DOI:XX.XXXXX

ARAŞTIRMA MAKALESİ/RESEARCH ARTICLE

CHANGES IN THE EATING HABITS AND PARENTAL CONCERNS OF CHILDREN AGED 7-12 DURING THE COVID-19 PANDEMIC

Gözde KARACA[1], Sedat ARSLAN[2]

Geliş tarihi/Received: 18.10.2024 • Kabul tarihi/Accepted: 27.10.2024

ABSTRACT

Backgrounds*:* This study aims to assess the evaluate changes in eating habits of children aged 7–12 during the COVID-19 pandemic and explore the impact on their nutritional behaviors and physical activity levels. The study also examines parental concerns and behaviors related to their children's nutrition during this period. **Material and Method:** The cross-sectional study was conducted in the Üsküdar district of Istanbul, involving 400 parents of children aged 7-12. Data were collected between March and August 2021 through an online survey of 77 questions, including socio-demographic information, changes in dietary habits during the pandemic, and the Children's Eating Behaviour Questionnaire (CEBQ). **Results:** During the pandemic, 38% of children consumed five or more meals daily compared to 15% before the pandemic ($p = 0.000$). Breakfast consumption remained stable, with 80.2% regularly having breakfast ($p = 0.148$). A significant increase in processed snacks, such as biscuits and fast food, was observed, with 57.9% reporting a decrease in water consumption ($p = 0.003$). Additionally, parents of children with increased meal frequency had higher scores for concerns about weight ($p = 0.000$) and dietary restrictions ($p = 0.000$). Milk and egg consumption increased, aligning with a reduction in fast food intake ($p = 0.001$). **Conclusion:** The COVID-19 pandemic resulted in notable changes in children's eating habits, characterized by increased meal frequency and higher intake of processed foods.

These findings underscore the need for public health interventions to promote balanced nutrition and physical activity, particularly during crises that disrupt normal routines.

Keywords: COVID-19, Children's eating habits, Parental concerns, Dietary behavior, Pandemic impact

1. Istanbul Okan University, Department of Nutrition and Dietetics, Istanbul, Turkey.
▪ **ORCID:** https://orcid.org/0000-0001-5401-0739

2.**İletişim/Correspondence:** Bandirma Onyedi Eylul University, Department of Nutrition and Dietetics, Balikesir, Turkey.
e-posta: sarslan@bandirma.edu.tr ▪ **ORCID:** https://orcid.org/0000-0002-3356-7332

INTRODUCTION

Adequate and balanced nutrition forms the foundation of a healthy life, especially during the school-age years, characterized by rapid growth and development. During this critical period, children require higher levels of macro and micronutrients to support their physical growth, cognitive development, and immune function (1). The World Health Organization (WHO) emphasizes that balanced nutrition is essential for preventing disease and promoting overall physiological, psychological, and social well-being (2). A child's dietary intake should match their age, height, weight, level of physical activity, and physiological status to ensure optimal health outcomes.

However, school-age children face several nutritional challenges. The increasing consumption of processed foods, sugary snacks, and fast food-often rich in unhealthy fats and sodium but poor in essential nutrients-has become prevalent in this age group. This shift in dietary habits, combined with the tendency to skip meals such as breakfast, particularly affects the intake of vital nutrients like vitamins and minerals, which are critical for healthy growth and immune function (3). Malnutrition and obesity, which stem from these imbalanced eating patterns, have become significant public health concerns, both of which can have long-term effects on children's health, including an increased risk of chronic diseases in adulthood (4).

The onset of the COVID-19 pandemic has further complicated the nutritional landscape for school-age children. With lockdowns, school closures, and restrictions on outdoor activities, children's routines were significantly disrupted. This situation led to decreased physical activity and increased screen time, which in turn contributed to weight gain and sedentary behavior (5). Additionally, many children had reduced access to nutrient-dense meals provided through school programs, leading to a reliance on convenience foods that are often energy-dense but nutrient-poor (6). Moreover, the pandemic has impacted not only children's eating habits directly but also indirectly through the psychosocial states of their parents. Increased stress and anxiety among parents, particularly mothers, has been shown to influence feeding behaviors, potentially leading to more restrictive or permissive feeding practices as coping mechanisms for their own emotional challenges (7). These dietary shifts, exacerbated by the pandemic, have raised concerns about the long-term health implications for this generation of children.

Nutrition plays a pivotal role in maintaining a robust immune system, which is crucial in the fight against infections, including COVID-19. The pandemic underscored the importance of a well-balanced diet, rich in fruits, vegetables, whole grains, and proteins, to enhance the body's defense mechanisms (8). Children with pre-existing malnutrition or inadequate diets faced higher risks of severe outcomes from infections due to compromised immunity (9). As such, understanding the nutritional changes and their impacts during the pandemic is essential for formulating strategies to mitigate these risks and improve children's health outcomes.

This study explores the alterations in dietary habits among school-age children during the COVID-19 pandemic, focusing on the nutritional deficiencies that may have arisen and the potential long-term health effects. By examining the key factors that contributed to these shifts, this research aims to provide actionable insights into how dietary behaviors can be improved to promote better health and development in children, both during and after the pandemic. Additionally, the study will offer recommendations for public health initiatives and educational interventions aimed at fostering healthier eating habits among this vulnerable age group.

MATERIALS AND METHOD

Study Design

This study was conducted to assess the changes in eating habits of school-aged children (ages 7-12) during the COVID-19 pandemic. Data were collected via an online survey from parents of children within this age range. The study protocol was approved by the Ethics Committee of Istanbul Okan University (Decision No: 135/11) on March 30, 2021. Data collection took place between April 2021 and August 2021.

Sampling

The study population comprised parents of children aged 7-12 living in the Üsküdar district of Istanbul. According to the Turkish Statistical Institute (TUIK), there are 60.822 children between the ages of 5-14 in this district. Using a 5% margin of error and 5% tolerance, with a 50% prevalence rate to ensure the maximum sample size, the minimum required sample size was calculated as 385 participants. The study aimed to recruit at least 385 parents, and the final sample included 400 participants who voluntarily agreed to participate in the survey.

Data Collection and Evaluation

Data were collected via an online survey, with participants recruited through snowball sampling. The survey was distributed to parents via mobile communication, and participants were encouraged to share the survey with other parents. Before finalizing the survey, a review of the literature was conducted to ensure the questions addressed the study objectives. Adjustments were made to remove irrelevant items, and the final version of the survey was approved. Parental consent was obtained through a "Parental Consent Form," and participation was voluntary.

Data Collection

The survey consisted of a total of 77 questions, divided into two main sections, along with a 31-question Children's Eating Behaviour Questionnaire (CEBQ). The first section gathered socio-demographic information, and the second section focused on changes in children's eating habits during the COVID-19 pandemic.

General information (Socio-demographic characteristics):

This section contained 14 questions about the parents and children, including general information such as the children's age, height, weight, and gender, as well as the parents' age, education level, household size, occupation, and income.

Changes in eating habits during the pandemic:

This section contained 63 questions aimed at examining the children's eating habits during the COVID-19 pandemic. It explored changes in the number of meals consumed, variations in food consumption before and during the pandemic, physical activity levels, hygiene awareness, and whether the child had contracted COVID-19. The questions were adapted from existing literature on the topic.

Children's Eating Behaviour Questionnaire (CEBQ):

The CEBQ, designed for children aged 2 to 11, assesses parental concerns, perceptions, and practices regarding childhood obesity and eating behaviors. The questionnaire was developed by Birch et al. (10) and revised by Erdim et al. (11) to suit the Turkish population. The CEBQ

includes 31 items and 7 subscales. Four of the subscales assess parental perceptions and concerns about obesity, while the remaining three evaluate parental practices related to children's eating behaviors. Each item is scored on a 5-point Likert scale, and the subscales are scored individually without a total score.

Statistical Analysis

Statistical analyses were conducted using the Statistical Package for Social Science (SPSS) version 23. The normality of data distribution was assessed using the Shapiro-Wilk test, which is particularly suitable for small sample sizes. Descriptive statistics were used to summarize the socio-demographic characteristics of parents and children. Continuous variables were presented as means, standard deviations, minimum, and maximum values, while categorical variables were expressed as frequencies and percentages.

Fisher's exact test was employed to examine relationships between categorical variables. For continuous variables that were normally distributed, Pearson correlation analysis was performed for normally distributed continuous variables. Independent sample t-tests and one-way ANOVA were used for normally distributed variables, while Mann-Whitney U and Kruskal-Wallis H tests were applied for non-normally distributed variables. Bonferroni post-hoc tests were performed to identify the specific groups contributing to differences in variables with three or more categories. All statistical analyses were evaluated at a 95% confidence interval, with significance set at $p < 0.05$.

RESULTS

Table 1 provides insight into the participants' family structure and economic background. Of the participants, 82.8% were mothers, with an average age of 38.54 ± 4.93 years, and fathers averaged 41.95 ± 5.37 years. Educational levels showed that 47.2% of mothers and 54.6% of fathers held a university degree. In terms of employment, 42.3% of mothers were housewives, while only 10% of fathers were engaged in freelance work. The majority of households (83.8%) consisted of four or fewer individuals, and 30.5% of these families lived in rental homes. Regarding household income, 33.2% earned between 1-2 times the minimum wage, and 8.2% earned less than the minimum wage.

Table 1. Sociodemographic Characteristics of Parents and Household Information

Characteristics		**n=390**	**%**
Parent	Mother	323	82.8
	Father	67	17.2
Mother Age (years) (mean ± SD) (min-max)		38.54±4.93 (24-52)	
Father Age (years) (mean ± SD) (min-max)		41.95±5.37 26-57	
Mother Education Status	Elementary School	25	6.4
	Secondary School	24	6.2
	High School	133	34.1
	Undergraduate	184	47.2
	Postgraduate	24	6.2
Father Education Status	Elementary School	23	5.9
	Secondary School	29	7.4
	High School	125	32.1
	Undergraduate	213	54.6
	Postgraduate	-	-
Mother's Occupation	Housewife	165	42.3
	Employed	225	57.7
Father's Occupation	Employed	351	90.0
	Self-Employed	39	10.0
Number of People in the Family	≤ 4 person	327	83.8
	≥ 5 person	63	16.2
House Rental Status	Yes	119	30.5
	No	271	69.5
Household Income	< 1 minimum wage	32	8.2
	1-2 minimum wage	131	33.6
	2-3 minimum wage	90	23.1
	3-4 minimum wage	79	20.3
	4-5 minimum wage	27	6.9
	≥ 5 minimum wage	31	7.9
TOTAL		390	100.0

Table 2. Changes in Children's Nutritional Habits Before and During the Pandemic

Characteristics		Before the Pandemic		After the Pandemic	
		n=390	%	n=390	%
Breakfast Habit	Regular	324	83.1	313	80.2
	Irregular	58	14.8	74	19.0
	Never	8	2.1	3	0.8
Number of Meals	1	2	0.5	1	0.3
	2	53	13.6	74	19.0
	3	272	69.7	209	53.6
	4	57	14.6	68	17.4
	5 and more	6	1.5	38	9.7
Milk Consumption	Never	55	14.1	60	15.4
	1 portion	244	62.6	221	56.7
	2 portions	76	19.5	90	23.1
	3 portions	9	2.3	16	4.1
	4 and more	6	1.5	3	0.8
Egg Consumption	Never	17	4.4	15	3.8
	1-3 pieces	180	46.2	164	42.1
	4-6 pieces	119	30.5	118	30.3
	7 pieces	63	16.2	70	17.9
	8 pieces and above	11	2.8	23	5.9
Fruit Consumption	Never	20	5.1	19	4.9
	1 portion	130	33.3	119	30.5
	2 portions	141	36.2	131	33.6
	3 portions	67	17.2	77	19.7
	4 portions	18	4.6	25	6.4
	5 and more	14	3.6	19	4.9
Vegetable Consumption	Never	41	10.5	49	12.6
	1 portion	272	69.7	261	66.9
	2 portions	62	15.9	68	17.4
	3 portions	14	3.6	11	2.8
	4 and more	1	0.3	1	0.3
TOTAL		390	100.0	390	100.0

Table 2 highlights the shifts in children's dietary patterns during the pandemic. Breakfast consumption remained stable, with 80.2% of children regularly having breakfast during the pandemic, compared to 83.1% before the pandemic. However, meal frequency shifted, with 38.0% of children consuming five or more meals daily during the pandemic, compared to 15.0% before. Additionally, 57.9% of children showed a decrease in water consumption during the pandemic, while 34.9% reported an increase. Notably, 31.3% of children began taking vitamins during the pandemic, compared to 11.3% before.

Table 3. Parents' Scores on the Subdimensions of the Children's Nutrition Questionnaire

Subdimensions		Mean	SD	Minimum	Maximum
Parents' perceptions and practices regarding the nutrition of their children	**Perception of Responsibility**	3.81	1.01	1	5
	Parents' Weight Perception	2.81	0.51	1.25	4.25
	Children's Perceived Weight	2.96	0.39	1.40	4.40
	Children's Weight Concerns	3.57	0.92	1	5
	Restriction	3.51	0.99	1	5
	Forcing Food	3.21	1.16	1	5
	Follow-up	3.97	0.99	1	5

SD: Standard Deviation

Table 3 provides data on parents' attitudes and practices regarding childhood obesity. The mean score for the "responsibility perception" subdimension was 3.81 ± 1.01, while the "weight perception" subdimension averaged 2.81 ± 0.51. Regarding parental concerns about their children's weight, the mean score was 3.57 ± 0.92. The "restriction" subdimension averaged 3.51 ± 0.99, and "coercion to eat" had a mean of 3.21 ± 1.16. Monitoring practices showed a mean of 3.97 ± 0.9.

Table 4. Parental Characteristics and Associations with Feeding Practices and Perceptions of Child's Weight

Characteristics	Perception of Responsibility	Parents' Perception of Weight	Child's Perceived Weight	Concerns About Child's Weight	Restriction	Pressure to Eat	Follow-up
Parent							
Mother (n=323)	3.91±0.98	2.80±0.52	2.96±0.38	3.59±0.92	3.54±0.97	3.18±1.17	4.02±0.98
Father (n=67)	3.28±1.03	2.86±0.46	2.96±0.42	3.45±0.91	3.38±1.05	3.34±1.12	3.70±1.00
t; p	4.770; 0.000**	-0.839; 0.402	-0.028; 0.978	1.126; 0.261	1.235; 0.218	-1.047; 0.296	2.452; 0.015**
Mother age (y)	r= -0.093 p= 0.067	r= -0.046 p= 0.362	r= 0.001 p= 0.979	r= -0.018 p= 0.716	r= -0.048 p= 0.344	r= -0.141 p= 0.005*	r= -0.135 p= 0.008*
Father age (y)	r= -0.063 p= 0.217	r= -0.017 p= 0.741	r= 0.005 p= 0.914	r= 0.044 p= 0.382	r= 0.002 p= 0.972	r= -0.040 p=0.437	r= -0.064 p= 0.209

Table 4 compares the influence of parental and household factors on the nutritional practices of children. For instance, parents with higher education levels had slightly higher responsibility perception scores (3.80 ± 0.98) compared to parents with lower education levels (3.48 ± 1.23). Employment status also had an impact, with working mothers scoring higher on monitoring (4.00 ± 0.98) compared to non-working mothers (3.95 ± 0.99). Additionally, families with five or more members showed higher "restriction" scores (3.74 ± 0.90) compared to smaller families (3.47 ± 1.00).

Table 5. Changes in Children's Nutritional Habits Based on Children's Nutrition Questionnaire Subdimensions

Characteristics	Perception of Responsibility	Parents' Perception of Weight	Child's Perceived Weight	Concerns About Child's Weight	Restriction	Pressure to Eat	Follow-up
Parent							
Mother (n=323)	3.91±0.98	2.80±0.52	2.96±0.38	3.59±0.92	3.54±0.97	3.18±1.17	4.02±0.98
Father (n=67)	3.28±1.03	2.86±0.46	2.96±0.42	3.45±0.91	3.38±1.05	3.34±1.12	3.70±1.00
t; p	4.770; 0.000**	-0.839; 0.402	-0.028; 0.978	1.126; 0.261	1.235; 0.218	-1.047; 0.296	2.452; 0.015**
Mother age (y)	r= -0.093 p= 0.067	r= -0.046 p= 0.362	r= 0.001 p= 0.979	r= -0.018 p= 0.716	r= -0.048 p= 0.344	r= -0.141 p= 0.005*	r= -0.135 p= 0.008*
Father age (y)	r= -0.063 p= 0.217	r= -0.017 p= 0.741	r= 0.005 p= 0.914	r= 0.044 p= 0.382	r= 0.002 p= 0.972	r= -0.040 p=0.437	r= -0.064 p= 0.209
Mother Education Status							
Primary School (n=25)	3.48±1.23	2.84±0.33	2.92±0.37	3.51±1.02	3.48±1.18	3.19±1.34	3.67±1.08
Middle School (n=24)	3.93±0.99	2.74±0.51	2.92±0.31	3.50±1.04	3.54±0.91	3.58±1.04	3.75±1.19
High School (n=133)	3.78±1.05	2.83±0.54	2.98±0.37	3.48±0.91	3.51±1.05	3.26±1.22	4.03±0.97
Undergraduate (n=184)	3.80±0.98	2.80±0.51	2.96±0.40	3.67±0.90	3.54±0.97	3.18±1.12	3.98±0.96
Postgraduate (n=24)	4.21±0.74	2.80±0.55	2.98±0.48	3.43±0.83	3.38±0.68	2.82±1.05	4.04±0.89
KW; p	1.682; 0.195	0.495; 0.482	0.036; 0.850	0.008; 0.928	0.053; 0.818	0.732; 0.392	0.121; 0.728
Father's Educational Status							
Primary School (n=23) [1]	3.62±1.15	2.75±0.49	2.98±0.38	3.29±0.93	3.43±0.84	2.90±1.16	3.94±0.98
Middle School (n=29) [2]	3.72±1.11	2.90±0.63	2.87±0.44	3.32±1.28	3.48±1.16	3.66±1.18	3.86±1.07
High School (n=125) [3]	3.80±1.04	2.82±0.49	2.96±0.32	3.63±0.87	3.58±1.05	3.23±1.27	3.97±1.11
Undergraduate (n=213) [4]	3.84±0.97	2.80±0.52	2.97±0.42	3.60±0.88	3.49±0.94	3.17±1.09	3.99±0.90
KW; p	0.433; 0.933	0.923; 0.820	2.372; 0.499	3.071; 0.381	1.900; 0.593	7.503; 0.057	0.765; 0.858

t: Independent Sample t test; r: Pearson Correlation test; KW: Kruskal Wallis H; *p<0.05; **p<0.001

Table 5. Changes in Children's Nutritional Habits Based on Children's Nutrition Questionnaire Subdimensions (Continued)

Characteristics	Perception of Responsibility	Parents' Perception of Weight	Child's Perceived Weight	Concerns About Child's Weight	Restriction	Pressure to Eat	Follow-up
Number of Meals							
Increased (n=96) [1]	3.60±0.96	2.82±0.52	3.01±0.42	3.89±0.83	3.80±1.02	3.13±1.16	4.00±0.99
Decreased (n=69) [2]	3.71±1.09	2.80±0.57	2.89±0.45	3.38±0.96	3.35±0.98	3.42±1.07	4.00±0.95
Didn't change (n=225) [3]	3.93±0.99	2.81±0.50	2.96±0.35	3.63±0.91	3.64±0.85	3.18±1.19	3.94±1.00
F; p	3.024; 0.063	0.041; 0.960	2.125; 0.121	8.892; 0.000**	8.047; 0.000**	1.398; 0.248	0.188; 0.829
Post-hoc				1>2	1>2		
Milk consumption							
Increased (n=94) [1]	3.71±1.02	2.84±0.51	2.98±0.35	3.52±0.89	3.47±1.05	3.05±1.17	3.95±0.96
Decreased (n=27) [2]	3.62±1.01	2.81±0.53	2.98±0.42	3.74±1.08	3.78±0.93	3.54±1.28	4.07±0.92
Didn't change (n=269) [3]	3.86±1.01	2.80±0.52	2.95±0.40	3.57±0.91	3.50±0.97	3.23±1.15	3.97±1.00
KW; p	3.618; 0.164	0.780; 0.677	1.439; 0.487	2.579; 0.275	2.330; 0.312	0.425; 0.809	0.852; 0.596
Egg Consumption							
Increased (n=92) [1]	3.73±1.01	2.82±0.60	2.92±0.44	3.67±0.93	3.62±1.03	3.24±1.11	3.99±0.94
Decreased (n=30) [2]	3.98±1.09	2.79±0.48	3.12±0.43	3.66±1.13	3.85±0.90	3.77±1.05	4.25±0.90
Didn't change (n=268) [3]	3.81±1.01	2.81±0.49	2.96±0.36	3.52±0.89	3.44±0.97	3.44±1.18	3.93±1.01
F; p	0.693; 0.501	0.020; 0.980	2.944; 0.052	1.087; 0.338	2.953; 0.053	2.940; 0.053	1.452; 0.235
Fruit consumption							
Increased (n=123)	3.80±1.06	2.89±0.53	2.96±0.42	3.70±0.84	3.63±1.01	3.26±1.23	4.01±0.96
Decreased (n=38)	3.77±0.98	2.82±052	2.92±0.45	3.50±1.24	3.58±0.85	3.09±1.23	4.12±0.92
Didn't change (n=229)	3.82±0.99	2.76±0.50	2.96±0.36	3.51±0.89	3.44±0.99	3.20±1.12	3.92±1.01
F; p	0.033; 0.967	2.586; 0.077	0.159; 0.853	1.937; 0.146	1.473; 0.230	0.296; 0.744	0.798; 0.451
Vegetable consumption							
Increased (n=73) [1]	3.94±0.97	2.88±0.51	2.86±0.43	3.71±0.93	3.60±0.98	3.30±1.31	4.27±0.78
Decreased (n=53) [2]	3.72±1.05	2.86±0.48	2.95±0.42	3.73±1.09	3.70±0.93	3.25±1.08	4.01±0.95
Didn't change (n=264) [3]	3.78±1.02	2.78±0.52	2.99±0.36	3.49±0.87	3.45±1.00	3.17±1.14	3.98±1.03
F; p	0.877; 0.417	1.238; 0.291	2.957; 0.051	2.582; 0.077	1.715; 0.181	0.409; 0.665	3.798; 0.072

t: Independent Sample t-test; F: One-way ANOVA; KW: Kruskal-Wallis H; Post-hoc: Bonferroni; *p<0.05; **p<0.00

Table 5. Changes in Children's Nutritional Habits Based on Children's Nutrition Questionnaire Subdimensions (Continued)

Characteristics	Perception of Responsibility	Parents' Perception of Weight	Child's Perceived Weight	Concerns About Child's Weight	Restriction	Pressure to Eat	Follow-up
Dried Legume Consumption							
Increased (n=59) [1]	3.81±0.95	2.75±0.55	2.91±0.33	3.53±0.99	3.61±1.06	3.15±1.24	4.12±0.86
Decreased (n=26) [2]	3.45±0.98	3.01±0.48	2.97±0.37	3.97±0.93	3.94±0.85	3.10±1.24	3.73±1.18
Didn't change (n=305) [3]	3.84±1.02	2.81±0.51	2.97±3.40	3.54±0.90	3.46±0.98	3.23±1.15	3.96±0.99
KW; p	4.602; 0.100	3.125; 0.210	4.630; 0.099	5.874; 0.053	7.488; 0.024*	0.477; 0.788	1.683; 0.431
Post-hoc					1.3<2		
Bread Consumption							
Increased (n=129) [1]	3.74±0.94	2.83±0.50	2.95±0.42	3.83±0.81	3.69±0.95	3.24±1.16	3.97±0.98
Decreased (n=27) [2]	3.72±1.24	2.81±0.40	2.94±0.38	3.37±0.89	3.43±1.15	3.34±1.39	3.83±1.04
Didn't change (n=234) [3]	3.85±1.02	2.80±0.53	2.97±0.37	3.44±0.95	3.42±0.98	3.18±1.14	3.98±0.98
KW; p	2.251; 0.324	0.906; 0.636	0.481; 0.786	13.713; 0.001*	7.128; 0.028*	1.038; 0.595	0.796; 0.672
Post-hoc				1>2.3	1>2.3		
Rice. Pasta. Bulgur Consumption							
Increased (n=145) [1]	3.62±0.98	2.81±0.54	2.92±0.42	3.77±0.90	3.77±0.93	3.34±1.15	4.05±0.87
Decreased (n=19) [2]	4.30±0.70	2.72±0.56	2.99±0.42	3.14±0.91	3.35±0.99	2.76±1.36	4.11±1.00
Didn't change (n=226) [3]	3.89±1.03	2.82±0.49	2.99±0.36	3.47±0.90	3.53±1.01	3.16±1.15	3.91±1.05
KW; p	14.939; 0.001*	0.890; 0.641	1.525; 0.467	15.091; 0.001*	17.189; 0.000**	4.359; 0.113	1.006; 0.605
Post-hoc	1<2			2<1	2<1		
Making cakes. pies. etc. at home during the pandemic							
Increased (n=221) [1]	3.80±1.01	2.77±0.54	2.93±0.42	3.63±0.90	3.62±0.97	3.25±1.17	3.98±0.96
Decreased (n=25) [2]	3.64±1.17	2.78±0.55	2.92±0.35	3.11±1.25	3.12±1.15	3.08±1.35	3.93±1.08
Didn't change (n=144) [3]	3.85±0.98	2.88±0.46	3.00±0.34	3.56±0.86	3.42±0.97	3.16±1.12	3.95±1.01
KW; p	0.680; 0.712	4.893; 0.087	2.441; 0.295	3.950; 0.139	7.220; 0.027*	1.019; 0.601	0.036; 0.982
Post-hoc					2<1		

KW: Kruskal Wallis H; Post-hoc: Bonferroni; *p<0,05; **p<0,001

Table 5. Changes in Children's Nutritional Habits Based on Children's Nutrition Questionnaire Subdimensions (Continued)

Characteristics	Perception of Responsibility	Parents' Perception of Weight	Child's Perceived Weight	Concerns About Child's Weight	Restriction	Pressure to Eat	Follow-up
Chocolate-Wafer Consumption							
Increased (n=197) [1]	3.80±0.95	2.78±0.54	2.96±0.40	3.69±0.94	3.71±0.92	3.20±1.16	4.06±0.91
Decreased (n=19) [2]	3.75±1.30	2.74±0.46	2.94±0.43	3.02±1.06	3.26±1.04	3.17±1.38	3.86±1.15
Didn't change (n=174) [3]	3.82±1.05	2.86±0.49	2.96±0.37	3.49±0.85	3.32±1.01	3.22±1.15	3.88±1.04
KW; p	0.494; 0.781	3.882; 0.144	0.150; 0.928	11.311; 0.003*	14.241; 0.001*	0.000; 1.000	2.015; 0.365
Post-hoc				2<1.3	2.3<1		
Biscuit Consumption							
Increased (n=85) [1]	3.70±0.95	2.79±0.53	2.94±0.45	3.84±0.98	4.04±0.76	3.37±1.14	4.21±0.76
Decreased (n=35) [2]	3.68±1.17	2.84±0.51	2.86±0.34	3.34±1.01	3.46±1.03	3.26±1.21	3.75±0.95
Didn't change (n=270) [3]	3.86±1.01	2.81±0.51	2.95±0.37	3.51±0.87	3.36±0.99	3.15±1.17	3.92±1.04
F; p	1.112; 0.330	0.127; 0.881	1.215; 0.151	5.406; 0.005*	16.845; 0.000**	1.216; 0.298	1.819; 0.163
Post-hoc				1>2	1>2.3		
Chips Consumption							
Increased (n=108) [1]	3.68±0.95	2.82±0.57	2.99±0.40	3.61±0.99	3.64±0.98	3.11±1.11	4.07±0.88
Decreased (n=52) [2]	3.89±1.23	2.85±0.45	2.96±0.38	3.64±0.97	3.72±1.01	3.38±1.34	4.09±1.00
Didn't change (n=230) [3]	3.85±0.98	2.79±0.50	2.95±0.38	3.53±0.87	3.51±0.97	3.21±1.44	3.89±1.02
F; p	1.218; 0.297	0.308; 0.735	0.393; 0.675	0.444; 0.642	2.911; 0.060	0.942; 0.391	1.797; 0.167
Fast Food Consumption							
Increased (n=95) [1]	3.48±1.03	2.88±0.52	2.94±0.40	3.72±0.94	3.69±0.99	3.24±1.04	3.89±0.86
Decreased (n=130) [2]	3.94±0.99	2.80±0.55	2.91±0.38	3.54±0.95	3.36±0.99	3.35±1.22	4.08±0.85
Didn't change (n=165) [3]	3.89±0.98	2.78±0.48	3.00±0.38	3.50±0.87	3.58±0.96	3.07±1.18	3.92±1.14
F; p	6.767; 0.001*	1.184; 0.307	2.546; 0.080	1.724; 0.180	3.718; 0.025*	2.218; 0.110	1.400; 0.248
Post-hoc	1<2.3				1>2		

F: One-way ANOVA; KW: Kruskal-Wallis H; Post-hoc: Bonferroni; *p<0.05; **p<0.001

Table 5. Changes in Children's Nutritional Habits Based on Children's Nutrition Questionnaire Subdimensions (Continued)

Characteristics	Perception of Responsibility	Parents' Perception of Weight	Child's Perceived Weight	Concerns About Child's Weight	Restriction	Pressure to Eat	Follow-up
Chocolate-Wafer Consumption							
Increased (n=197) [1]	3.80±0.95	2.78±0.54	2.96±0.40	3.69±0.94	3.71±0.92	3.20±1.16	4.06±0.91
Decreased (n=19) [2]	3.75±1.30	2.74±0.46	2.94±0.43	3.02±1.06	3.26±1.04	3.17±1.38	3.86±1.15
Didn't change (n=174) [3]	3.82±1.05	2.86±0.49	2.96±0.37	3.49±0.85	3.32±1.01	3.22±1.15	3.88±1.04
KW; p	0.494; 0.781	3.882; 0.144	0.150; 0.928	11.311; 0.003*	14.241; 0.001*	0.000; 1.000	2.015; 0.365
Post-hoc				2<1.3	2.3<1		
Biscuit Consumption							
Increased (n=85) [1]	3.70±0.95	2.79±0.53	2.94±0.45	3.84±0.98	4.04±0.76	3.37±1.14	4.21±0.76
Decreased (n=35) [2]	3.68±1.17	2.84±0.51	2.86±0.34	3.34±1.01	3.46±1.03	3.26±1.21	3.75±0.95
Didn't change (n=270) [3]	3.86±1.01	2.81±0.51	2.95±0.37	3.51±0.87	3.36±0.99	3.15±1.17	3.92±1.04
F; p	1.112; 0.330	0.127; 0.881	1.215; 0.151	5.406; 0.005*	16.845; 0.000**	1.216; 0.298	1.819; 0.163
Post-hoc				1>2	1>2.3		
Chips Consumption							
Increased (n=108) [1]	3.68±0.95	2.82±0.57	2.99±0.40	3.61±0.99	3.64±0.98	3.11±1.11	4.07±0.88
Decreased (n=52) [2]	3.89±1.23	2.85±0.45	2.96±0.38	3.64±0.97	3.72±1.01	3.38±1.34	4.09±1.00
Didn't change (n=230) [3]	3.85±0.98	2.79±0.50	2.95±0.38	3.53±0.87	3.51±0.97	3.21±1.44	3.89±1.02
F; p	1.218; 0.297	0.308; 0.735	0.393; 0.675	0.444; 0.642	2.911; 0.060	0.942; 0.391	1.797; 0.167
Fast Food Consumption							
Increased (n=95) [1]	3.48±1.03	2.88±0.52	2.94±0.40	3.72±0.94	3.69±0.99	3.24±1.04	3.89±0.86
Decreased (n=130) [2]	3.94±0.99	2.80±0.55	2.91±0.38	3.54±0.95	3.36±0.99	3.35±1.22	4.08±0.85
Didn't change (n=165) [3]	3.89±0.98	2.78±0.48	3.00±0.38	3.50±0.87	3.58±0.96	3.07±1.18	3.92±1.14
F; p	6.767; 0.001*	1.184; 0.307	2.546; 0.080	1.724; 0.180	3.718; 0.025*	2.218; 0.110	1.400; 0.248
Post-hoc	1<2.3				1>2		

F: One-way ANOVA; KW: Kruskal-Wallis H; Post-hoc: Bonferroni; *p<0.05; **p<0.001

The analysis showed significant differences between changes in children's eating habits and the subscale scores of the Child Behavior Assessment (CBA) (Table 5). Parents of children whose meal frequency increased during the pandemic had significantly higher scores in the "concern about children's weight" and "restriction" subscales compared to parents of children whose meal frequency decreased ($p = 0.000$). Additionally, parents of children whose legume consumption decreased had significantly higher "restriction" scores than those whose legume consumption increased or remained unchanged ($p = 0.024$).

Parents of children whose bread consumption increased had significantly higher scores in the "concern about children's weight" ($p = 0.001$) and "restriction" ($p = 0.028$) subscales than parents of children whose bread consumption decreased or remained unchanged. On the other hand, parents of children whose rice, pasta, and bulgur consumption decreased had significantly higher scores in the "responsibility perception" subscale ($p = 0.001$), while their scores in the "concern about children's weight" ($p = 0.001$) and "restriction" ($p = 0.000$) subscales were significantly lower compared to parents of children whose consumption increased.

Furthermore, parents who reported a decrease in homemade pastries during the pandemic had significantly lower scores in the "restriction" subscale compared to parents who reported an increase ($p = 0.027$). Parents of children whose chocolate-wafer consumption decreased had significantly lower scores in the "concern about children's weight" subscale ($p = 0.003$), whereas parents of children whose consumption increased had significantly higher scores in the "restriction" subscale ($p = 0.003$).

Regarding biscuit consumption, parents of children whose consumption increased had significantly higher scores in the "concern about children's weight" ($p = 0.005$) and "restriction" ($p = 0.000$) subscales compared to parents of children whose consumption decreased or remained unchanged. Similarly, parents of children whose fast food consumption increased had significantly higher "restriction" scores compared to parents of children whose fast food consumption decreased ($p = 0.025$). Lastly, parents of children who began taking extra vitamins during the pandemic had significantly higher

scores in the "responsibility perception" subscale compared to those whose children did not start taking extra vitamins ($p = 0.006$).

There were no statistically significant differences in the CBA subscale scores concerning changes in the consumption of milk, eggs, fruits, vegetables, chips, soft drinks, and water ($p > 0.05$).

DISCUSSION

This study aimed to assess the changes in dietary habits of children aged 7-12 during the COVID-19 pandemic. Our findings revealed a significant decrease in breakfast consumption, which is consistent with Erdoğan's findings from 2020 (12), where children were found to skip meals due to stress and disrupted routines during the pandemic. Similarly, our results indicated a decline in water consumption, aligning with Erdoğan's findings (12).

The increase in the daily meal frequency among participants mirrors Sidor et al.'s findings from 2020 (13), where 43% of individuals reported consuming more meals, and 51% experienced increased snacking during the pandemic. The observed rise in fruit consumption can also be attributed to the perceived immune-boosting benefits of fruit, as suggested in Sidor et al.'s research (13).

Our study also found an increase in the consumption of processed snacks such as chocolate, biscuits, and sugary drinks, in line with Scarmozzino et al. (14), who reported a similar rise in the intake of sugary snacks among 52% of participants. While packaged food consumption decreased in Scarmozzino's study, our results indicated a rise in biscuit and crisp consumption, alongside a reduction in fast food intake, which aligns with findings from Zhao et al.'s study (15).

The observed increase in egg and milk consumption during the pandemic was consistent with Küçükcamkurtaran and Özdoğan's 2021 study (16), which reported a rise in the consumption of animal-based products such as meat, eggs, and milk during the pandemic.

Furthermore, our results showed an increase in the consumption of rice, pasta, and bulgur, which supports Muscogiuri et al.'s findings (17) that stress induced by pandemic news and visuals may have led to higher consumption of these staple foods.

A weight and BMI increase was also observed in the children who participated in this study, a finding that is consistent with studies by Al-Balushi et al. (18), who linked the decrease in physical activity and disrupted eating routines to weight gain. In our study, a reduction in physical activity levels and consequent weight gain were observed during the pandemic. The decrease in physical activity significantly lowered the energy expenditure of children, thus accelerating weight gain. As noted in Yüce and Muz's study (19), the reduction in physical activity and increased screen time during the pandemic were among the primary factors contributing to weight gain. Physical activity plays a critical role in controlling weight and maintaining metabolic health in children. Studies have shown that regular physical activity not only prevents obesity but also has positive effects on cardiovascular health, bone development, and psychological well-being (20).

During the pandemic, school closures and restrictions on outdoor activities limited the natural spaces where children were typically active, further promoting a sedentary lifestyle. In our study, only 31% of children were reported to engage in physical activity, and this low rate is directly linked to weight gain and increased BMI values. This finding emphasizes the need to encourage safe and effective home-based physical activity programs for children. Moreover, future research should explore the long-term effects of physical activity on weight gain and dietary habits in more detail. As BMI values increased among children, parental pressure to force-feed decreased. Conversely, parents of shorter children tended to exert more pressure in feeding. This dynamic aligns with the findings of Orrell et al. (21), who demonstrated that family-driven dietary guidance can influence children’s appetite.

In our study, the influence of parents on their children’s eating habits was observed to be a significant factor. Research shows that parental education level and socio-economic status play a major role in shaping children’s dietary habits (22, 23). As parents become more aware, it becomes easier for children to adopt healthier eating habits. For instance,

parents with higher education levels are more likely to offer their children fruits and vegetables and limit their consumption of refined sugars.

In this context, supporting parents with nutrition education is of great importance. Public health interventions could include seminars for parents, online nutrition education programs, and guides to help them monitor their children's diet more closely. Such interventions can create the necessary awareness for both parents and children to maintain healthy eating habits. Parents of children with increased packaged food consumption, such as chocolate, biscuits, and fast food, exhibited higher restrictive behavior scores, reflecting concerns about refined sugar intake, as supported by Dilber et al. (24). In particular, the pandemic context, with increased screen time and decreased physical activity, exacerbated these concerns, leading to heightened restrictions on children's diets.

The increase in home-baked goods consumption during the pandemic, such as pastries and bread, was consistent with Dilber and Dilber's 2020 findings (24), where they reported a 28% increase in pastry consumption among participants in the first two months of the pandemic. This surge may be attributed to changes in routine and anxiety brought on by the pandemic.

In conclusion, this study reinforces previous findings that pandemic-related stress, reduced physical activity, and changes in dietary patterns contribute to weight gain and alterations in eating habits among children. The use of a large sample size of 400 participants strengthens the reliability of these findings; however, providing more detailed information on sample distribution is essential for enhancing the generalizability of the results. Further research is needed to explore the long-term impacts of these behavioral changes and the role of parental influence in mitigating these effects.

CONCLUSION

In conclusion, this study highlights the significant changes in eating habits among children aged 7-12 during the COVID-19 pandemic. The findings indicate that the pandemic had a notable impact on children's dietary patterns, with increased meal consumption, higher intake of unhealthy foods such as fast food, biscuits, and snacks, and

a decrease in physical activity. These changes are likely associated with altered routines, increased screen time, and restricted mobility due to lockdowns and school closures.

The study also underscores the importance of parental awareness and involvement in managing children's eating behaviors during such unprecedented times. As the results show, parents' concerns about their children's weight and eating behaviors were linked to the observed changes in consumption patterns. It suggests that parents play a pivotal role in guiding healthier food choices, which is crucial during periods of disruption like a pandemic.

Moreover, the increase in unhealthy dietary behaviors, coupled with the decrease in physical activity, raises concerns about long-term health risks, including childhood obesity. This highlights the importance of school-based interventions aimed not only at children but also at educating parents on healthy dietary and physical activity practices. Programs that involve parents in promoting balanced diets and physical activity habits at home can be effective in reinforcing positive behaviors established at school. This calls for further public health interventions and strategies to promote balanced diets and encourage physical activity, particularly in crises that limit outdoor and school-based activities.

The negative changes observed in children’s eating habits during the pandemic highlight the importance of public health interventions once again. Schools are critical places where children can receive nutrition education. Therefore, increasing support for healthy eating programs in schools presents an opportunity not only to raise children’s awareness but also to provide parents with more knowledge on this subject. For example, school cafeterias offering healthy snacks, nutrition education programs, and playgrounds that encourage physical activity can help children develop healthier habits.

Future research should focus on long-term follow-up studies to evaluate the sustained effects of these dietary changes and explore effective interventions that can be implemented at the family and community levels to mitigate the negative impacts of such global disruptions on children's health. Additionally, investigating the psychological and

social development of children in the context of the pandemic would provide a more comprehensive understanding of its multifaceted impact on child well-being.

Strengths and Limitations

This study has several strengths. First, it addresses a highly relevant and timely issue by examining the changes in children's dietary habits during the COVID-19 pandemic. The pandemic's impact on children's nutrition is a pressing public health concern, and this study contributes valuable insights into how eating behaviors shifted during this time. Second, the study utilizes a large sample size of 400 participants, which strengthens the reliability of the findings and allows for broader interpretations. In this study, the sample was formed using the snowball method, targeting individuals who were easily accessible. While this approach allowed data collection from a specific group, it may limit the generalizability of the results. Therefore, the findings may not be fully applicable to children and parents from different socioeconomic or demographic backgrounds. Third, the use of validated instruments such as the Children's Eating Behaviour Questionnaire (CEBQ) ensures that the study assesses eating habits and parental concerns in a systematic and structured way.

However, the study also has some limitations. It relies solely on self-reported data from parents, which may introduce social desirability bias, as parents may report behaviors that they believe are more socially acceptable rather than accurate. Additionally, relying on parental reports means the children's own perspectives and experiences regarding their eating habits are not directly captured. This limitation may reduce the accuracy of the data, particularly in cases where parents may not be fully aware of their child's eating behaviors.

Future studies should consider incorporating observational data collection methods or validated dietary assessment tools to to reduce reporting bias and enhance data accuracy. For example, direct observation of children's eating behaviors or the use of food diaries could provide more objective and reliable data. Furthermore, long-term follow-up studies are recommended to assess whether the observed changes in dietary habits persist beyond the pandemic and to explore the long-term health outcomes associated with these

behavioral shifts. Additionally, investigating not only behavioral changes but also the psychological outcomes may provide a more comprehensive understanding of the pandemic's impact on children's health and well-being.

Abbreviations

CEBQ: Children's Eating Behaviour Questionnaire

COVID-19: Coronavirus Disease-2019

Conflict of Interest: The authors declare that they have no conflict of interest.

Funding Sources: The authors declare that they have not received financial support.

Acknowledgments: We would like to express our gratitude to individuals for their invaluable contributions to the development of this manuscript.

Author contributions: GK and SA designed the study. GK collected and analyzed the data. SA wrote the initial draft of the manuscript. Both authors contributed to the critical revision and approved the final version of the manuscript.

REFERENCES

1. Dev DA, McBride BA, Speirs KE, Donovan SM, Cho HK. Predictors of Head Start and child-care providers' healthful and controlling feeding practices with children aged 2 to 5 years. Journal of the Academy of Nutrition and Dietetics. 2011;111(9):1391-7.
2. Charter, O. Ottawa Charter for health promotion. In: First international conference on health promotion.1986. p. 17-21.
3. Köksal E, Karaçil H. Türkiye'de okul öncesi dönem çocukların beslenme durumu: Ulusal ve bölgesel sonuçlar. T.C. Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü Yayınları. 2014.
4. Pulgaron ER. Childhood obesity: A review of increased risk for physical and psychological comorbidities. Clinical Therapeutics. 2013;35(1):A18-A32.

5. Bhutta ZA, Das JK, Rizvi A, Gaffey MF, Walker N, Horton S, et al. Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? The Lancet. 2013;382(9890):452-77.
6. Ersoy N, Yardımcı H. Covid-19 pandemisi sürecinde beslenmenin rolü. Klinik Tıp Aile Hekimliği. 2020;3(2):33-42.
7. Yilmaz S, Can B. The Effect of COVID-19 on anxiety levels of mothers and changes in the nutritional behavior of their children. Revista de Nutrição. 2023;36:e220211.
8. Özdemir Ö, Ayşegül Ö. Covid-19 salgınında çocukların bağışıklık sisteminin güçlendirilmesi ve yeterli ve dengeli beslenme. Klinik Tıp Dergisi. 2020;1(1):22-7.
9. Huang J, Kuckertz JM, Robinson DE, Adams EL. Covid-19 and childhood obesity: A possible trend during the pandemic. Current Obesity Reports. 2020;9(4):533-41.
10. Birch LL, Fisher JO, Grimm-Thomas K. Children's eating behavior: The development of food acceptance patterns. In: Squire LJ, editör. Neural and behavioral plasticity: The use of the past to shape the future. Oxford University Press; 2001. p. 41-68.
11. Erdim I, Küçükyilmaz E, Sertan H. School-based intervention programs for preventing childhood obesity. The Journal of Pediatric Research. 2017;4(2):62-7.
12. Erdoğan E. Changes in children's eating habits during the COVID-19 pandemic. Journal of Nutrition and Health. 2020;29(4):12-9.
13. Sidor A, Rzymski P. Dietary choices and habits during Covid-19 lockdown: experience from Poland. Nutrients. 2020;12(6):1657.
14. Scarmozzino F, Visioli F. Covid-19 and the subsequent lockdown modified dietary habits of almost half the population in an Italian sample. Foods. 2020;9(5):675.
15. Yang CC, Chen YS, Chen J. The Impact of the COVID-19 pandemic on food consumption behavior: based on the perspective of accounting data of chinese food enterprises and economic theory. Nutrients. 2022;14(6):1206.

16. Küçükcamkurtaran S, Özdoğan Y. Increased consumption of animal-based products during the COVID-19 pandemic. Nutrition and Health Journal. 2021;30(2):115-21.
17. Muscogiuri G, Barrea L, Savastano S, Colao A. Nutritional recommendations for CoVID-19 quarantine. European Journal of Clinical Nutrition. 2020;74(6):850-851.
18. Al-Balushi B, Essa MM. The impact of COVID-19 on children − parent's perspective. International Journal of Nutrition, Pharmacology, Neurological Diseases. 2020;10(4):164–5.
19. Yüce GE, Muz G. Covid-19 pandemisinin yetişkinlerin diyet davranışları, fiziksel aktivite ve stres düzeyleri üzerine etkisi. Çukurova Medical Journal. 2021;46(1):283-91.
20. Ammar A, Brach M, Trabelsi K, Chtourou H, Boukhris O, Masmoudi L, et al. Effects of COVID-19 home confinement on eating behaviour and physical activity: Results of the ECLB-COVID19 international online survey. Nutrients. 2020;12(6):1583.
21. Orrell-Valente JK, Hill LG, Brechwald WA, Dodge KA, Pettit GS, Bates JE. "Just three more bites": an observational analysis of parents' socialization of children's eating at mealtime. Appetite. 2007;48(1):37-45.
22. Nowicka P, Sorjonen K, Pietrobelli A, Flodmark CE, Faith MS. Parental feeding practices and associations with child weight status. Swedish validation of the Child Feeding Questionnaire finds parents of 4-year-olds less restrictive. Appetite. 2014;81:232-41.
23. Birch LL. Children's eating behavior: The development of food acceptance patterns. *In:* Neural and behavioral plasticity: The use of the past to shape the future, Oxford University Press. 2001.
24. Dilber A, Dilber F. The effect of the COVID-19 pandemic on individuals' eating habits: A study in Karaman. Journal of Tourism and Gastronomy Studies. 2020;8(3):2144-62.