

Consumption of ultra-processed foods and screen exposure of preschoolers living in a region of high social vulnerability in São Paulo, Brazil

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ABSTRACT

Introduction: There is a worldwide increase in the consumption of ultra-processed foods, including among preschoolers. The screen exposure time demands attention to the consequences of this habit. Studies on the consumption of ultra-processed and the screen exposure time are scarce in the literature. **Objective:** To analyze the frequency of consumption of soft drinks, industrialized juice, sweets, and fast foods and the screen exposure time of preschoolers. **Methods:** Cross-sectional study with 218 children (mean age 2.5±0.9 years), attending a Non-Governmental Organization, in the city of São Paulo, Brazil. Data were collected using a semi-structured form filled out by the person responsible for the preschoolers. Social and environmental data, food frequency consumption, and exposure to screens were systematized to perform statistical analyses. **Results:** More than 30.0% of children consume sugar-sweetened beverages more than once a week, 35.8% consume sweets daily and 42.7% consume fast foods monthly. Half of the preschoolers are exposed to distractions at mealtime and 70.0% have a contact for more than an hour/day. Screen exposure time was significantly related ($p < 0.0001$) to children's age, consumption of soft drinks, and frozen foods. **Conclusion:** Among preschoolers, there is a high exposure to ultra-processed foods and screens, the latter associated with the consumption of soft drinks and frozen foods. This information reinforces the need for careful look and actions directed at families with preschoolers and residents of socially vulnerable regions.

Keywords: child, preschool; eating; Fast food; television; child nutrition.

INTRODUCTION

In the last decades, important changes in the life habits of the population have been observed, among them changes in the habits and type of food consumed, influenced by a succession of aspects related to urbanization, economic conditions, family structure, and a reduction in the level of physical activity due to the rise of technology¹.

In this context, rapid changes in the food system have influenced the increased availability of foods and beverages with a high degree of processing in household

How to cite this article: Leite et al.

Consumption of ultra-processed foods and screen exposure of preschoolers living in a region of high social vulnerability in São Paulo, Brazil. *ABCS Health Sci.* 2022;47:e022217
<https://doi.org/10.7322/abcshs.2020129.1584>

Received: Aug 14, 2020

Revised: Feb 19, 2021

Approved: Apr 06, 2021

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Declaration of interests: nothing to declare



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meals, and this consumption profile is already observed frequently among young children², a scenario that arouses reflection about the quality of food being offered in childhood, a period in which the adequate supply of nutrients plays an essential role in growth and development³.

Traditional meals, usually consisting of foods such as meat, grains, beans, milk/dairy products, vegetables, and fruits, are being replaced by the so-called, according to the new classification, ultra-processed foods⁴. These are highly palatable, affordable foods and beverages, usually pre-prepared or ready-to-eat, formulated with substances derived or extracted from foods, with extensive use of additives, and presented in sophisticated and attractive packaging⁴.

Ultra-processed products can be considered foods with an inadequate nutritional profile since they commonly have high levels of sodium, sugars, and fats in their composition⁵. According to the dietary guidelines for Brazilian children under 2 years of age⁶, these products, exemplified as cookies and crackers, artificial juices, soft drinks, packaged snacks, instant noodles, and sweets, should not be part of a child's diet.

Among the foods mentioned above, sugar-sweetened beverages such as soft drinks, juices, and artificial juices also hurt diet quality. They have low nutritional value, are limited to the supply of sugars, do not offer the same satiety as solid foods, and are associated with excessive consumption of calories among children⁷.

These changes in lifestyle habits are also reflected in how and where food is being consumed. It is no longer common for a family to sit down to a meal, and what we often see are children consuming food in front of the television or other distractions^{8,9}. Increased exposure to screens, such as watching television, using computers, playing video games, and using smartphones, is an important aspect to consider in discussions about changing eating patterns and the increasing prevalence of childhood overweight¹⁰.

According to the Brazilian Society of Pediatrics (SBP), the recommendation for children aged 2 to 5 years is a maximum of 1 hour per day of exposure to screens and sedentary activities¹¹. Furthermore, the Ministry of Health, in a guideline directed to children under two years of age, recommends that this age group should not be exposed to this type of resource, and recommends that it be replaced by activities that stimulate the child's interaction, colors, shapes, gestures, and reasoning⁶.

Studies on the consumption of ultra-processed foods among preschoolers and the time of exposure to screens are scarce in the literature. The existing research confirms the increase in consumption of these foods among young children, however, it assigns another focus to the discussion, such as maternal characteristics¹², reflexes on the child's health¹³, and breastfeeding¹⁴.

As food and exposure to screens are relevant factors, especially among children, in which habits adopted in childhood have a guiding role on health¹⁵ and considering that the literature

on screen time and its possible influences on food and its consequences are sparse¹⁶, we sought to describe and analyze these aspects in a socially vulnerable population residing in one of the largest capital cities in the country.

The objective of the present study was to analyze the frequency of consumption of soft drinks, processed juices, sweets, and fast food and the time of exposure to screens among preschool children attending a non-governmental organization located in a region of high social vulnerability in the city of São Paulo.

METHODS

This is a cross-sectional, descriptive, and analytical study, with the use of primary data. It was carried out, from a convenience sample, with the guardians whose preschoolers were frequenters of a Non-Governmental Organization (NGO), located in a region of high vulnerability in the southern zone of the city of São Paulo.

Data collection was carried out in 2017. On days previously scheduled by the NGO, the guardians were invited to attend the institution for re-enrollment and were informed about the research. They were then invited to sign the Informed Consent Form (ICF) and fill out the form on the child's living habits. The project was submitted and approved by the Research Ethics Committee, under opinion number 2.108.942.

All preschoolers were evaluated before inclusion in the convenience sample for the existence of any pathology or specific dietary restriction that could influence their lifestyle habits, to avoid undue conclusions from the results. In addition, all the guardians who were able to answer the questions and agreed to participate voluntarily by signing the informed consent form were included in the study.

The questionnaire for the collection of information was prepared online, and each person responsible was supervised and oriented by employees of the NGO and trainees from the Nutrition course, both for help in filling it out, since it was done by computer and for clearing up any doubts about the questions.

The question form initially asked for demographic information, which was: date of birth, educational level of the person responsible, and the number of people living in the house.

As for food, a food frequency questionnaire (FFQ), was used as an instrument, which asked about the child's usual food intake. The FFQ prepared and applied to the study population was adapted¹⁷ and had questions about several food groups, since its application was part of a course completion work whose objective was to evaluate the quality of food consumption of preschoolers.

From the existing database, the selection of the types of food included in the present study was based on the markers of unhealthy food consumption described by the Brazilian Ministry of Health¹⁸, the analysis included, according to the research objectives, the frequency of consumption of sweets; frozen, sausage, processed,

canned or preserved foods; fast food (sandwiches, pizzas, and the like); and sugary drinks - soft drinks and processed juices.

Through individual questions, the person responsible for the preschooler indicated which alternative referred to the frequency that the child consumed the food group described. For the analyses, the frequencies reported in the FFQ were categorized as 1 to 3 times per month, per week, or day.

Also based on the same document¹⁸, two questions about screen exposure were asked. The first question asked whether the child usually eats while watching television or doing another activity to distract him or her (yes or no), and the second question asked the average time the child spends watching television or interacting with screens each day (the alternatives were no television, 30 minutes, 1 hour, 2 hours, 3 or more hours).

For the analysis of the results, the answers from the questionnaires were reviewed to check for discrepancies. In the first step, the variables were organized in descriptive tables of absolute and relative frequency for better knowledge and description of the sample. To verify possible associations between each socio-environmental and food consumption dependent variable and the independent variable for adequacy of screen exposure, the Chi-square test was used. All statistical analyses were performed in the statistical program STATA/SE, version 15.1, considering the significance level at 5%.

RESULTS

The questionnaire was filled out by 218 caretakers, whose mean age was 31.1 years (minimum of 18 and maximum of 68 years) and 81.2% (177) were female. More than half of the caretakers had completed high school education and most of the households had 4 to 5 residents (Table 1).

Table 1: Socio-environmental characteristics of the person responsible for preschoolers attending a Non-Governmental Organization in the municipality of São Paulo, Brazil (n=218).

	n	%
Sex		
Female	177	81.2
Male	41	18.8
Age		
18 to 25 years old	57	26.1
25 to 35 years old	99	45.4
35 years or older	62	28.5
Education		
Incomplete primary education	31	14.2
Complete primary education	47	21.6
High school	119	54.6
Higher education	21	9.6
Number of residents in the residence		
2 to 3	96	44.0
4 to 5	106	48.6
6 or more	16	7.4

Regarding the preschoolers whose guardians answered the questionnaires, the mean age was 2.5±0.9 years, with 52.8% (115) males. As for the frequency of food consumption, it can be observed (Table 2) that more than half consume soft drinks, processed juice, and sweets on a weekly or daily basis. As for the consumption of fast food type foods, consumption is monthly among most preschoolers (42.7%).

Approximately 70.0% of the study population is exposed to screens for more than one hour a day, the maximum time recommended by the World Health Organization. Table 3 shows that 25.0% of preschoolers have access to screens for more than 2 hours a day and that half (50.5%) are exposed to some type of distraction, screens among them, during meal times.

Table 2: Percentage of frequency of food intake of preschoolers according to the average age of children in years. São Paulo, Brazil (n=218).

Variable	N	Frequency (%) of consumption	Average age in years
Soda			
Does not consume	71	32.57	1.94
1 to 3x/month	37	16.97	2.75
1 to 3x/week	75	34.40	2.91
1 to 3x/day	35	16.06	2.60
Industrialized Juice			
Does not consume	48	22.02	1.77
1 to 3x/month	19	8.72	2.75
1 to 3x/week	78	35.78	2.78
1 to 3x/day	73	33.49	2.66
Sweets			
Does not consume	28	12.84	1.57
1 to 3x/month	18	8.26	2.45
1 to 3x/week	94	43.12	2.69
1 to 3x/day	78	35.78	2.66
Fast food			
Does not consume	52	23.85	1.78
1 to 3x/month	93	42.66	2.69
1 to 3x/week	59	27.06	2.95
1 to 3x/day	15	6.88	2.19

Table 3: Exposure to screens during the day and distractions (screens or other activity) during meal times among preschoolers attending a Non-Governmental Organization in the municipality of São Paulo, Brazil (n=218).

Variable	N	Frequency (%)
Screen exposure time during the day		
No exposure	23	10.55
30 minutes	40	18.35
1 to 2 hours	100	45.87
More than 2 hours	55	25.23
Distractions during meals		
Yes	110	50.46
No	108	49.54

Table 4 presents the characteristics of preschoolers, caregivers, and households according to the time of exposure to screens during the day, in which statistical significance was observed only with the age of the children ($p < 0.0001$).

As for the associations between daily screen exposure and food consumption (Table 5), it was observed that exposure time had a significant relationship ($p < 0.0001$) with the consumption of soft drinks and frozen foods.

DISCUSSION

The findings of this study indicate a high exposure to junk food and screens among preschoolers, highlighting the need for a more careful look at vulnerable populations. Studying and understanding the influence of food environments and socioeconomic context on these inadequacies in food consumption and exposure to screens is an important way to support and promote actions and public policies that aim to allow these families the opportunity to choose to adopt healthier eating and living habits.

Faced with the recommendation that ultra-processed foods, such as the groups analyzed in this study, should not be part of

the child's diet^{6,20}, it can be seen that preschoolers of younger ages were those who did not consume or consumed less frequently the foods mentioned. On the other hand, daily or weekly consumption was observed among older preschoolers, suggesting that there is care regarding the supply of food in the initial phase of complementary feeding, but that this care tends to be less present as time goes by.

Similarly to what was found in the present study, it can be observed that there is already important participation of ultra-processed foods in the diet of Brazilian children under 3 years^{21,22}, in different regions of the country^{13,14}, and that this consumption increases with age, in parallel with the decrease in the intake of fresh foods or foods with a low degree of processing²³. This pattern is being established in childhood and, according to recent literature reviews, is positively associated with markers of body fat during childhood and adolescence^{24,25}, as well as with inflammatory biomarkers²⁶.

Soft drinks, processed juices, and sweets were the most consumed foods among children. The consumption of these foods in childhood reflects the search for convenience by parents, who

Table 4: Child, person responsible, and household characteristics according to screen exposure time during the day. São Paulo, Brazil (n=218).

Variable	Exposure to screens		χ^2
	Adequate* n (%)	Inadequate n (%)	
Sex			
Female	26 (25.2)	77 (74.8)	0.259
Male	37 (32.2)	78 (67.8)	
Age (child)			
6 months to 1 year	11 (57.9)	8 (42.1)	<0.001
> 1 year up to 2 years	26 (46.4)	30 (53.6)	
>2 years up to 3 years	19 (24.1)	60 (75.9)	
>3 years up to 4 years	7 (10.9)	57 (89.1)	
Age (Responsible person)			
18 to 25 years old	18 (31.6)	39 (68.4)	0.552
25 to 35 years old	25 (25.2)	74 (74.3)	
35 years or older	20 (32.3)	42 (67.7)	
Education (Responsible person)			
Incomplete primary education	13 (41.9)	18 (58.1)	0.402
Complete primary education	13 (27.7)	34 (72.3)	
High school	32 (26.9)	87 (73.1)	
Higher education	5 (23.8)	16 (76.2)	
Number of residents in the residence			
2 to 3	31 (32.3)	65 (67.7)	0.615
4 to 5	28 (26.4)	78 (73.6)	
6 or more	4 (25.0)	12 (75.0)	

χ^2 – Chi-square test

* Adequate: <1 hour per day of screen exposure

Table 5: Association between food consumption and exposure time to screens of preschoolers attending an NGO. São Paulo, Brazil (n=218).

Food/Frequency of food consumption	Exposure to screens		χ^2
	Adequate* n (%)	Inadequate n (%)	
Soda			
Does not consume	29 (40.8)	42 (59.2)	<0.001
1 to 3x/month	8 (21.6)	29 (78.4)	
1 to 3x/week	10 (13.3)	65 (86.7)	
1 to 3x/day	16 (45.7)	19 (54.3)	
Industrialized Juice			
Does not consume	20 (41.7)	28 (58.3)	0.196
1 to 3x/month	5 (26.3)	14 (73.7)	
1 to 3x/week	20 (25.6)	58 (74.4)	
1 to 3x/day	18 (24.7)	55 (75.3)	
Frozen, sausage, processed, canned, or pickled foods			
Does not consume	34 (38.2)	55 (61.8)	<0.001
1 to 3x/month	4 (10.0)	36 (90.0)	
1 to 3x/week	11 (18.0)	50 (82.0)	
1 to 3x/day	14 (50.0)	14 (50.0)	
Sweets			
Does not consume	11 (39.3)	17 (60.7)	0.413
1 to 3x/month	3 (16.7)	15 (83.3)	
1 to 3x/week	27 (28.7)	67 (71.3)	
1 to 3x/day	22 (28.2)	56 (71.8)	
Fast food			
Does not consume	15 (29.4)	36 (70.6)	0.939
1 to 3x/month	25 (26.9)	68 (73.1)	
1 to 3x/week	18 (30.5)	41 (69.5)	
1 to 3x/day	5 (33.3)	10 (66.8)	

χ^2 – Chi-square test

* Adequate: <1 hour per day of screen exposure

have an important workload and lack of time²⁷ and prioritize ease of access and cost since these foods have attractive prices to the consumer in addition to greater palatability and practicality²³.

Relvas et al.²⁸, observed a high consumption of ultra-processed foods among children also in the metropolitan region of São Paulo, where the higher consumption of these foods showed a positive association with the lower level of maternal education, a relevant factor considering the reality of high vulnerability regions, commonly found in the country and like the one studied in this study.

On this aspect, the fact that the population studied is located in a peripheral region and with low social indicators, which can be characterized as a food desert, in which access to whole or minimally processed foods tends to be scarcer or unlikely, also needs to be considered. On the other hand, there is an accumulation of retail stores, establishments that, for the most part, prioritize the supply and facilitate access to processed and ultra-processed foods^{29,30}.

A significant proportion of children exposed to screens for more than one hour a day and also to distractions during meal times were noted. The Brazilian Society of Pediatrics highlighted some damages caused by excessive screen time, among them eating disorders such as for overweight/obesity, anorexia/bulimia, sedentary lifestyle, and psychological and cognitive disorders¹¹.

Studies associating aspects of food intake and nutritional status with screen time in childhood are limited, which makes it difficult to compare the results found in the present research. A review that addressed risk factors in early life for the development of childhood obesity highlighted the importance of further investigations on this topic in young children¹⁶.

We found that consumption of frozen foods and soft drinks was associated with screen exposure time, supporting the findings of previous studies^{31,32}, including a systematic review of the literature³³, that screen exposure is related to unhealthy food consumption.

These are foods commonly advertised in television advertisements, which may be a possible justification for this observed association. An analysis of the type of food advertised on Brazilian television showed that about 60% of the ads refer to ultra-processed foods, confirming the opposition between what is presented to the public and what is recommended by the Dietary Guidelines for the Brazilian population³⁴.

In light of the above, the increasingly early access to screens has raised concern, since it provides a window for food^{35,36}, advertising and propaganda. Experimental studies show that food marketing has a direct influence on children's preferences, with all the articulation and use of images, characters, and colors. There is also the façade of "healthy eating", influencing not only the children but also the family providers in the acquisition of these products^{22,37}.

Therefore, health and education professionals must awaken parents' perception and caution regarding the exposure of children to screens, which is occurring early, for a long period of the day, and also during meal times³⁸.

Given the findings, this is a relevant study, given that there are few publications in the literature that have analyzed the consumption of ultra-processed foods and the time of exposure to screens in preschool children in a region of social vulnerability. However, the present study has limitations to be considered. The instrument used was not previously validated, and even though the questions asked were related to children's usual consumption, memory bias cannot be completely ruled out. The questionnaires in this study were self-completed, and even with the constant presence of an assistant in this process, there may be mistakes in the answers. It is also worth mentioning that those responsible for the children were not always their parents, another aspect that can influence the veracity of the answers filled out.

All these characteristics may attenuate or reinforce some associations and/or effects among the aspects studied here. Considering the wide range of factors that influence eating and cultural habits, further studies are needed for a better understanding of such factors and their concomitant effects on the quality of life of preschool children.

This does not exclude that, concomitantly, actions are taken to promote healthy living and eating habits, implemented through educational programs for mothers and families.

We conclude, therefore, that there is a high exposure to non-recommended foods and screens among preschoolers attending an NGO, associated with the consumption of soft drinks and frozen foods. This information reinforces the need for a careful look and actions directed at families with preschool children and residents of regions of high social vulnerability.

These actions must be maintained during childhood and consolidated during adolescence to avoid or at least reduce the consequences of these inappropriate habits in adulthood.

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