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ORIGINAL ARTICLE

Factors Associated with the Intake of Ultra-Processed Cariogenic Foods by Preschoolers During the COVID-19 Pandemic

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ABSTRACT

Objective: To evaluate the characteristics and factors associated with the intake of ultra-processed cariogenic foods (UFC) by preschoolers during the COVID-19 pandemic. **Material and Methods:** This is a cross-sectional study involving parents of 672 children from two to five years old enrolled at public schools in Curitiba, Brazil. Parents answered a questionnaire about socioeconomic and demographic data, their behavior regarding the dietary education of their children (Parent Mealtime Action Scale - translated and validated for use in Brazil), and children's food intake (qualitative food frequency questionnaire - list of foods based on a report from the Pan American Health Organization). The data were analyzed using Poisson regression analysis (α=0.05). **Results:** About 43% of parents/guardians reported changes in their children's diet during the pandemic, being that diet got worse and better in 19% and 24% of the cases, respectively. The ultra-processed cariogenic foods with the highest daily intake frequencies were sweetened juices/sweetened drinks (0.52), followed by cookies (0.37), and candies (0.35). Parents with a lower level of education reported a daily frequency of UCF intake 1.36 times higher (PR=1.359; CI 95%: 1.106-1.669) in their children compared to those with a higher level of education. On the other hand, parents'/guardians' report of higher intake and greater offer of fruits and vegetables to children was associated with low UCF intake (PR=0.716; CI 95%: 0.592-0.866). **Conclusion:** The lower level of formal education of parents/guardians and lower availability of fruits and vegetables were related to higher consumption of ultra-processed cariogenic foods by children.

Keywords: Coronavirus Infections; Diet, Cariogenic; Child, Preschool.

Introduction

In March 2020, the World Health Organization (WHO) characterized the outbreak of Coronavirus Disease - 2019 (COVID-19) as a pandemic [1]. The International Committee on Taxonomy of Viruses defined the name of the etiologic agent of this pathology as Severe Acute Respiratory Syndrome - Related Coronavirus 2 (SARS-CoV-2) [2]. Once the forms of viral dissemination were determined, strategies were applied to cope with and mitigate contagion. Restrictive measures, despite being effective and necessary to control the spread of SARS-CoV-2, have caused negative impacts on the quality of life of individuals [3]. In children, home isolation has been associated with a higher incidence of domestic violence and child abuse [4], reduced levels of physical activity [5,6], higher rates of sedentary lifestyle and obesity [5,7,8], increased screen time [8], altered sleep patterns [5,6,8], behavioral changes, such as increased irritability and stress [9], and diet modifications [5,7,10-13].

Since 2015, WHO has set clear targets to decrease the intake of free sugars [14]. However, its reduction is still a major challenge [15]. Reducing the intake of ultra-processed foods seems to be a promising initiative to achieve this goal, as it is directly associated with a high intake of fats and free sugars [16,17] and a risk factor for the development of several health problems [14,15,18]. Furthermore, during the pandemic, a reduction in children's dietary quality has been reported, with increased food insecurity [19] and intake of processed or ultra-processed foods [5]. This is significant because recent research has associated early childhood dental caries with the intake of these types of foods [15].

Parents'/Guardians' behavior and food availability influence children's feeding practices [20] and are associated with the development of dental caries [21]. Although family and sociodemographic characteristics probably influenced children's eating patterns during the pandemic, the factors associated with increased intake of ultra-processed cariogenic foods are still unclear. Knowing and understanding the factors associated with the intake of ultra-processed cariogenic foods during this period of health crisis and social isolation can contribute to the development of health education strategies that positively impact the reduction of sugar intake by children. Therefore, this study aimed to evaluate the characteristics and factors associated with the intake of ultra-processed cariogenic foods (UCF) in preschoolers during the COVID-19 pandemic, such as carbonated soft drinks, sweetened juices, candies, cakes, pastries, desserts, and cookies.

Material and Methods

Study Design and Ethical Clearance

This is a cross-sectional study involving 672 parents/guardians of children from two to five years old of both sexes enrolled in the Municipal Public School System (MPSS) in Curitiba, Paraná, Brazil. In addition to fulfilling the aforementioned requirements, parents/guardians had to fill out and sign the Informed Consent Form (ICF) to be included in the study. Furthermore, preschoolers with special dietary needs (based on information from guardians) were excluded.

This study was approved by the Human Research Ethics Committee of the Health Sciences Center of the Federal University of Parana (CCAE: 29188620.3.0000.0102) and also by Municipal Health Secretariat (CAAE: 291777620.3.3001.0101) from Curitiba, according to CNS Resolution 466/12, being conducted in accordance to Declaration of Helsinki.

A pilot study involving the parents/guardians of 71 preschoolers from MPSS with the same age range as the study population was previously conducted one month before the beginning of the study. The families were selected by convenience to test the understanding of the data collection instruments and the data collection

dynamics. The necessary adjustments to the instruments and methodology were made from the analysis of the conduct and results of the pilot study, being necessary small adjustments with regard to the graphic layout of the questionnaire.

Sample Calculation

A sample calculation for the cross-sectional study using the proportion estimation formula was performed to gather a sufficient number of individuals to compose the group to be investigated, with a finite population correction. The calculations were carried out through the website www.openepi.com. A 50% prevalence of the outcome variable 'high intake of cariogenic foods' was used for sample size calculation. The adopted confidence level (1-α) was 95% and the precision of estimation was 5%. Since 33,531 children from two to five years old are enrolled in the Municipal Public School System of Curitiba, the sample was multiplied by 1.5 to compensate for clustering effects and cluster sampling, which resulted in a minimum of 574 children. The total sample was distributed over 10 city regions to maintain the proportion of students enrolled in each region. The website random.org was used for the drawing of the schools. Questionnaires were sent to all parents/guardians of children from two to five years old in each of the 28 randomly selected MPSS schools, reaching the predetermined number in each region to maintain the appropriate proportion of students.

Data Collection

Data collection was conducted between October 2020 and February 2021 using a questionnaire that was answered by parents/guardians regarding socioeconomic and demographic status, parental behavior during children's meals, and the characterization of food intake, with questions related to usual food intake, intake modification in the COVID-19 pandemic, and assessment of the frequency of food intake. It also contained a brief explanation of the survey, a guidance on filling out the forms, and presented how to contact the researchers in case of doubts. During the COVID-19 pandemic, the MPSS schools started to operate remotely, but still provided basic food baskets and educational activities on a monthly basis. Therefore, the way parents/guardians were approached varied according to the context experienced during the pandemic. To establish more restrictive measures to combat the pandemic, Curitiba relied on the effective reproduction number (Rt), which determines the potential for the virus to spread at a specific time 't' under the control measures in place. An Rt value <1 indicates the deceleration of the spread, and when this was the case, the questionnaires were delivered in person. An Rt value >1 indicates acceleration, so the questionnaires were e-mailed.

Socioeconomic and Demographic Evaluation

Socioeconomic and demographic characteristics data were collected through an easy-to-understand questionnaire used in a previous study in this same population [21] that was answered by parents/guardians. Moreover, data regarding household characteristics (family income and the number of residents in the household), parents/guardians (marital status, formal education, work activity), and preschoolers (sex and age) were collected.

Usual Intake of Ultra-Processed Cariogenic Foods and Dietary Modification during the COVID-19 Pandemic

To assess dietary modifications during the COVID-19 pandemic, questions about the report of previous usual food intake and about changes that occurred during the pandemic were formulated. The list of food items used in the questionnaire, developed by the authors, was based on the report developed by the Pan American

Health Organization (PAHO) on the intake of ultra-processed food and drinks in Latin America [22]. Therefore, the three ultra-processed items indicated as the main sources of free sugars, according to the PAHO report, were considered in this study: carbonated soft drinks; sweetened juices, drinks and candies (candy, caramel, lollipops, ice cream, chocolate) [22].

Parents/guardians were instructed to report whether their child usually ate the food item before the pandemic (previous usual intake) and whether there was a change (increase, decrease, or no change) in their child's intake of the item during the pandemic. The questionnaire also included aspects about the parent's/guardian's perception of change in the family and child's diet. Three categories were assigned to the dietary changes: 'improved', 'worsened', or 'not changed'.

Evaluation of the Frequency of Intake of Ultra-Processed Cariogenic Foods

Parents/guardians also answered questions about the frequency of intake of food items in the past three months. A questionnaire developed by the authors containing a list of ultra-processed cariogenic food items and an intake frequency scale for each item was applied. Food items based on the report developed by the Pan American Health Organization (PAHO) on the intake of ultra-processed food and drinks in Latin America [22] were included. The five ultra-processed items indicated as the main sources of free sugars, according to the PAHO report, were considered: carbonated soft drinks; sweetened juices, drinks; candies (candy, caramel, lollipops, ice cream, chocolate); cakes, pastries, desserts; and cookies (biscuits) [22].

Parents/guardians were instructed to fill in the frequency of intake of each food item. The categories used for reporting the frequency of intake were: 'never or rarely', '1 to 2 times a week', '3 to 6 times a week', '1 to 2 times a day', '3 or more times a day'. The reported frequency categories were converted into a value indicating the daily intake of each food item. The values used in the conversion of the frequencies expressed in the questionnaire were: 'never or rarely' = 0; '1 to 2 times a week' = 0.214 (1.5 times/7 days a week); '3 to 6 times a week' = 0.643 (4.5/7); '1 to 2 times a day' = 1.5 (1.5/1); '3 or more times a day' = 3 (3/1). The daily intake frequency obtained for each of the food items with free sugars (range zero to three) was summed to obtain the equivalent daily frequency for the set of ultra-processed cariogenic foods (range zero to 15).

Evaluation of Parental Behavior during Children's Meals

To evaluate the parents' behavior relating to their children's food education, three domains of the Brazilian version of the Parental Mealtime Action Scale (PMAS) were used after being translated and validated for Brazilian Portuguese [23]. The domains used were 'Daily fruits and vegetables availability', 'Snack modeling', and 'Snack limit'. The domain 'Snack limit' reflects limits set by parents for daily intake of sweets. The domain 'Daily fruits and vegetables availability' indicates parents' intake of fruits and vegetables and their offer to children. Finally, the domain 'Snack modeling' reflects parents' intake of sweets, soft drinks, and snacks. A one-to-three-point rating scale ('never' = 1; 'sometimes' = 2; 'always' = 3) was used to obtain the guardians' reports on how often they adopt each behavior. Each domain's value was acquired from the sum of the answers for each question divided by the number of questions in the domain (three), then this result was used as a numerical variable (range one to three for each domain). For the first and third domains, higher averages represented a greater frequency of behavior by those responsible for their children's nutritional education. For the second domain, higher averages represented a less favorable behavior to the child`s oral health [23].

Statistical Analyses

The statistical data analysis was performed using the SPSS software (IBM Corp., IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY, USA). Non-parametric tests were used to evaluate the association between variables due to the asymmetric distribution of the data. The median daily intake of ultra-processed cariogenic foods was divided into 'high UCF intake' and 'low UCF intake'. The independent variables were categorized as follows: degree of kinship to the child ('mother/father' or 'other'), level of education of the guardian ('less than or equal to 8 years of formal education' or 'more than 8 years of formal education'), marital status of the guardian - married/in a common-law marriage 'yes' or 'no'), and sex of the child ('male' or 'female'). The independent numerical variables - 'per capita household income', 'age of the child in years', and 'age of the guardian in years' – were measured using mean and median. The questions of PMAS were categorized into 'never', 'sometimes', and 'always', and assigned them a value of 1, 2, and 3, respectively. The value of each PMAS domain was obtained from the mean of the question.

The association between the previous usual food intake and dietary changes reported by the parents/guardians in the COVID-19 pandemic was analyzed using the Chi-square test. The association between food frequency was dichotomized into high and low intake, and the independent covariates were assessed using the Chi-square Test and Mann-Whitney Test. Variables with $p < 0.20$ in the univariate analyses were selected to construct the multiple Poisson regression model with robust variance for the response variable (intake of ultra-processed cariogenic foods), and kept in the final model those that provided the best fit and remained significant ($p < 0.05$) in the set of variables. A significance level of 5% was adopted.

Results

The vast majority of respondents were parents of children (97.6%), married/in a common-law marriage (60.6%), and with more than 8 years of formal education (85.7%). Children had a mean age of 3.7 years (SD= 1.0) and 51.3% were male (Table 1). None of the children met the exclusion criteria. Parents/guardians reported that most children had no dietary modifications during the pandemic (57%). However, for the parents, children's diet got worse in 19% and better in 24% of the cases during the pandemic. Table 2 shows the changes in the intake of each food. The biggest change occurred in the group of candies, in which 29.8% of parents/guardians reported an increase and 15.0% a decrease in the child's intake.

Table 1. Socioeconomic and demographic characteristics of the studied population.

Variables	N (%)
Sex of the child	
Female	327 (48.7)
Male	345 (51.3)
Degree of kinship to the child	
Mother/Father	653 (97.6)
Others	16 (2.4)
Married/In a common-law marriage	
Yes	403 (60.6)
No	262 (39.4)
Level of education of the guardian	
Less than or equal to 8 years of formal education	93 (13.8)
More than 8 years of formal education	576 (85.7)
Age of the child in years	
Mean (SD)	3.7 (1.0)
Median (Min - Max.)	4 (2 - 5)
Age of the guardian in years	
Mean (SD)	32.7 (7.3)

Median (Min-Max.)	32 (18–68)
Per capita household income in BRL	
Mean (SD)	685.94 (455.29)
Median (Min-Max)	600.00 (66.67-4,333.33)

SD = Standard Deviation; Min-Max. = Minimum and maximum; Values lower than 672 are due to missing data for the variable.

Table 2. Changes in the food intake of preschoolers during the covid-19 pandemic.

Variables	During the Pandemic, the Habit			Total
	Decreased N (%)	Did not Change N (%)	Increased N (%)	N (%)
Consuming Candies	100 (15.0)	368 (55.2)	199 (29.8)	667 (100.0)
Consuming sweetened drinks, juices	84 (12.7)	476 (71.8)	103 (15.5)	663 (100.0)
Consuming soft carbonated drinks	122 (18.7)	449 (68.8)	82 (12.6)	653 (100.0)

Values lower than 672 are due to missing data for the variable.

The children's frequency of intake of the evaluated ultra-processed cariogenic foods over the past three months is shown in Table 3. The ultra-processed cariogenic foods with the highest daily intake frequencies were sweetened juices/sweetened drinks, with a daily mean intake of 0.52 (SD=0.72), followed by cookies, with 0.37 (SD=0.48), and candies, with 0.35 (SD=0.49). The mean daily frequency of UCF intake was 1.63 (SD=1.75), the median was 1.07 (Minimum=0, Maximum=15) and the interquartile range was 1.49.

Table 3. Food intake frequency in preschoolers during the pandemic.

Variables	Frequency					Daily Mean (SD) (95% CI)	Median (Interquartile Range)
	Never/ Rarely N (%)	1 to 2 times a week N (%)	3 to 6 times a week N (%)	1 to 2 times a day N (%)	3 or more times a day N (%)		
Carbonated Soft Drinks	304 (45.8)	296 (44.6)	39 (5.9)	12 (1.8)	13 (2.0)	0.22 (0.46) (0.19 - 0.26)	0.21 (0.21)
Sweetened Juices/ Sweetened Drinks	169 (25.5)	261 (39.4)	134 (20.2)	64 (9.7)	34 (5.1)	0.52 (0.72) (0.47 - 0.58)	0.21 (0.64)
Candies	159 (24.1)	341 (51.7)	114 (17.3)	34 (5.2)	11 (1.7)	0.35 (0.49) (0.32 - 0.39)	0
Cakes, Pastries, Desserts	343 (52.2)	256 (39.0)	51 (7.8)	4 (0.6)	3 (0.5)	0.16 (0.29) (0.13 - 0.18)	0.21 (0.21)
Cookies (Biscuits)	123 (18.8)	352 (53.9)	137 (21.0)	30 (4.6)	11 (1.7)	0.37 (0.48) (0.34 - 0.41)	0.21 (0.43)

SD: Standard Deviation; Values lower than 672 are due to missing data for the variable.

When the frequency of intake of ultra-processed cariogenic foods was dichotomized into high and low, it was observed that high intake was associated with parents' lower level of formal education and lower availability of fruits or vegetables, assessed using PMAS (Table 4). This association is also shown in the multivariate regression model (Table 5).

Table 4. Association of frequency of intake of ultra-processed cariogenic foods and covariates in preschoolers during the pandemic.

Variables	Intake		Univariate Analysis		
	Low N (%)	High N (%)	p-value	Crude PR	CI95%
Level of education of the guardian			0.002*	1.377	1.121–1.692
Less than or equal to 8 years of formal education	35 (41.7)	49 (58.3)			
More than 8 years of formal education	313 (57.6)	230 (42.4)			
Married/In a common-law marriage			0.889	1.013	0.846–1.212

Yes	213 (55.8)	169 (44.2)			
No	133 (55.2)	108 (44.8)			
Sex of the child			0.443	0.934	0.784–1.112
Female	163 (54.0)	139 (46.0)			
Male	187 (57.0)	141 (43.0)			
Age of the child in years			0.091	1.274	0.962–1.686
2 to 3	62 (63.9)	35 (36.1)			
4 to 5	288 (54.0)	245 (46.0)			
Per capita household income in BRL					
Mean (SD)	700.83 (468.03)	682.98 (460.95)	0.444	1.000	1.000–1.000
Median (interquartile range)	616.66 (500.00)	579.16 (475.00)			
PMAS - Snack limits					
Mean (SD)	2.73 (0.47)	2.68 (0.49)	0.210	0.898	0.759–1.063
Median (interquartile range)	3.00 (0.33)	3.00 (0.67)			
PMAS - Snack modeling					
Mean (SD)	1.62 (0.41)	1.67 (0.42)	0.134	1.178	0.951–1.416
Median (interquartile range)	1.67 (0.67)	1.67 (0.67)			
PMAS - Daily fruits and vegetables availability					
Mean (SD)	2.55 (0.42)	2.43 (0.43)	<0.001*	0.707	0.587–0.853
Median (interquartile range)	2.67 (0.67)	2.33 (0.67)			

SD: Standard Deviation; *Statistically Significant; Values lower than 672 are due to missing data for the variable.

Parents with a lower level of education consumed 1.36 times more ultra-processed cariogenic foods when compared to those with a higher level of formal education (p=0.003). The lower the PMAS daily fruit and vegetables availability values, the higher the prevalence of intake of ultra-processed cariogenic foods (RP=0.716; 95%CI:0.592-0.866) (Table 5).

Table 5. Multivariate Poisson regression model with robust variance for intake of ultra-processed cariogenic foods.

Variables	p-value	Adjusted RP	CI (95%)
Level of education of the guardian			
More than 8 years of formal education		1	
Less than or equal to 8 years of formal education	0.003*	1.359	1.106–1.669
PMAS - Daily fruit and vegetables availability	0.001*	0.716	0.592–0.866

PR = Prevalence Ratio; CI = Confidence Interval; *Statistically Significant; Values lower than 672 are due to missing data for the variable.

The analyses made showed that there was no significant difference between the group that answered the form in its physical version and the group that used the virtual version regarding formal education (p=0.060), per capita income (p=0.068), and age of the responsible person (p=0.245).

Discussion

This study showed that the COVID-19 pandemic modified the intake of ultra-processed cariogenic foods in preschoolers. The factors associated with high intake of this group of food items were the parents'/guardians' lower level of formal education and lower values in the domain 'daily fruits and vegetables availability', which reflects the intake of these food items by parents and their offer to children. No studies investigating specifically the intake of ultra-processed cariogenic foods during the pandemic were found; however, some studies have investigated changes in food intake in children during this period [5,7,10-13].

This study showed that almost half of parents/guardians reported a change in the quality of their children's food intake. In a survey conducted in France [13], 60% of the parents of 498 children from 3 to 12 years old reported a change in at least one dimension of their children's eating behavior during the restrictive measures when compared to the previous period. In Brazil [11], in a study with 1003 parents of children from 0

to 12 years old, 61.5% of parents/guardians reported changes in their children's eating habits during the pandemic. The modifications have occurred to a greater or lesser degree depending on the period or place where they happened. These changes reveal the need for family monitoring of aspects of eating behavior to evaluate and minimize the impacts observed during the pandemic. Within the reported changes in children's food intake, increased or decreased intake of certain food items [5,7,10,11,13] were observed. A systematic review assessed eating behavior during COVID-19 and indicated changes in food consumption, characterized by an increased frequency of snacking and a preference for sweets and ultra-processed foods over fruits, vegetables, and fresh foods [24]. Among the reasons that could lead to this modification of eating habits during the pandemic are increased food insecurity [10] and the confinement itself, which modified parental eating practices [25] by decreasing people's ability to acquire fresh food, increased consumption of takeout, and a preference for long shelf-life foods to minimize going out to buy groceries [26].

The literature indicates that parental education can influence the intake of unhealthy foods [27], even during the pandemic [13]. In this study, the association between parents'/guardians' level of formal education and the intake of ultra-processed cariogenic foods was demonstrated. Children of parents with a lower level of formal education consumed more ultra-processed cariogenic foods than children of parents with more than 8 years of education. The literature shows that low parental education is related to lack of access to information and lower purchasing power of families, which triggers inappropriate eating practices such as increased consumption of UFC [28]. The pandemic led to a crisis in the food supply and distribution system and an increase in food insecurity due to the decrease in household income, which can be more aggressive in those with low education [26]. A lower level of education may be associated with negative changes in eating behavior, indicating that parents/guardians with different levels of education may exhibit different eating behaviors during the pandemic [13,27].

Even before the covid pandemic, the literature indicated a high intake of ultra-processed foods in young children in Brazil [29]. This food intake profile shows increased availability of energy-rich, nutrient-poor, and sugar-sweetened snacks and drinks, especially in low and middle-income countries, where home-cooked meals are replaced by ultra-processed foods [30]. The consumption of ultra-processed foods is related to several adverse health outcomes, particularly in children, as shown in a recent systematic review. These outcomes include poor nutritional quality of the diet, adiposity and lipid profile changes, overweight, poor dietary practices, respiratory diseases, and an increased occurrence of dental caries [31]. Childhood eating practices contribute to lifelong nutritional habits and are influenced by family attitudes and eating patterns [20]. Changes in food intake are mainly influenced by income and food demand [32], both of which were affected during the pandemic [33]. The increasing trends in the consumption of ultra-processed foods verified in Brazil [34] may have influenced the result of our study, however, it should be considered that was also an increase in the purchase of ultra-processed foods during the confinement period [12]. As a consequence of home confinement, children started having their meals exclusively at home, which increases parental responsibility in food preparation and changes their eating practices [10], especially within the working from home context.

The excessive consumption of sugary drinks is a risk factor for the development of several chronic diseases [35], and its consumption has remained high, especially in countries burdened by diet-related chronic diseases [36]. In our study, the ultra-processed food that showed the highest increase in consumption was sweetened juices/sweetened drinks, which is consistent with literature data that indicate higher consumption of this type of ultra-processed beverage when compared to other foods [37]. One factor that could favor a more expressive increase in sweetened juices/sweetened drinks over other CFUs would be the fact that young children

regularly consume sweetened fruit drinks, in part because parents may falsely believe them to be healthy due to the claims and images on the front of the package [38].

The results pointed out that, regarding parents' behavior during children's meals, the lower the values of the 'daily fruits and vegetables availability' domain of PMAS, the higher the prevalence of intake of ultra-processed cariogenic foods. Thus, it can be considered that a family in which parents offer fruits and vegetables to their children and also consume this type of food, acting as a model, usually has a low intake of ultra-processed cariogenic foods. A nationwide study [39] showed that mothers' fruit intake influenced their children's attitudes and behavior toward fruit intake, highlighting the importance of the parental model in the child's dietary profile. The other PMAS domains assessed were not associated with a high intake of ultra-processed cariogenic foods in the multiple analysis. In the studied group, offering and consuming food items from a 'healthy' category was the most important factor in defining the frequency of intake of ultra-processed cariogenic foods. Thus, parental modeling showed a greater positive impact on feeding than setting limits.

On the other hand, a systematic review with meta-analysis [40], which included studies out of the pandemic context, demonstrated that parenting may depend on the context of food intake and the child's age. It also indicated that regarding the intake of healthy foods, active guidance and education may be more effective, while regarding the intake of unhealthy foods, rules and guidelines may be more effective. Yet, the particular context of social isolation, which narrowed family relationships, must be taken into account.

Because the pandemic brought several difficulties for the elaboration and development of epidemiological surveys, the results of this study must be analyzed in light of its limitations. Among them, the differences in the way the questionnaire was delivered (physically or virtually) may have resulted in selection bias. It should also be pointed out that this is a cross-sectional study and the attribution of causality to its results needs to be confirmed in longitudinal research.

Conclusion

The pandemic of COVID-19 affected the lives and daily lives of the population globally, and in our study, we observed that modifications in the consumption of ultra-processed foods in preschoolers occurred. Furthermore, this change in consumption was associated with parents' low education level and parental behavior during the child's mealtime. Therefore, considering the data found in our work, we suggest that parents make more fruits, vegetables, and healthy foods available to their children to attempt to reduce the consumption of ultra-processed foods.

Authors' Contributions

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All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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