumption 1 to 5 times a week, and consumption rarely or never.

Finally, the Big Five Inventory (BFI-25) was also used, an instrument composed of 25 adjectives divided into five subscales: extraversion, conscientiousness, neuroticism, agreeableness, and openness. The items are rated on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), for each adjective. Items 6, 11, and 21 were reverse-scored (1=5, 2=4, 3=3, 4=2, 5=1). Subsequently, the scores for each subscale were summed and the mean was calculated. The results were classified as low (1.0 - 2.4), medium (2.5 - 3.4), and high (3.5 - 5.0), thus reflecting the level of each of the five main personality factors (Hauck et al., 2012). For the purpose of the present analyses, each BFI-25 subscale score was dichotomized into "Yes" (trait present) or "No" (trait absent) using a median split based on the score distribution of the current sample, a decision made during the data analysis phase and not pre-registered. Specifically, participants scoring above the sample median on a given subscale were classified as "Yes" for that trait, whereas those scoring at or below the median were classified as "No."

The database was built on Microsoft Excel, version 2016, and the statistical analysis was performed on Statistical Package for the Social Sciences (SPSS)<sup>®</sup> software, version 25.0. Absolute frequencies (n) and relatives (%) were used for descriptive analyses. The bivariate associations between each independent variable and outcomes (weight gain, increased food intake, and reduced food intake) were verified

by the Pearson Chi-square test with Yates continuity correction (two categories) and linear trend (more than two categories), raw logistic regression models and adjustments were constructed to analyze the principles of each outcome variable. Initially, the variables that presented  $p < 0.20$  in the analyses (**Table 3**) were taken to the regression models, and their raw values of odds ratio (OR) and 95% confidence interval (CI 95%) were presented (Model 1). Afterward, the adjusted model (Model 2) was constructed considering the inclusion of all significant ( $p < 0.05$ ) variables together. The exception was the model for reduction in food consumption that had only one variable associated (sleep problems); thus precluding the multivariate model.

### 3. Results

Of the 525 questionnaire responses received, 519 professors from 48 higher education institutions met the inclusion criteria and, of these, four were excluded, one duplicate response, one retired individual, and two self-employed individuals; the final analytical sample comprised 515 professors ( $n = 515$ ).

The general characteristics of the sample of professors are presented in **Table 1**. The majority of participants were female, aged between 40 and 45 years, from the South and Northeast of the country, from the area of knowledge of Health Science, Human Science and Applied Social Science, with weekly workload greater than 40 hours, working as professors for 5 to 14 years.

**Table 2** shows the factors associated with weight gain, increased food intake, and reduced food intake. Most female participants, aged between 40 and 45 years, and with family income between R\$8001.00 and R\$16,000.00 were associated with weight gain and increased food intake during the pandemic. On the other hand, the variables of children, psychological problems prior to the pandemic period, and neuroticism profile were associated with the outcomes of weight gain and increased food intake, indifferent to the affirmative or negative response. Moreover, reduced food intake during the pandemic was associated only with sleep problems.

**Table 1.** General characterization of the sample of professors during the COVID-19 pandemic ( $n = 515$ ).

Variable	n	%
<b>Sex</b>		
Female	327	63.5
Male	188	36.5
<b>Age</b>		
25 to 39 years	182	35.3
40 to 54 years	241	46.8
55 years or more	92	17.9
<b>Regions of country</b>		

## Continued

South	258	51.0
Northeast	216	42.7
Midwest	14	2,8
North	11	2.2
Southeast	7	1.4
<b>Area of knowledge</b>		
Health Science	164	32.0
Human Science	93	18.1
Applied Social Science	85	16.6
Exact Science and Earth Science	50	9.7
Agrarian Science	48	9.4
Biological Science	31	6.0
Engineering	27	5.3
Linguistics, Letters and Arts	15	2.9
<b>Workload</b>		
0 - 39 h	53	10.3
40 h or more	463	89.7
<b>Time in higher education</b>		
0 - 4 years	98	19.0
5 - 14 years	206	39.9
15 - 24 years	157	30.4
25 years or more	55	10.7

**Table 2.** Factors associated with weight gain, increased food intake, and reduced food intake during the pandemic.

Variable	Weight gain		Increase in food intake		Reduction in food intake	
	n	%	n	%	n	%
<b>Total</b>	258	50.0	243	47.1	103	20.0
<b>Gender</b>						
Male (n = 188)	77	41.0	73	38.8	44	23.4
Female (n = 327)	180	55.0	170	52.0	59	18.0
<b>Age</b>						
25 to 39 years (n = 182)	89	48.9	93	51.1	36	19.8
40 to 54 years (n = 241)	134	55.6	124	51.1	46	19.1
55 years or over (n = 92)	35	38.0	26	28.3	21	22.8
<b>Marital status</b>						
Married (n = 350)	179	51.1	166	47.4	63	18.0

## Continued

Others (n = 166)	79	47.6	77	46.4	40	24.1
<b>Household income</b>						
Up to R\$8000 (n = 98)	<b>58</b>	<b>59.2</b>	<b>57</b>	<b>58.2</b>	21	21.4
From R\$8,001 to R\$16,000 (n = 244)	<b>123</b>	<b>50.4</b>	<b>115</b>	<b>47.1</b>	51	20.9
More than R\$16,000 (n = 162)	<b>72</b>	<b>44.4</b>	<b>67</b>	<b>41.4</b>	30	18.5
<b>Children</b>						
Yes, they live together (n = 246)	<b>137</b>	<b>55.7</b>	<b>128</b>	<b>52.0</b>	42	17.1
No, or they do not live together (n = 270)	<b>121</b>	<b>44.8</b>	<b>115</b>	<b>42.6</b>	61	22.6
<b>Previous psychological problems</b>						
No (n = 334)	<b>151</b>	<b>45.2</b>	<b>140</b>	<b>41.9</b>	65	19.5
Yes (n = 182)	<b>107</b>	<b>58.8</b>	<b>103</b>	<b>56.6</b>	38	20.9
<b>Extraversion</b>						
No (n = 240)	115	47.9	105	43.8	55	22.9
Yes (n = 258)	135	52.3	129	50.0	45	17.4
<b>Socialization</b>						
No (n = 261)	137	52.5	127	48.7	53	20.3
Yes (n = 252)	119	47.2	115	45.6	49	19.4
<b>Conscientiousness</b>						
No (n = 283)	144	50.9	138	48.8	58	20.5
Yes (n = 225)	110	48.9	102	45.3	42	18.7
<b>Neuroticism</b>						
No (n = 264)	<b>122</b>	<b>46.2</b>	<b>112</b>	<b>42.4</b>	44	16.7
Yes (n = 241)	<b>133</b>	<b>55.2</b>	<b>129</b>	<b>53.5</b>	56	23.2
<b>Openness</b>						
No (n = 274)	147	53.6	136	49.6	50	18.2
Yes (n = 234)	108	46.2	106	45.3	50	21.4
<b>Physical activity</b>						
Active (n = 258)	123	47.7	115	44.6	48	18.6
Insufficiently active (n = 258)	135	52.3	128	49.6	55	21.3
<b>Sleep problems</b>						
No (n = 212)	96	45.3	<b>81</b>	<b>38.2</b>	<b>33</b>	<b>15.6</b>
Yes (n = 304)	162	53.3	<b>162</b>	<b>53.3</b>	<b>70</b>	<b>23.0</b>
<b>Binge eating</b>						
No (n = 435)	<b>210</b>	<b>48.3</b>	<b>191</b>	<b>43.9</b>	86	19.8
Yes (mild) (n = 37)	<b>30</b>	<b>81.1</b>	<b>33</b>	<b>89.2</b>	6	16.2

**Note.** Bold values indicate  $p < 0.05$  (chi-square test).

**Table 3** shows the regression models on the associations of weight gain and increase in food intake. Regarding weight gain, female gender, age between 40 and 54 years, income, and binge eating, even with the adjustment for family income (Model 2) maintained statistical significance.

Regarding the increased food intake, female gender, age 25 to 39 years and 40 to 54 years, income, and binge eating maintained statistical significance even after adjustment. Also note that participants who do not have children (OR: 0.64; 95% CI: 0.42 - 0.97) presented a protective factor for increasing food intake.

**Table 3.** Association of weight gain and increased food intake in university professors during the COVID-19 pandemic.

Variable	Weight gain		Increase in food intake	
	Model 1	Model 2	Model 1	Model 2
<b>Gender</b>				
Male	1	1	1	1
Female	1.77 (1.23 - 2.54)	<b>1.67 (1.13 - 2.49)</b>	1.71 (1.18 - 2.46)	<b>1.52 (1.17 - 4.02)</b>
<b>Age</b>				
25 to 39 years	1.56 (0.93 - 2.60)	1.08 (0.61 - 1.92)	2.65 (1.55 - 4.55)	<b>2.17 (1.17 - 4.02)</b>
40 to 54 years	2.04 (1.25 - 3.34)	<b>1.88 (1.10 - 3.23)</b>	2.69 (1.60 - 4.52)	<b>2.38 (1.33 - 4.28)</b>
55 years or over (n = 92)	1	1	1	1
<b>Household income</b>				
Up to R\$8000	1.81 (1.09 - 3.01)	<b>2.18 (1.23 - 3.88)</b>	1.97 (1.19 - 3.28)	<b>2.33 (1.28 - 4.23)</b>
R\$8001 to R\$16,000	1.27 (0.85 - 1.89)	1.42 (0.92 - 2.20)	1.26 (0.85 - 1.89)	1.40 (0.89 - 2.20)
More than R\$16,000	1	1	1	1
<b>Children</b>				
Yes, they live together	1	---	1	1
No, or they do not live together	0.65 (0.46 - 0.92)	---	0.68 (0.48 - 0.97)	<b>0.64 (0.42 - 0.97)</b>
<b>Previous psychological problems</b>				
No	1	---	1	---
Yes	1.73 (1.20 - 2.49)	---	1.81 (1.25 - 2.60)	---
<b>Neuroticism</b>				
No	1	---	1	---
Yes	1.43 (1.01 - 2.04)	---	1.56 (1.10 - 2.22)	---

## Continued

## Sleep problems

No	---	---	1	---
Yes	---	---	1.85 (1.29 - 2.64)	---

## Binge eating

No	1	1	1	1
Yes (mild)	4.59 (1.98 - 10.69)	<b>4.25</b> <b>(1.80 - 10.07)</b>	10.54 (3.67 - 30.26)	<b>9.11</b> <b>(3.13 - 26.53)</b>

**Note.** The values are presented as odds ratio (OR) and 95% confidence interval (95% CI); Model 1: gross; Model 2: adjusted for the variables that made up the final model.

## 4. Discussion

This study aimed to verify the possible impacts of the pandemic scenario on the eating behavior of university professors and the association with weight gain, increased food intake, and reduced food intake. The findings indicate that professors aged 40 to 54 years, with income of up to R\$8000 and experience binge eating, had increased food intake and body weight. Whereas professors who presented reduced food intake were associated with sleep problems. The study confirms the initial hypothesis that eating behavior changed during the COVID-19 pandemic.

The results indicate that women underwent greater changes in food intake and, consequently, greater weight gain. Similar data were found in the literature, such as studies conducted in the USA, Norway, Brazil, Italy, and Spain, where food intake in females was higher when compared with males due to women being more prone to emotional eating, consistent with the literature (Sumalla-Cano et al., 2022; Park et al., 2022; Durães et al., 2020; Bemanian et al., 2020; Di Renzo et al., 2020).

A hypothesis raised by the studies relates to food restriction with gender difference. Dietary restriction is related to cognitive effort in controlling food and calorie intake, as in the case of diets. In general, women have a greater dietary restriction since they tend more to go on diets when compared with men. Moreover, some experimental studies have shown that women who diet tend to eat more when exposed to stress or negative emotions when compared with those who do not diet, thus suggesting that dieting can be a trigger for emotional eating (Bemanian et al., 2020; Di Renzo et al., 2020; Camilleri et al., 2014; Peneau et al., 2013; Klem et al., 1990; Van Strien, 2018).

Regarding age, the findings indicate that individuals aged between 40 and 54 years are more associated with increased food intake and weight gain and age between 25 and 39 years associated with increased food intake. A study conducted in Italy (Di Renzo et al., 2020) showed that a greater control in excess food intake was associated with lower age, corroborating the data found. However, we found contrary data in a study conducted in Brazil and the USA, where individuals over 41 years of age were less likely to change food intake than young adults (Park et

al., 2022; Durães et al., 2020).

Socioeconomic status, lower than R\$8000, showed an association with increased body weight and food intake, which may be related to the worsening of food insecurity during the pandemic, due to the increase in the cost of food. The literature has similar data, such as in a study conducted with teachers from the basic school system in Brazil which showed an association between income from 3 to 5 minimum wages and higher chances of increasing the consumption of sweets and soft drinks and/or artificial juice (Durães et al., 2020). In Chile, individuals with medium socioeconomic status were associated with increased body weight (Reyes-Olavarria et al., 2020). Lower income was associated with a higher consumption of snacks, desserts, and unhealthy beverages in the USA. In addition, psychological distress was correlated with emotional eating and higher consumption of high-sugar foods and beverages in Norway (Park et al., 2022; Bermanian et al., 2020).

The food insecurity scenario worsened among low-income families, who were already struggling with food insecurity before the pandemic, due to the economic impacts of the COVID-19 pandemic, such as decreased family income, fewer resources, and/or less flexibility in their jobs (Wolfson & Leung, 2020; Park et al., 2022). The propensity to obesity has a strong correlation with economic disadvantages in developing countries. In particular, lower socioeconomic levels seem to affect body weight by increasing psychological distress and emotional eating (Sobal & Stunkard, 1989; Spinosa et al., 2019; Cecchetto et al., 2021).

Weight gain and increased food intake had a strong association with binge eating. Several studies found the same results, with emotional feeding increasing significantly with a higher level of negative emotions, such as anxiety and depression, and with higher body mass index (Nguyen-Rodriguez et al., 2008; Geliebter & Aversa, 2003; Goossens et al., 2009). A study conducted in Italy, during the social restriction of the COVID-19 pandemic, observed that the feeling of hunger and satiety changed for more than half of the population, and 34.4% of the respondents had more appetite, whereas 17.8% of respondents had less appetite (Di Renzo et al., 2021). Thus, behaviors associated with emotional eating are strictly related to stressful life events and perceived life stress (Klatzkin et al., 2019; Michels et al., 2020; O'Connor et al., 2008; Kuijer & Boyce, 2012; Bermanian et al., 2020; Ozamiz-Etxebarria et al., 2020).

The possible association of certain eating behaviors with overweight and the possibility of repercussions of the pandemic, such as staying at home for longer periods, stress, and anxiety regarding health, triggering episodes of eating disorders in vulnerable individuals is known. The short- and long-term implications of having or developing an eating disorder concomitantly with COVID-19 are unknown, and this will likely become more apparent over the years (Coulthard et al., 2021; Touyz et al., 2020).

Among the limitations of this study, the data collection performed over the Internet covered the beginning of the first wave of cases in the country. It had unequal participation in the sample by region since underreporting occurred due to

self-reported questionnaires. However, the sample size was adequate. The strong point of the study was the evaluation of university professors from Brazil, and we have found no other studies with this public to date.

## 5. Conclusion

Given the above, the pandemic evidently affected negatively the food intake of university professors, especially women, aged 40 to 54 years, with an income of less than R\$8000, and who experience binge eating. The worsening of mental health during the pandemic, thus influencing food intake, is known. Therefore, effective public policies are needed to support these individuals, with multidisciplinary care of health professionals and strategies to ensure the right of the entire population to food security.

Finally, we can observe that professors were significantly impacted during the pandemic period. However, further studies, addressing the nutrition and health of university professors, are needed.

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## Authors' Contributions

All authors were involved in the conception and planning of the review. K.B., A.P.V., L.E.D.F., and D.M.B. developed the search strategy. K.B. conducted the searches. K.B., C.D., G.S., A.P.V., D.M.B., G.W.W., L.E.D.F., and D.R.P.S. were responsible for completing data extraction, quality assessment, and data analysis. K.B. and D.M.B. drafted the initial manuscript, and all authors commented on previous versions of the manuscript. All authors reviewed and approved the manuscript prior to submission.

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## Conflicts of Interest

All authors certify that they have no affiliations or involvement in any organization or entity with any financial or non-financial interest in the subject matter or

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