

Food Consumption Patterns, Breakfast, Meals with Family and Associations with Common Mental Disorders in Adolescents: A School-Based Cross-Sectional Study

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Abstract

Background

Adolescence is a period of transition and vulnerabilities, in which mental illnesses can develop more easily. The objective of this work is to verify the association between food consumption patterns and the presence of Common Mental Disorders in Brazilian adolescents.

Methods

This is a cross-sectional study which analyzed data from 71,553 Brazilian adolescents aged 12-17 years, from the ERICA Study. Principal Component Analysis was performed to identify Food Consumption Patterns, and Logistic Regression Models were performed to identify the associations between Common Mental Disorders, Food Consumption Patterns, and eating practices that are breakfast consumption and practice of having meals accompanied by family.

Results

Two patterns were found, a Healthy Food Consumption Pattern and a Unhealthy Food Consumption Pattern. Adolescents classified in the second (OR: 0.77; 95% CI 0.68 - 0.88) or third (OR: 0.87; 95% CI 0.74 - 0.95) tercile of the Healthy Food Consumption Pattern had a lower chance of having Common Mental Disorders, while those who belonged to the third tercile of the Unhealthy Food Consumption Pattern (OR: 1.22; 95% CI 1.02 - 1.42), had an increased chance of having Common Mental Disorders. Eating breakfast sometimes (OR: 0.69; 95% CI 0.59 - 0.80) or almost every day/every day (OR: 0.52; 95% CI 0.46 - 0.59), and the practice of having the main meals with the family sometimes (OR: 0.64; 95% CI 0.54 - 0.75) or almost every day/every day (OR: 0.48; 95% CI 0.40-0.55), decreased the chance for Common Mental Disorders.

Conclusion

Strategies to promote the mental health of adolescents as the adoption of healthy eating practices must be strengthened and promoted.

Background

Common Mental Disorders (CMD) refer to two main categories of diagnoses: depressive and anxiety disorders. In addition, there are non-specific and somatic complaints, which may be associated with CMD [1, 2]. Considering depressive and anxiety disorders in isolation, America is one of the continents with the highest prevalence rate in adolescents, around 5.4% and 7.2%, respectively [3].

Also, half of all conditions related to mental health start around 14 years old, characterizing adolescence as a period of transition and vulnerabilities, where mental illness can more easily develop [4, 5]. Additionally, the number of risk factors to which the adolescent remains exposed is directly associated with impacts on mental health [5].

Many reports try to verify isolated associations between risk factors, such as consumption of some types of foods and eating practices [6, 7] and CMD. These reports hypothesize that food intake may influence physiological factors that play roles in the genesis and course of mental illnesses. However, most of these were conducted with adults, and little is known about these associations in adolescents.

Moreover, there is an association between healthy eating practices, such as eating breakfast and having meals in the presence of the family with better mental health in adolescents [8, 9].

Despite the published scientific literature, which brings important elements about the mental health of adolescents, there is a gap regarding the consumption of foods that can compose eating patterns and eating practices with the presence of

CMD in adolescents. In this sense, we aimed to verify the association between food consumption patterns and the presence of CMD in Brazilian adolescents.

Methods

Design and Sampling process

This is a cross-sectional report with data from the Report on Cardiovascular Risks in Adolescents (ERICA). ERICA was a cross-sectional, national, school-based report with data collection carried out between the period of March 2013 and December 2014, with a sample composed of adolescents aged between 12 and 17 years of both sexes, enrolled in the last three years of elementary school and three years of high school in Brazilian public and private schools.

The sampled population framework was scaled into 32 geographic strata: each capital of the 27 units of the federation; and five strata comprising municipalities with more than 100,000 inhabitants in each of the country's five macro-regions, totaling 273 eligible Brazilian municipalities. After geographic stratification, schools were selected and school classes were selected [10, 11].

Detailed information on sample definition, sampling process, research protocol, participant selection, and data collection have been published in previous reports [10, 12].

Dependent variable

To build the Common Mental Disorders (CMD) variable, the Goldberg General Health Questionnaire (GHQ-12) [13] was used, validated for use in adolescents [14]. The GHQ-12 is a widely used self-completed instrument and is known to be a reliable measure of mental health. The GHQ-12 helps to track psychiatric disorders in the community and non-psychiatric clinical settings from an index generated from the individuals' responses [15].

For the screening of CMD among the adolescents in this report, the binary system with a cutoff point of five was considered, that is, the presence of CMD was considered when at least 5 of the 12 items were answered with one of the last two options of the questionnaire ("a little more than normal" or "much more than normal"). This cutoff point has a sensitivity of 86.7%, specificity of 88.9%, a positive predictive value of 71.2%, and ROC curve area (Receiver Operating Characteristics) of 0.94 [16].

Independent variables

Food consumption pattern

For the construction of the food consumption pattern food categories consumed by adolescents were used. This information was accessed in the first 24-hour food recall, applied through face-to-face interviews conducted by trained researchers. The interview technique used was the multiple-pass method [17] which consists of a guided interview in five stages, intending to reduce underreporting of food consumption, through the instrument REC24h-ERICA [18]. For this collection, the software Brasil-Nutri [19] was used to record food consumption data.

Similar foods were grouped and the kilocalories consumed from these foods were calculated from the 24-hour food recall. To obtain closer analyzes of the actual consumption of adolescents, the outliers were removed. Outliers were considered and, consequently, excluded from the present report those adolescents who presented food intake below 500 Kcal/day or above 6,000 Kcal/day [20]. The food groups used in this report to construct the patterns were: vegetables, fresh fruits, legumes, cereals, meat, sweetened beverages, candies, chips, and stuffed cookies.

For the construction of groups of vegetables, fresh fruits, legumes, cereals, and meats, only those consumed in-natura or used in culinary preparations were considered, whereas those produced industrially and with the addition of industrial ingredients were not considered. Candy, chewing gum, caramels, lollipops, and other candies produced with industrial

ingredients were considered for the construction of the candies group. And for the construction of the sweetened beverages group, soft drinks with added sugar, fresh fruit juices, powdered or industrially produced juices, chocolate drinks, and energy drinks were considered.

Eating practices

The following variables that refer to eating practices were considered for this report: the practice of having main meals with the family and breakfast consumption. The variable "practice of having main meals with the family" was constructed from the grouping of two other variables, namely, "Does your father (or stepfather) or your mother (or stepmother) or guardian have lunch with you?" and "Does your father (or stepfather) or mother (or stepmother) or guardian have dinner with you?", with the answer alternatives grouped into "never or rarely", "sometimes" and "almost every day or every day days".

The variable "breakfast consumption" was recategorized with the union of the alternatives "eat almost every day" and "eat every day".

Adjusted variables

The adjusted variables were identified from a theoretic model and selected with the aid of a Directed Acyclic Graph (DAG) built in the Dagitty (<http://www.dagitty.net/>) [21] (Supplementary Material).

The set of minimum adjustments sufficient to estimate the total effect of food consumption with CMD recommended by the DAG were: socioeconomic factors, age, sex, school administrative dependency, and the set of minimum adjustments sufficient to estimate the total effect of breakfast consumption and having meals with family with CMD recommended by the DAG were: socio-economic status, region of residence, race/color, sex, age, type of school, lives with parents, region of school, work. Variables related to socioeconomic factors were considered: work activity performed by the adolescent, race/color, region of school, and macro-region of residence.

The age of the adolescents was categorized into three age groups: 12 and 13, 14 and 15, 16 and 17. Administrative dependence could be public administration and private administration. As for gender, the alternatives in the student's questionnaire were: female and male. The variable Region of school had the rural and urban categories, while the variable Region of Brazil had the 5 Brazilian regions: North, South, Midwest, Northeast, and Southeast. The race/color variable had the following categories: white, black, brown, yellow (Asian), and indigenous.

The variable living with parents has the following categories: lives with both parents live only with mother or only father and does not live with either parent.

The categorization of the time of weekly Physical Activity (PA) practice was performed according to the cutoff points proposed by the National Adolescent Health Survey – PENSE [22], in which adolescents who accumulated 300 minutes or more of activity were considered physically "active", "insufficiently active 1" those between 1 to 149 minutes, "insufficiently active 2" those who practiced any physical activity from 150 to 299 minutes. Students who did not practice any physical activity in the reference period were considered "inactive".

To establish the socioeconomic status of adolescents was decided to calculate a Pattern of Socioeconomic Indicators (PSI) (Supplementary Material) with the variables associated with CMD in the report by Ribeiro et al. (2020) [23] and Erwling and Barros (2017) [24], which were "number of residents per room", "employees in the residence", "number of bathrooms" and "number of refrigerators". The pattern was characterized by the presence of employees, lower number of residents per room, higher number of bathrooms and higher number of refrigerators (Supplementary Material).

The macro-regions of Brazil in which they reside were kept in North, Northeast, Midwest, Southeast, and South. The schools considered in this report were: public and private. The variable "paid or unpaid work" was constructed by joining

two other variables from the questions "Does the student worked without payment during the last year?" and "Does the student worked remunerated during the last year?", that is, it was considered as "worked" if the adolescent answered that he performed any paid or unpaid job function.

To obtain the mean of sleep time, the weighted mean was calculated between the time in hours of sleep usually practiced during weekdays and weekend days, separately. Those individuals who reported a practice of sleeping less than 4 hours and more than 14 hours were excluded, according to Borges (2017) [25]. The daily screen time was classified as greater than three hours a day and less than or equal to three hours a day [26].

Statistical analysis

The descriptive analysis included the calculation of absolute and relative frequencies for categorical variables, in addition to measures of central tendency and dispersion when the variables were numerical. The chi-square test was performed to compare the proportions between the variables.

To identify the adolescents' food consumption patterns, Principal Component Analysis (PCA) was performed, which is an exploratory analytical method that condenses the information contained in the observed variables into a smaller number of variables, with minimal loss of information. For the performance of the PCA, the following variables were considered: vegetables, fresh fruits, pulses, cereals, meat, sweetened beverages, candies, chips, and stuffed cookies. The Kaiser-Meyer-Olkin (KMO) was estimated as a measure of the adequacy of the PCA, with values between 0.5 and 1.0 considered acceptable for this index. Subsequently, components with Eigen Values > 1.0, defined according to the screen plot graph, were extracted from the PCA. The structure of the components was obtained from the indicators that had a load factor > 0.3, with a variable being generated in units of points for each consumption pattern. For each pattern, a categorical variable was created from the values of the terciles of distribution of the scores of these patterns.

To verify the magnitude of the association between food consumption patterns and CMD, using the Odds Ratio (OR) and its 95% confidence intervals (95% CI), the binary logistic regression models was adopted.

The bivariate analysis was performed using simple logistic regression models, with the variable "CMD" as dependent and the variables "food consumption patterns", "breakfast consumption" and "practice of having main meals accompanied by parents or guardians" as explanatory.

It is noteworthy that because the ERICA data come from a complex sample, the survey command (svy:) was applied in all statistical analyzes performed in the statistical program Stata software version 14.0 [28].

Ethical aspects

This report was approved by the Research Ethics Committee of the Instituto de Estudos de Saúde Coletiva da Universidade Federal do Rio de Janeiro (IESC/UFRJ) which belongs to the report's central coordination (IESC/UFRJ – Aprovação nº 45/2008) and of each State. Informed consents were obtained from all subjects, parent and their legal guardian(s). The authors confirm that all methods were performed in accordance with the Declaration of Helsinki.

Results

Characteristics of adolescents included in the report

This report has evaluated 71,553 Brazilian adolescents. From this number, 50.21% were male, 35.10% with age between 12 to 13 years old, 26.03% of the adolescents answered that they had some paid or unpaid work activity, 96.10% study in schools located in urban areas, 57.27% lives with their parents and, 68.21% having the meals with family almost every day or every day (Table 1).

Regarding the level of PA, 16.72% of adolescents were classified as inactive, and 14.19% as insufficiently active, that is, with physical activity for less than 150 minutes per day. According to the classification of the Sociedade Brasileira de Pediatria (2019) [26], with a daily time of fewer than 3 hours a day. In this study, 58.15% of the students stayed longer than recommended for their age group in front of screens (Table1).

Table 1
 Characterization of Brazilian adolescents with Common Mental Disorders assessed by the ERICA Study.

| Variable | Common Mental Disorders | | | p-value ^a |
|--------------------------------------------------|-------------------------|--------|---------|----------------------|
| | Global (%) | No (%) | Yes (%) | |
| Sex | | | | |
| Female | 49.79 | 46.05 | 67.92 | <0.001 |
| Male | 50.21 | 53.95 | 32.08 | |
| Age (Years old) | | | | |
| 12–13 | 35.10 | 36.49 | 28.39 | <0.001 |
| 14–15 | 34.99 | 34.77 | 36.06 | |
| 16–17 | 29.90 | 28.74 | 35.55 | |
| Pattern of Socioeconomic Indicators ¹ | | | | |
| Tercile 1 | 46.19 | 46.02 | 47.01 | 0.2728 |
| Tercile 2 | 34.99 | 35.27 | 33.60 | |
| Tercile 3 | 18.83 | 18.71 | 19.39 | |
| Race/Color | | | | |
| White | 40.05 | 39.93 | 40.32 | 0.5365 |
| Black | 8.31 | 8.36 | 8.12 | |
| Brown | 48.83 | 48.98 | 48.32 | |
| Yellow (Asian) | 2.12 | 2.07 | 2.37 | |
| Indigenous | 0.69 | 0.65 | 0.87 | |
| Paid or unpaid work | | | | |
| No | 73.97 | 74.93 | 69.32 | <0.001 |
| Yes | 26.03 | 25.07 | 30.68 | |
| Macro-region of residence | | | | |
| Midwest | 7.67 | 7.60 | 7.98 | 0.7908 |
| Northeast | 21.34 | 21.41 | 20.97 | |
| North | 8.43 | 8.38 | 8.67 | |
| Southeast | 50.78 | 50.87 | 50.37 | |
| South | 11.78 | 11.74 | 12.01 | |
| Type of school | | | | |
| Public | 83.61 | 83.70 | 83.19 | 0.4025 |
| Private | 16.39 | 16.30 | 16.81 | |

| Common Mental Disorders | | | | |
|------------------------------------------|-------|-------|-------|--------|
| School region | | | | |
| Rural | 3.90 | 4.09 | 3.01 | 0.0132 |
| Urban | 96.10 | 95.91 | 96.99 | |
| Physical activity level | | | | |
| Inactive (0 min/week) | 16.72 | 15.59 | 22.20 | <0.001 |
| Insufficiently active 1 (<150 min/week) | 14.19 | 14.21 | 14.13 | |
| Insufficiently active 1 (<300 min/week) | 14.05 | 14.50 | 11.88 | |
| Active (\geq 300 min/week) | 55.04 | 55.71 | 51.79 | |
| Daily time on screens (hours/day) | | | | |
| > 3 hours a day | 58.15 | 59.41 | 51.97 | <0.001 |
| \leq 3 hours a day | 41.85 | 40.59 | 48.03 | |
| Live with parents | | | | |
| Both parents | 57.27 | 58.48 | 51.39 | <0.001 |
| Only with mother or only with father | 36.85 | 36.08 | 40.61 | |
| Neither parents | 5.88 | 05.44 | 7.99 | |
| Breakfast consumption | | | | |
| Does not consume | 21.82 | 19.74 | 31.91 | |
| Sometimes | 29.76 | 29.39 | 31.54 | <0.001 |
| Almost every day/every day | 48.42 | 50.87 | 36.55 | |
| Practice of having the meals with family | | | | |
| Never or almost never | 8.67 | 7.33 | 15.37 | <0.001 |
| Sometimes | 23.13 | 22.31 | 27.34 | |
| Almost every day/every day | 68.21 | 70.36 | 57.39 | |
| ^a chi-square test | | | | |

Characteristics of adolescents with CMD included in the sample

It has been observed that, in this sample, girls (67.92%) are more affected by CMD than boys (32.08%) (<0.001), and among adolescents between the ages of 14 and 15 years old (36.06%) (<0.001). Frequently, CMD most affected young people those who do not perform paid or unpaid work (69.32) (<0.001) (Table1).

Those with presence of CMD, compared to those without presence of CMD, 22.20% were inactive in physical activities (<0.001). As for the practice of having the main meals with the family, the percentage of adolescents who belongs to the category "almost every day or every day" was mostly higher among those who did not have CMD (70.36%) compared to those with CMD (57.39%) (<0.001) and, consumed less frequently the breakfast (36.55%) (<0.001), respectively (Table 1).

Food consumption patterns

The results for the identification of Food Consumption Patterns (FCP), presented in Table 2, identified two main components, with a contribution of 28.78% of explained accumulated variation. The KMO index and the factor loadings of all indicators were satisfactory. Pattern 1 was characterized by higher consumption of vegetables, legumes, cereals, and meats, called in this report the Healthy Food Consumption Pattern (HFCP), and pattern 2 was characterized by greater consumption of sweetened beverages, candies, chips, and stuffed sweet cookies and lower consumption of fresh fruit, and was called an Unhealthy Food Consumption Pattern (UFCP) (Table 2).

Table 2
Factor loads of the components of the Main Component Analysis of Brazilian adolescents included in the ERICA study.

| Indicator | Pattern 1 | Pattern 2 | KMO [‡] |
|------------------------------------------|----------------|----------------|------------------|
| Sweetened Beverages | 0.2080 | 0.5152 | 0.5591 |
| Candies | -0.0217 | 0.3227 | 0.5114 |
| Vegetables | 0.3171 | -0.1973 | 0.5654 |
| Fresh Fruits | -0.1848 | -0.5046 | 0.5675 |
| Legumes | 0.4684 | 0.0005 | 0.5751 |
| Cereals | 0.5563 | -0.1067 | 0.5864 |
| Chips | -0.03337 | 0.3399 | 0.5494 |
| Stuffed Cookies | 0.0572 | 0.4301 | 0.5259 |
| Meat | 0.5369 | -0.1581 | 0.5896 |
| <i>Eigenvalue</i> | <i>1.43952</i> | <i>1.15046</i> | . |
| <i>Explained variance (%)</i> | <i>15.99</i> | <i>12.78</i> | . |
| <i>Cumulative variance explained (%)</i> | <i>15.99</i> | <i>28.78</i> | . |
| <i>Overall</i> | . | . | <i>0.5756</i> |
| ‡Kaiser-Meyer-Olkin. | | | |

Association between FCP, eating practices and CMD

The variables associated with the presence of CMD in the multiple logistic regression models are shown in Table 3. Based on the results, we identified that adolescents classified in the second (OR: 0.79; 95% CI 0.70 -0.89) or third (OR: 0.87; 95% CI 0.78 - 0.98) tercile of the HFCP, that is, those who consumed more kilocalories from healthy foods (vegetables, legumes, cereals, and meats) had a lower chance of having CMD, while those who belonged to the third tercile of the UFCP (OR: 1.19; 95% CI 1.01-1.40), that is, those who consumed more kilocalories from unhealthy foods (sweetened beverages, candies, chips and snacks filled sweet biscuits and less consumption of fresh fruit) had an increased chance of having CMD.

As for eating practices, eating breakfast sometimes (OR: 0.73; 95% CI 0.64 - 0.84) or almost every day/every day (OR: 0.55; 95% CI 0.48 - 0.62), and the practice of having the main meals with the family sometimes (OR: 0.66; 95% CI 0.54 - 0.81) or almost every day/every day (OR: 0.46; 95% CI 0.40 - 0.53), decreased the chance for CMD in Brazilian adolescents belonging to this report (Table 3).

Table 3

Crude and adjusted logistic regression analysis: probability of Common Mental Disorders in Brazilian adolescents included in the ERICA Study.

| Variable | Common Mental Disorders | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------|
| | Crude OR (CI95%) | Adjusted OR (CI95%) |
| HFCP [¥] | | |
| First tercile | (Ref.) | (Ref.) |
| Second tercile | 0.81 (0.72 - 0.90)*** | 0.77 (0.68 - 0.88)** |
| Third tercile | 0.71 (0.65 - 0.78)*** | 0.87 (0.74 - 0.95)* |
| UFCP [¥] | | |
| First tercile | (Ref.) | (Ref.) |
| Second tercile | 1.12 (0.98 - 1.27) | 1.01 (0.87 - 1.17) |
| Third tercile | 1.30 (1.13 - 1.49)*** | 1.22 (1.02 - 1.42)* |
| Breakfast consumption [£] | | |
| Does not consume | (Ref.) | (Ref.) |
| Sometimes | 0.66 (0.59 - 0.75)*** | 0.69 (0.59 - 0.80)*** |
| Almost every day/every day | 0.45 (0.40 - 0.50)*** | 0.52 (0.46 - 0.59)*** |
| Practice of having meals with family [£] | | |
| Never or almost never | (Ref.) | (Ref.) |
| Sometimes | 0.58 (0.50 - 0.67)*** | 0.64 (0.54 - 0.75)*** |
| Almost every day/every day | 0.38 (0.34 - 0.43)*** | 0.48 (0.40 - 0.55)*** |
| OR: Odds Ratio; CI: Confidence Interval; UFCP: Unhealthy food consumption pattern; HFCP: Healthy food consumption pattern; *p<0.05; **p<0.01; ***p<0.001 | | |
| [¥] Adjusted by having meals with family, Physical Activities, socio-economic status, macro-region of residence, race/color, sex, age, screen time, type of school, work, sleep time mean, lives with parents, region of school. | | |
| [£] Adjusted by socio-economic status, region of residence, race/color, sex, age, type of school, lives with parents, region of school, work. | | |
| ¹ the pattern of socioeconomic indicators was characterized by a higher number of employees in the home, a lower number of residents per room, a higher number of bathrooms in the home and a higher number of refrigerators in the home (Supplementary Material). | | |

Discussion

This cross-sectional and representative report for the Brazilian population showed that having a HFCP, characterized by the consumption of vegetables, legumes, cereals, and meat, is associated with a lower chance of CMD in adolescents.

Moreover, eating practices of breakfast consumption and the practice of having the main meals with the family regularly are associated with a lower chance of CMD. However, having an UFCP characterized by the consumption of sweetened beverages, candies, chips, and stuffed cookies and lower consumption of fresh fruit is associated with increased chances of CMD.

Reports with non-Brazilian adolescents have found similar results when evaluating the association between consumption of unhealthy diets and the diagnosis of depression and anxiety [29, 30]. Other authors report associations between specific food groups such as sweetened beverages, especially soft drinks, chips, snacks, and fast food or takeaway meals with depression and anxiety [31, 32]. There is still no explanation of the mechanisms by which unhealthy foods worsen the mental health of adolescents, however, we know that food and the act of eating are part of a complex interaction of factors that involves the environment in which the individual is inserted and its particularities [33], potentiated by the psychic and physiological characteristics, particular to adolescence.

However, the adoption of healthy eating is associated with better mental health in adolescents. Renzaho, Kumanyika & Tucker (2011) [34], in a cross-sectional report with Australian children and adolescents aged between 4 and 12 years old, showed that the consumption of fruits and vegetables was associated with protection against emotional problems. Jacka et al. (2011) [29], in a longitudinal report with a two-year follow-up, observed that a healthy diet is a predictor of better mental health in adolescents.

In this context, in addition to acting in the prevention of Chronic Non-Communicable Diseases (NCDs), the adoption of a healthy diet can contribute to reducing the chances of CMD. Therefore, encouraging practices that promote healthy and adequate eating can be useful in preventing these disorders in adolescents. In Brazil, the National School Food Program (PNAE) seeks to encourage and guarantee the right to adequate and healthy food for children and adolescents enrolled in public schools [35]. In addition, the Food Guide for the Brazilian Population, of the Ministry of Health, encourages fresh and minimally processed food choices, based on a healthy daily diet, and advises against the consumption of ultra-processed foods in all age groups.

In the present report, we found that healthy eating practices, such as eating breakfast and having meals with the family were inversely associated with the presence of CMD in adolescents. Fulkerson et al. (2004) [31] also found that the consumption of breakfast, lunch, and dinner is associated with lower chances of depression in American adolescents. Also, skipping breakfast significantly increased the risks of stress and depressive mood in Korean adolescents [36]. Breakfast consumption is also associated with positive health outcomes, such as prevention of overweight and other NCDs [37], improved cognition, and adequate school performance in children and adolescents [38, 39]. Thus, the planning and consumption of healthy foods in this meal is also a protection strategy against CMD [8].

The presence of the family during meals is crucial for the construction of healthy eating practices, so much that the higher frequency of family meals is associated with fewer depressive symptoms and fewer emotional difficulties in adolescents [40]. Agathão et al. (2021) [9], in a longitudinal report, found that Regular meals with the family were a protective factor for the mental health of Brazilian adolescents aged between 12 and 17 years. Furthermore, the chance of having depression can be up to 4.5 times greater in adolescents who do not have the practice of having meals with the family (frequency less than or equal to once a week) [41].

It is understood that family meals are opportunities in which family members can connect and strengthen their bonds [9, 42]. Therefore, having meals with the family can be considered a protective factor for the presence of CMD in adolescents. In addition, the presence of parents at meals is positively associated with higher consumption of fruits, vegetables, and dairy products by adolescents [43]. Consequently, strategies that encourage families to eat together should be promoted.

This report has limitations, such as the cross-sectional design, which no causality between nutritional factors and mental health can be established, and the variables used in the composition of food consumption patterns, which were constructed from a single 24-hour food recall, which may not accurately characterize the practiceual consumption of adolescents. However, the strengths of this report should be considered, such as its originality, as we did not find, within our searches, articles that discuss the association of eating patterns, eating practices, and CMD.

Conclusion

The results found in this report demonstrate that having a HFCEP, eating breakfast and having the practice of having the main meals with family regularly reduce the chance of CMD, while having an UFCEP increases the chance of CMD in Brazilian adolescents.

Thus, strategies to promote the mental health of adolescents that encourage the adoption of healthy eating practices and practices must be strengthened and promoted. In addition, these themes must be addressed and worked with adolescents and their families.

List Of Abbreviations

CMD: Common Mental disorders

ERICA: Report on Cardiovascular Risk in Adolescents

GHQ-12: Goldberg General Health Questionnaire

PCA: Principal Component Analysis

ROC curve area: Receiver Operating Characteristics

IBGE: Instituto Brasileiro de Geografia e Estatística

DAG: Directed Acyclic Graph

BMI: Body Mass Index

WHO: World Health Organization

KMO: Kaiser Meyer Olkin

FCP: Food Consumption Patterns

Declarations

Ethics approval and consent to participate: This report was approved by the Research Ethics Committee of the Instituto de Estudos de Saúde Coletiva da Universidade Federal do Rio de Janeiro (IESC/UFRJ) which belongs to the report's central coordination (IESC/UFRJ – Aprovação nº 45/2008) and of each State. Informed consents were obtained from all subjects, parent and their legal guardian(s). The authors confirm that all methods were performed in accordance with the Declaration of Helsinki.

Consent for publication: Not applicable.

Availability of data and materials: The datasets used and/or analysed during the current study are available from the ERICA Study Committee on reasonable request.

Competing Interests: The authors declare no competing interests.

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References

1. Goldberg DP, Huxley P. *Common mental disorders: a bio-social models*. England: Routledge Press; 1992.
2. Goldberg D. A bio-social models for common mental disorders. *Acta psychiatrica scandinavica Supplementum*. 1994. doi: [10.1111/j.1600-0447.1994.tb05916.x](https://doi.org/10.1111/j.1600-0447.1994.tb05916.x)
3. World Health Organization. *Depression and Other Common Mental Disorders Global Health Estimates (License: CC-BY-NC-SA-3.0-IGO)*. WHO: World Health Organization Press. 2017. <https://apps.who.int/iris/handle/10665/254610> Accessed 23 nov 2021.
4. Gore FM, Bloem PJN, Patton GC, Ferguson J, Joseph V, Coffey C, et al. Global burden of disease in young people aged 10-24 years: A systematic analysis. *Lancet*, 2011. doi: [10.1016/S0140-6736\(11\)60512-6](https://doi.org/10.1016/S0140-6736(11)60512-6).
5. World Health Organization. *Adolescent mental health*. 2020. <https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health>
6. Dipnall JF, Pasco JA, Meyer D, Berk M, Williams, Dodd S, Jacka FN. The association between dietary patterns, diabetes and depression. *Journal of Affective Disorders*. 2015. doi: [10.1016/j.jad.2014.11.030](https://doi.org/10.1016/j.jad.2014.11.030)
7. Patton GC, Olsson CA, Skirbekk V, Saffery R, Wlodek ME, Azzopardi, PS, et al. Adolescence and the next generation. *Nature*. 2018. doi: [10.1038/nature25759](https://doi.org/10.1038/nature25759)
8. O'Sullivan TA, Robinson M, Kendall GE, Miller M, Jacoby P, Silburn SR, Oddy WH. A good-quality breakfast is associated with better mental health in adolescence. *Public Health Nutrition*. 2008. doi: [10.1017/S1368980008003935](https://doi.org/10.1017/S1368980008003935)
9. Agathão BT, Cunha DB, Sichieri R, Lopes CS. The role of family meal frequency in common mental disorders in children and adolescents over eight months of follow-up. *PLoS ONE*. 2021; doi: [10.1371/journal.pone.0243793](https://doi.org/10.1371/journal.pone.0243793).
10. Bloch KV, Szklo M, Kuschnir MCC, Abreu GA, Barufaldi LA, Klein CH, et al. The study of cardiovascular risk in adolescents - ERICA: Rationale, design and sample characteristics of a national survey examining cardiovascular risk factor profile in Brazilian adolescents. *BMC Public Health* 2015; doi: [10.1186/s12889-015-1442-x](https://doi.org/10.1186/s12889-015-1442-x).
11. Vasconcellos MTL, Silva PLN, Szklo M, Kuschnir MCC, Klein CH, Abreu GA, et al. Sampling design for the Study of Cardiovascular Risks in Adolescents (ERICA). *Cadernos de Saúde Pública*. 2015. doi: [10.1590/0102-311X00043214](https://doi.org/10.1590/0102-311X00043214)
12. Silva TLN, Klein CH, Souza AM, Barufaldi LA, Abreu GA, Kuschnir MCC, et al. Response rate in the study of cardiovascular risks in adolescents—ERICA. *Revista de Saúde Pública*. 2016. doi: [10.1590/S015188787.2016050006730](https://doi.org/10.1590/S015188787.2016050006730)
13. Goldberg DP. *The detection of psychiatric illness by questionnaire: a technique for the identification and assessment of non-psychotic psychiatric illness*. 1rd ed. Oxford: University Press; 1972.
14. French DJ, Tait RJ. Measurement invariance in the General Health Questionnaire-12 in young Australian adolescents. *European Child and Adolescent Psychiatry*. 2004. doi: [10.1007/s00787-004-0345-7](https://doi.org/10.1007/s00787-004-0345-7)
15. Goldberg DP, Williams P. *A user's guide to the General Health Questionnaire - GHQ*. Nfer-Nelson Press; 1988.
16. Goldberg DP, Gater R, Sartorius N, Ustun TB, Piccinelli M, Gureje O, Rutter, C. The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychology Medicine*. 1997. doi: [10.1017/s0033291796004242](https://doi.org/10.1017/s0033291796004242)

17. Conway JM, Ingwersen LA, Vinyard BT, Moshfegh AJ. Effectiveness of the US Department of Agriculture 5-step multiple-pass method in assessing food intake in obese and nonobese women. *American Journal of Clinical Nutrition*. 2003; doi: [10.1093/ajcn/77.5.1171](https://doi.org/10.1093/ajcn/77.5.1171).
18. Barufaldi LA, Abreu GA, Veiga GV, Sichieri R, Kuschnir MCC, Cunha DB, et al. Software to record 24-hour food recall: application in the Study of Cardiovascular Risks in Adolescents. *Revista Brasileira de Epidemiologia*. 2016; doi: [10.1590/1980-5497201600020020](https://doi.org/10.1590/1980-5497201600020020).
19. Ministério da Saúde. *Software Brasil-Nutri*. Instituto de Medicina Social da Universidade do Estado do Rio de Janeiro; 2009.
20. Andrade RG, Pereira RA, Sichieri R. Food intake in overweight and normal-weight adolescents in the city of Rio de Janeiro. *Cadernos de Saúde Pública*. 2003; doi: [10.1590/S0102-311X2003000500027](https://doi.org/10.1590/S0102-311X2003000500027).
21. Textor J, Zander BVD, Gilthorpe MK, Liskiewicz M, Ellison GTH. Robust causal inference using directed acyclic graphs: the R package 'dagitty'. *International Journal of Epidemiology* 45(6):1887-1894, 2016.
22. Instituto Brasileiro de Geografia e Estatística. *Pesquisa nacional de saúde do escolar* (ISBN 978-85-240-4387-1). Coordenação de População e Indicadores Sociais. 2015. <https://biblioteca.ibge.gov.br/visualizacao/livros/liv97870.pdf> Accessed 23 nov 2021.
23. Ribeiro IBS, Correa MM, Oliveira G, Cade NV. Common mental disorders and socioeconomic status in adolescents of ERICA. *Revista de Saúde Pública*. 2020. doi: [10.11606/S1518-8787.2020054001197](https://doi.org/10.11606/S1518-8787.2020054001197)
24. Erwling F, Barros ADJ. Como as mudanças na posse de bens afetam o indicador econômico nacional em 10 anos? *Revista Saude Publica*. 2017. doi: [10.1590/S1518-8787.201705100651](https://doi.org/10.1590/S1518-8787.201705100651).
25. Borges, MA. Duração do sono e o excesso de peso em adolescentes brasileiros: estudo ERICA. 2019. Publication No. CDU 614. Master Degree dissertation, Universidade Federal do Espírito Santo. http://repositorio.ufes.br/bitstream/10/10123/1/tese_11575_2015_Marcela%20Aparecida%20S%20Borges.pdf Accessed 23 nov 2021.
26. Sociedade Brasileira de Pediatria. *Manual de Orientação: #MENOS TELAS #MAIS SAÚDE*. Grupo de Trabalho Saúde na Era Digital (2019-2021). https://www.sbp.com.br/fileadmin/user_upload/_22246c-ManOrient_-_MenosTelas_MaisSaude.pdf Accessed 23 nov 2021.
27. World Health Organization. *Growth reference data for 5-19 years*. Geneva: World Health Organization Press. 2007. <https://www.who.int/tools/growth-reference-data-for-5to19-years> Accessed 23 nov 2021.
28. StataCorp LP, College Station, United States.
29. Jacka FN, Kremer PJ, Berk M, Silva-Sanigorski AM, Moodie M, Leslie ER et al. A prospective study of diet quality and mental health in adolescents. *PLoS ONE*. 2011 doi: [10.1371/journal.pone.0024805](https://doi.org/10.1371/journal.pone.0024805)
30. Jacka FN, Kremer PJ, Leslie ER, Berk M, Patton GC, Toumbourou JW, Williams JW. Associations between diet quality and depressed mood in adolescents: Results from the Australian Healthy Neighbourhoods Study. *Australian & New Zealand Journal of Psychiatry*. 2010. doi: [10.3109/00048670903571598](https://doi.org/10.3109/00048670903571598)
31. Fulkerson JA, Sherwood NA, Perry CL, Neumark-Sztainer D, Story M. Depressive symptoms and adolescent eating and health behaviors: a multifaceted view in a population-based sample. *Preventive Medicine*. 2004. doi: [10.1016/j.ypmed.2003.12.028](https://doi.org/10.1016/j.ypmed.2003.12.028)
32. Kashino I, Kochi T, Imamura F, Eguchi, M, Kuwahara K, Nanri A, et al. Prospective association of soft drink consumption with depressive symptoms. *Nutrition*, 2021. doi: [10.1016/j.nut.2020.110860](https://doi.org/10.1016/j.nut.2020.110860)
33. Ministério da Saúde. *Guia Alimentar para a População Brasileira* (ISBN 978-85-334-2176-9). 2ed. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Brasília: Ministério da Saúde; 2014. https://bvsmms.saude.gov.br/bvs/publicacoes/guia_alimentar_populacao_brasileira_2ed.pdf Accessed 23 nov 2021.

34. Renzaho AMN, Kumanyika S, Tucker KL. Family functioning, parental psychological distress, child behavioral problems, socio-economic disadvantage and fruit and vegetable consumption among 4-12 year-old Victorians, Australia. *Health Promotion International*. 2011. doi: [10.1093/heapro/daq054](https://doi.org/10.1093/heapro/daq054)
35. Ministério da Educação. *Resolução nº 6, de 08 de maio de 2020*. Fundo Nacional de Desenvolvimento da Educação; 2020. <https://www.fnnde.gov.br/index.php/aceso-a-informacao/institucional/legislacao/item/13511-resolu%C3%A7%C3%A3o-n%C2%BA-6,-de-08-de-maio-de-2020> Accessed 25 nov 2021.
36. Lee G, Han K, Kim H. Risk of mental health problems in adolescents skipping meals: The Korean National Health and Nutrition Examination Survey 2010 to 2012. *Nursing Outlook*. 2017. <https://doi.org/10.1016/j.outlook.2017.01.007>
37. Monzani A, Ricotti R, Caputo M, Solito A, Archero F, Bellone S, Prodam F. A Systematic Review of the Association of Skipping Breakfast with Weight and Cardiometabolic Risk Factors in Children and Adolescents. What Should We Better Investigate in the Future? *Nutrients*. 2019. doi: [10.3390/nu11020387](https://doi.org/10.3390/nu11020387)
38. Rampersaud GC, Pereira MA, Girard BL, Adams J, Metz J. Breakfast practices, nutritional status, body weight, and academic performance in children and adolescents. *Journal of American Diet Association*. 2005. doi: [10.1016/j.jada.2005.02.007](https://doi.org/10.1016/j.jada.2005.02.007)
39. Lien L. Is breakfast consumption related to mental distress and academic performance in adolescents? *Public Health Nutrition*. 2007. doi: [10.1017/S1368980007258550](https://doi.org/10.1017/S1368980007258550)
40. Utter J, Denny S, Peiris-John R, Moselen E, Dyson B, Clark T. Family Meals and Adolescent Emotional Well-Being: Findings from a National Study. *Journal of Nutrition Education and Behavior*. 2017. Doi: [10.1016/j.jneb.2016.09.002](https://doi.org/10.1016/j.jneb.2016.09.002)
41. Moitra P, Madan J, Shaikh NI. Eating practices and sleep patterns of adolescents with depression symptoms in Mumbai, India. *Maternal Child Nutrition*. 2020. doi: [10.1111/mcn.12998](https://doi.org/10.1111/mcn.12998)
42. Smith S, Ramey E, Sisson SB, Richardson S, Degrace B. The Family Meal Models: Influences on Family Mealtime Participation. *OTJR Occupation Participation and Health*. 2020. doi: [10.1177/1539449219876878](https://doi.org/10.1177/1539449219876878)
43. Videon TM, Manning CK. Influences on adolescent eating patterns: the importance of family meals. *Journal of Adolescent Health*. 2003. doi: [10.1016/s1054-139x\(02\)00711-5](https://doi.org/10.1016/s1054-139x(02)00711-5)

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