

Association between common mental disorders and dietary intake among university students doing health-related courses

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Abstract *The objective of this study was to determine the association between common mental disorders (CMD) and dietary intake among Brazilian undergraduate students doing health-related courses. We interviewed 432 students enrolled at a public university in Fortaleza, the capital of the State of Ceará, between April and December 2018. The students were screened for CMD using the Self-Reporting Questionnaire (SRQ-20). Food consumption and physical activity were assessed using a 24-hour dietary recall and the International Physical Activity Questionnaire short form (IPAQ-SF), respectively. We used linear regression to measure the association between energy and nutrient intake and positive screening for CMD. The models were adjusted for age, gender and physical activity. Overall prevalence of CMD was 44.5% and the rate was higher in women than in men. Individuals who screened positive for CMD practiced less physical activity and reported higher mean intake of added sugar and saturated fat and lower mean fiber intake, regardless of age, gender, and level of physical activity. Our findings show that the prevalence of CMD among undergraduate students doing health-related courses was high and that the presence of potential CMD was associated with higher intake of added sugar and saturated fats and lower fiber intake.*

Key words *Mental disorders, Students, Food consumption, Lifestyle*

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Introduction

University students face a number of challenges encompassing not only academic stressors, but also social, affective, and psychological circumstances, making them prone to mental illness¹. Common mental disorders (CMD) are characterized by difficulty concentrating and making decisions, insomnia, irritability, fatigue, and somatic complaints such as headaches, loss of appetite, trembling, and indigestion², and can have a direct negative influence on academic performance and quality of life³.

International studies have shown that the prevalence of CMD among university students is high, ranging from 28.8% and 44.7%⁴, while studies conducted in Brazilian universities with students doing health-related courses reported rates ranging from 31.5% and 44.9%^{5,6}. Common academic related stressors include sleep loss, feelings of despair and helplessness, difficulty making new friends, shyness, excessive fear, and depression⁷.

The diet of university students is generally high in energy and added sugars and sodium, due to the frequent consumption of snacks sold in campus canteens such as fast foods, potato chips, cakes, pies, and sugary drinks, and fruit and vegetable intake below the recommended levels^{8,9}. The choice to eat practical foods with little or no essential nutrients is often related to living away from the family and lack of self-care¹⁰.

Evidence suggests that an adequate diet may be a protective factor against the development or exacerbation of CMD symptoms¹¹. Considering the physical, psychological, and social pressures of college and the possible relationship between dietary factors and mental disorders, this study aims to identify the association between the development of CMD and energy, added sugar, and sodium intake among university students doing health-related courses.

Methodology

We conducted a cross-sectional study with students of both sexes at a public university in Fortaleza, the capital of the State of Ceará. This study is part of a larger study called "*Promoção de saúde na população jovem: qual o papel da Universidade?*" ("Health promotion among young people: what is the role of Universities?").

The sample consisted of students on courses at the university's Health Sciences Center. Sample

size was calculated using Cochran's finite population formula¹² based on a prevalence of excess weight of 50%, which is close to the national prevalence rate¹³, to maximize sample size, a 95% confidence interval, maximum margin of error of 5%, non-response rate of 20%, and the total number of students enrolled in the first semester of 2018 (1,490 students), resulting in a minimum sample of 381 students. Participants were selected using convenience sampling in a number proportional to the number students enrolled on each course.

Students who were not enrolled at the time of data collection and those aged under 18 years were not considered eligible. Individuals who did not fully complete the questionnaires were excluded.

The data were collected between April and December 2018 by a trained team made up of a psychologist, nutritionist, and nutrition academics using a questionnaire devised to collect information on sociodemographic characteristics (sex, age, race/skin color, family income, civil status, course, and semester) and lifestyle (physical activity, alcohol consumption, smoking, and excess weight). For analysis purposes, certain variables were categorized as follows: race (white and other), age (≤ 21 years and > 21 years), semester (beginning ≤ 4 th and end ≥ 5 th), family income (≤ 3 minimum salaries and > 3 minimum salaries), and marital status (single and other).

Physical activity was assessed using the International Physical Activity Questionnaire short form (IPAQ-SF)¹⁴. The IPAQ-SF consists of questions concerning activities undertaken in the last seven days before the administration of the questionnaire. The students were subsequently classified according to the criteria developed by the IPAQ Coordinating Center in Brazil¹⁵ as follows: very active – individuals who met the recommendations of vigorous activity five or more days per week for at least 30 minutes per session, or vigorous activity three or more days per week for at least 20 minutes per session plus moderate activity and/or walking five or more days per week for at least 30 minutes per session; active – individuals who met the recommendations of vigorous activity three or more days per week for at least 20 minutes per session, or moderate activity and/or walking five or more days per week for at least 30 minutes per session, or any other activity (vigorous, moderate, and/or walking) accrued over five or more days in the week for 150 minutes or more per week; and irregularly active – individuals who practiced physical ac-

tivity, but did not meet the above criteria. The latter are classified as follows: irregularly active A – individuals who practiced physical activity at least five days in the week or for 150 minutes per week; irregularly active B – individuals who did not meet the recommended frequency or duration; or sedentary: individuals who did not practice physical activity for at least 10 continuous minutes during the week. For the statistical analysis, the students were categorized as inactive (sedentary) and active (highly active, active, and irregularly active).

The students were screened for CMD using the Self-Reporting Questionnaire (SRQ-20)¹⁶, which consist of 20 dichotomous items, where the responses “yes” and “no” are assigned scores of one and zero, respectively. The presence or absence of potential CMD is determined based on the sum of the affirmative responses, where a score greater than or equal to seven indicates that the individual “has potential for CMD”. For analysis purposes, the variable was dichotomized as “without potential for CMD” and “with potential for CMD”.

Diet was assessed using a 24-hour dietary recall (24HR) administered on a week or weekend day using the multiple-pass method. The data were entered using the software used by the *Estudo de Riscos Cardiovasculares em Adolescentes – ERICA*¹⁷ (Study of Cardiovascular Risks in Adolescents), whose database is the same as that developed by the Brazilian Institute of Geography and Statistics (IBGE) for the 2008/2009 National Food Survey. Nutrient intake was adjusted using the residual method proposed by Willett¹⁸. For the analysis of intra-individual variance in dietary intake among students, we used the adjusted means of energy, carbohydrate, lipid, protein, fiber, sodium, and added sugar intake.

The numerical and categorical variables were described using means and standard deviations and percentages, respectively. Symmetry of distribution was tested using the Kolmogorov-Smirnov test. All skewed distributions were transformed into logarithms. Individuals with and without potential for CMD were compared using the chi-squared test and differences in adjusted means of energy and nutrient intake between the groups were assessed using Student's t-test.

The association between energy and nutrient intake and potential for CMD was measured using linear regression. The models were applied separately for each nutrient (carbohydrate, proteins, total fat, saturated fat, fiber, added sugar,

and sodium) and energy. The models were adjusted initially for age and sex and then for age, sex, and physical activity. The analyses were performed using the SAS software online version, adopting a significance level of 0.05.

This study was approved by Ceará State University's Research Ethics Committee and all participants signed an informed consent form.

Results

Thirty of the 432 students selected to participate in the study were excluded because they did not fill in the questionnaire completely. The remaining 402 students were aged between 18 and 60 years (average age = 21.3 years, SD = 3.2), 64.4% (n=259) were female, 66.4% (n= 267) non-white, 11.9 % showed excess weight, 24,6% were classified as active, and 74.6% had a family income of ≤ 3 minimum salaries.

The prevalence of positive screening for CMD was 44.5% and the median SRQ-20 score was 6. The prevalence of positive screening for CMD was greater in women than in men (53.3% versus 28.7%, $p < 0.001$) and was highest in nursing students (56.9%), followed by nutrition (43,4%), physical education (40.8%), and biological sciences (40%) students. The course that showed the lowest prevalence of positive screening for CMD was medicine, with 34.7% of students screening positive (Table 1).

The prevalence of physical inactivity was higher among individuals with potential for CMD than in those without (45.8% versus 33.2%). This difference was statistically significant (Table 1).

Mean added sugar intake in the overall sample was 78.8 g/day. Individuals with potential for CMD showed higher added sugar and saturated fat intake (90.2 g/day versus 71.2 g/day and 29.7 g/day versus 27.5 g/day, respectively) and lower fiber and sodium intake (15.1 g/day versus 17.3 g/day and 1,629.1 mg/day versus 1,853.6 mg/day, respectively) than those without potential for CMD. These differences were statistically significant (Table 2).

A direct association was observed between CMD and saturated fat and added sugar intake. However, the association between CMD and saturated fat intake lost its significance after adjusting for age, sex, and physical activity (Table 3). The association between CMD and fiber and sodium intake was negative, regardless of age, sex, and level of physical activity.

Discussion

Our findings show that almost half of the study participants screened positive for CMD. Studies in other regions of the country found similar results, reporting prevalence rates ranging from 31.5% to 44.9% among students doing health-related courses^{5,19} and a rate of 40% in students from other areas⁶. Other studies in Brazil with students doing health-related courses also found that the prevalence of CMD was higher in women^{20,21}. Factors that may explain increased prevalence among women include sex differences in neuronal function linked to mood and anxiety, greater exposure to psychosocial stressors in women, and gender inequalities^{22,23}.

Frequency of physical activity was lower in individuals with potential for CMD. In this regard, physical activity has been shown to have

a protective effect against symptoms of CMD²⁴. Studies also show that regular physical activity has a positive effect on mood, anxiety and depression, while inactivity has been shown to be a risk factor for the development of depressive symptoms^{25,26}.

Our findings also show that individuals with potential for CMD showed higher added sugar and saturated fat intake and lower fiber and sodium intake and a direct association between CMD and added sugar intake. Mean sugar intake was 78.8g/day, which is equivalent to 15.8% of the total energy intake of a 2,000-calorie diet, exceeding the daily intake rate recommended by the World Health Organization (WHO)²⁷ by over 10%. These results are similar to those found by Fernandes *et al.* (2016)⁹, who reported a mean added sugar intake of 69.21 g/day among university students doing health-related courses.

Table 1. Sociodemographic and lifestyle characteristics of students doing health-related courses at a public university and screening for common mental disorders. Fortaleza, Ceará. 2018.

Variable	Total (n)	Potential for common mental disorders		p-value
		No (%)	Yes (%)	
Sex				
Male	143	45.7	22.9	≤ 0.01
Female	259	54.3	77.1	
Age group				
≤ 21 years	246	61.4	60.9	0.9
> 21 years	156	38.6	39.1	
Course				
Biological sciences	55	14.8	12.3	0.05
Physical education	120	31.8	27.4	
Nursing	102	19.7	32.4	
Medicine	49	14.4	9.5	
Nutrition	76	19.3	18.4	
Semester				
Beginning (≤ 4th)	222	56.5	53.6	0.5
End (≥ 5th)	180	43.5	46.4	
Family income per capita				
≤ 3 minimum salaries	259	73.8	75.6	0.7
> 3 minimum salaries	88	26.2	24.4	
Race/skin color				
White	135	30.5	37.4	0.1
Other	267	69.5	62.6	
Civil status				
Single	382	96.0	93.9	0.8
Other	20	4.0	6.2	
Physical activity				
Inactive	156	33.2	45.8	≤ 0.01
Active	246	66.8	54.2	

Source: Author's elaboration.

Table 2. Mean energy and nutrient intake among students doing health-related courses at a public university according to screening for common mental disorders. Fortaleza, Ceará, 2018.

Energy or Nutrient*	Total	Potential para common mental disorders		p-value
		No	Yes	
Energy (g/day)	2,311.3	2,363.5	2,231.2	0.2
Carbohydrates (g/day)	272.1	273.3	271.9	0.8
Added sugar (g/day)	78.8	71.2	90.2	≤ 0.01
Fiber (g/day)	16.5	17.3	15.1	≤ 0.01
Total fats (g/day)	74.9	73.6	77.1	0.07
Saturated fats (g/day)	28.1	27.5	29.7	0.03
Proteins (g/day)	92.0	93.1	88.2	0.1
Sodium (mg/day)	1,742.5	1,853.6	1,629.1	0.04

*Nutrients adjusted for total energy intake.

Source: Author's elaboration

Table 3. Linear regression coefficients (β) demonstrating the association between energy and nutrient intake and potential for common mental disorders among students doing health-related courses at a public university. Fortaleza, Ceará, 2018.

Energy or Nutrient	Crude model (β)	Model adjusted for age and sex (β)	Model adjusted for age, sex and physical activity (β)
Energy (kcal/day)	-132.3	2.4	-16.0
Carbohydrates (g/day)	-1.4	-0.9	-1.5
Added sugar (g/day)	19.0*	16.2*	16.0*
Fiber (g/day)	-2.2*	-1.9*	-1.9*
Total fats (g/day)	3.5	2.7	2.6
Saturated fats (g/day)	2.2*	1.7	1.7
Proteins (g/day)	-5.0	-4.6	-4.0
Sodium (mg/day)	-224.5	-272.6*	-276.8*

* p-value ≤ 0.05.

Source: Author's elaboration

A study investigating constipation and associated factors among students doing health-related courses reported that 14.6% of respondents had constipation and almost half ate out of home, opting for ready snacks and fast food. This eating behavior was shown to be associated with high workload and, primarily, academic stress, contributing to lower intake of fiber and other nutrients⁸.

The biological response to stressors produces distinct reactions among different individuals, including increased appetite^{8,28}. These conditions can contribute to unhealthy eating behaviors, in-

cluding increased consumption of fast food and ready meals and snacks, skipping meals, and eating less²⁹.

A study investigating emotional state and eating behavior among 54 female university students reported that nutrition and pharmacy students ate sweet foods when they felt stressed (23% and 43%, respectively) and anxious (27% and 43%, respectively)³⁰. Research conducted with 3,706 university students in the United Kingdom reported a positive association between levels of stress and consumption of snacks and fast food³¹. However, a study that assessed food

consumption in university students did not find any association between consumption of total energy and macronutrients and stress levels, but found that the consumption of savory snacks, ready snacks, and fast food was more frequent among students with higher levels of stress³².

The literature shows that the following situations may trigger stress among university students: leaving home, sharing accommodation with new people, trying to meet their own and their parents' expectations, difficulty organizing time, sleep deprivation, difficulty reconciling work and/or study and household chores, intense study routines, stressors particular to each course, and worrying about being able to finish the course and getting a job after finishing their studies³³. These pressures make university students more prone to emotional imbalances such as stress and anxiety and can ultimately lead to academic failure³⁴.

In light of the above, special attention should be paid to the high prevalence of CMD among university students, some of whom will be future health professionals. In this respect, it is essential that health professionals have good mental

health in order to perform the role of carer and health promoter effectively and efficiently^{3,35}.

This study has some limitations. First, cross-sectional studies are limited in their ability to determine the cause-and-effect relationship between variables. Second, the psychiatric screening questionnaire used by this study is subject to categorization bias, since a variety of cut-off points may be adopted for positive screening. However, to correct for possible errors, we followed the recommendation of Mari and Williams¹⁶ for the Brazilian version of the instrument, adopting a cut-off point of seven affirmative answers for positive screening for CMD.

Conclusion

Our findings show that the prevalence of potential CMD among public university students was high and that the presence of potential CMD was associated with being female, physical inactivity, increased intake of added sugar and saturated fats, and lower fiber intake.

Collaborations

AR Sousa was responsible for the conception and design of the research, performed the collection, typing, analysis, interpretation of data and the writing of the text. DM Reis was responsible for the conception and design of the research; performed the collection, typing, analysis, interpretation of data and the writing of the text. TM Vasconcelos performed in the interpretation of data and in writing and revision of the final version of the manuscript. APV Abdon coordinated the research, participated in the analysis and interpretation of data and in writing and reviewing the final version of the manuscript. SP Machado coordinated the research, participated in the analysis and interpretation of data and in writing and reviewing the final version of the manuscript. IN Bezerra coordinated the research, participated in the analysis and interpretation of data and in writing and reviewing the final version of the manuscript.

References

1. Auerbach RP, Alonso J, Cuijpers P, Ebert DD, Hasking P, Nock MK, Stein DJ, Kessler RC, Zaslavsky AM, Mortier P, Bruffaerts R, Benjet C, Demyttenaere K, Gree JG, Murray E, Pinder-Amaker S, Sampson NA, Vilagut G. WHO World Mental Health Surveys International College Student Project: Prevalence and distribution of mental disorders. *J Abnorm Psychol* 2018; 127(7):623-638.
2. Goldberg D, Huxley P. *Common mental disorders: a bio-social model*. 1ª Edição. London: Tavistock/Routledge; 1992.
3. Ansolin AGA, Rocha DLB, Santos RP, Pozzo VCD. Prevalência de transtorno mental comum entre estudantes de psicologia e enfermagem. *Arqui Cien Saude* 2015; 22(3):42-45.
4. Haile YG, Alemu SM, Habtewold TD. Common mental disorder and its association with academic performance among Debre Berhan University students, Ethiopia. *Int J Ment Health Syst* 2017; 11(34):02-11.
5. Pacheco JP, Giacomini HT, Tam WW, Ribeiro TB, Arab C, Bezerra IM, Pinasco Gustavo C. Mental health problems among medical students in Brazil: a systematic review and meta-analysis. *Braz J Psychiatry* 2017; 39(4):369-378.
6. Silva AO, Neto JLC. Associação entre níveis de atividade física e transtorno mental comum em estudantes universitários. *Motri* 2014; 10(1):49-59.
7. Perini JP, Delanogare E, Souza SA. Transtornos mentais comuns e aspectos psicossociais em universitários do sul do Brasil. *Vitalle-RevCienSaude* 2019; 31(1):44-51.
8. Deliens T, Clarys P, Bourdeaudhuij I, Deforche B. Determinants of eating behaviour in university students: A qualitative study using focus group discussions. *BMC Public Health* 2014; 14(53):1-12.
9. Fernandes DPS, Cândido FG, Rocha JLM, Reis VG, Souza ECG, Duarte MSL. Ingestão de açúcar de adição por estudantes da área da saúde em uma instituição de ensino de Viçosa, Brasil. *Mundo Saude* 2016; 40(1):94-105.
10. Silva DAS, Petroski EL. The simultaneous presence of health risk behaviors in freshman college students in Brazil. *J Community Health* 2012; 37(3):591-598.
11. Deasy C, Coughlan B, Pironom J, Jourdan D, Mannix-Mcnamara P. Psychological Distress and Coping amongst Higher Education Students: A Mixed Method Enquiry. *PloS One* 2014; 9(12):1-23.
12. Cochran WG. *Sampling Techniques*. 3. Edição. Nova York: John Wiley; 1977.
13. Instituto Brasileiro de Geografia e Estatística (IBGE). *Pesquisa de Orçamentos Familiares - POF 2008 - 2010. Antropometria e Estado Nutricional de Crianças, Adolescentes e Adultos no Brasil*. Rio de Janeiro: IBGE; 2010.
14. Matsudo S, Araújo T, Marsudo V, Andrade D, Andrade E, Oliveira LC, Braggion G. Questionário Internacional de Atividade Física (IPAQ): Estudo de validade e reprodutibilidade no Brasil. *Rev Bras Ativ Fis Saúde* 2001; 6(2):5-18.
15. Centro Coordenador do IPAQ no Brasil. *Classificação e avaliação do nível de atividade física*, 2007. [acessado 19 fev 2020]. Disponível em: <https://celafiscs.org.br/articles/>.

16. Mari JJ, Williams P. A validity study of a psychiatric screening questionnaire (SRQ-20) in primary care in the city of Sao Paulo. *J Bras Psiquiatr* 1986; 22(2):6-23.
17. Barufaldi LA, Abreu GA, Veiga GV, Sichieri R, Kuschnir MCC, Cunha DB, Pereira RA, Bloch KV. Programa para registro de recordatório alimentar de 24 horas: aplicação no Estudo de Riscos Cardiovasculares em Adolescentes. *Rev Bras Epidemiol* 2016; 19(2):464-468.
18. Willett WC, Howe GR, Kushi LH. Adjustment for total energy intake in epidemiologic studies. *Am J Clin Nutr* 1997; 65(4 Supl.):1220S-1231S.
19. Graner KM, Moraes ABAd, Torres AR, Lima MCP, Rolim GS, Ramos-Cerqueira ATA. Prevalence and correlates of common mental disorders among dental students in Brazil. *PLoS ONE* 2018; 13(9):e0204558.
20. Silva PLBC, Silva BFF, Chagas KKAR, Tortola MBA, Caldeira RLR. Transtorno mental comum entre estudantes de enfermagem e fatores envolvidos. *Ver Enferm Cent-Oeste Min* 2019; 9:3.191-3.197.
21. Sakae TM, Padão DL, Jordana LK. Sintomas depressivos em estudantes da área da saúde em uma universidade no sul de Santa Catarina - UNISUL. *Rev AMRIGS* 2010; 54(1):38-43.
22. Patel V, Araya R, Lima M, Ludermir A, Todd C. Women, poverty and common mental disorders in four restructuring societies. *Soc Sci Med* 1999; 49(11):1.461-1.471.
23. Joel D, Berman Z, Tavor I, Wexler N, Gaber O, Stein Y, Shefi N, Pool J, Urchs S, Margulies DS, Liem F, Hänggi J, Jäncke L, Assaf Y. Sex beyond the genitalia: the human brain mosaic. *PNAS* 2015; 112(50):15.468-15.473.
24. Harvey SB, Hotopf M, Øverland S, Mykletun A. Physical activity and common mental disorders. *British J Psychiat* 2010; 197(5):357-364.
25. Rimer J, Dwan K, Lawlor DA, Carolyn AG, Marion MM, Wendy M, Gillian EM. Exercise for depression. *Cochrane Database Syst Rev* 2012; (7):CD004366.
26. Schuch FB, Vancampfort D, Richards J, Rosenbaum S, Ward PB, Stubbs B. Exercise as a treatment for depression: A meta-analysis adjusting for publication bias. *J Psychiatr Res* 2016; 77:42-51.
27. Organização Mundial de Saúde (OMS). *Ingestão de açúcares por adultos e crianças*. Genebra: OMS; 2015. [acessado 2020 fev 19]. Disponível em: https://www.paho.org/bra/images/stories/GCC/ingestao%20de%20acucare%20por%20adultos%20e%20criancas_portugues.pdf?ua=1.
28. Wallis DJ, Hetherington MM. Emotions and eating. Self-reported and experimentally induced changes in food intake under stress. *Appetite* 2009; 52(2):355-362.
29. Choi J. Impact of Stress Levels on Eating Behaviors among College Students. *Nutrients* 2020; 12(5):1.241.
30. Pereira TC, Sousa FGA, Moreira AS, Santos JL, Patrício AMD, Bueno MM. Estado emocional e comportamento alimentar de universitárias de uma instituição de ensino particular. *Rev E-ciência* 2019; 7(1):16-20.
31. El Ansari W, Adetunji H, Oskrochi R. Food and mental health: relationship between food and perceived stress and depressive symptoms among university students in the United Kingdom. *Cent Eur J Public Health* 2014; 22(2):90-97.
32. Penaforte FRO, Matta NC, Japur CC. Associação entre estresse e comportamento alimentar em estudantes universitários. *Demetra* 2016; 11(1):225-237.
33. Vasconcelos-Raposo J, Soares AR, Fernandes MG, Teixeira CM. Níveis de ideação suicida em jovens adultos. *Estud psicol* 2016; 22(2):345-354.
34. El Ansari W, Berg-Beckhoff G. Nutritional correlates of perceived stress among university students in Egypt. *Int J Environ Res Public Health* 2015; 12(11):14.164-14.176.
35. Araújo AHI. *Influências de quadros de ansiedade e depressão no consumo alimentar em adultos jovens saudáveis* [dissertação]. Brasília: Universidade de Brasília; 2017.

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