Original Article

BREAKFAST CONSUMPTION AND OBESITY AMONG PREADOLESCENTS: AN EPIDEMIOLOGICAL STUDY

Running title: BREAKFAST AND CHILDHOOD OBESITY

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Abstract

Background: This study aimed to examine the association between breakfast consumption and childhood weight status, in relation to various socioeconomic and lifestyle factors. **Methods:** A cross-sectional survey was conducted including 1728 children aged 10–12 years and their parents, during school years 2014–2016. Primary schools from five Greek counties (including Athens metropolitan area) were randomly selected. Parental and child data were collected through self-administered, anonymous questionnaires. Children's weight status was based on gender- and age-specific tables derived from the International Obesity Task Force (IOTF) body mass index (BMI) cutoffs. Logistic regression was used to determine the association between frequency and type of breakfast consumption and children's weight status. **Results:** The frequency of breakfast consumption was not associated with childhood overweight or obesity, not even when other factors were included in the analysis like sex, age, physical activity, meals/day, family annual income, parental weight status, parental physical activity level, parental educational level and parental employment status. From the 9 foods that were included only the consumption of bread or rusks and chocolate milk were found to have a negative association with childhood overweight or obesity (Odds Ratio (OR): 0.51; 95% CI: 0.34, 0.79 and OR: 0.50; 95% CI: 0.28, 0.87, respectively). **Conclusions:** The result that frequency of breakfast consumption was not associated with children's overweight/obesity may lead to a deeper investigation of the foods consumed during breakfast. Bread or rusks and chocolate milk seemed to have a protective effect; further nutritional analysis is needed to explore the potential mechanisms of this observation. **Keywords:** breakfast consumption, children obesity, children overweight, health promotion, type of breakfast

Background

Childhood obesity is recognized as a major public health problem in our century and has been described as a "global pandemic". [1] Globally, the number of obese boys and girls has increased almost 12 and 10 times, respectively, over the last 40 years. [2] Childhood obesity has been associated with early development of dilation, endothelial and cardiovascular dysfunction and atherosclerosis. [3] Furthermore, obesity has been recognized as a major risk factor for some severe chronic diseases, such as dyslipidemia, hypertension, type 2 diabetes mellitus, polycystic ovary system for girls and sleep disorders. [4] Moreover, obese children are more likely to develop psychological and psychiatric symptoms and disorders like depression, anxiety, attention-deficit/hyperactivity disorder, lower self-esteem and eating disorders. [5]

Breakfast is considered to be the most essential meal of the day, since it may have a protective role against chronic diseases and has been considered to increase the cognitive and school performance among children and adolescents. [6] Despite the benefits of breakfast consumption more and more children tend to abstain from this healthy habit. [7] Skipping breakfast has been associated with an increased risk of developing health problems, including cardiometabolic diseases and diabetes. Additionally, the frequency of breakfast consumption has been negatively associated with the development of childhood obesity. [8, 9]

However, the different types of breakfast and their impact on the development of obesity have not been studied yet. Thus, the aim of this study was to examine the different types of foods preferred for breakfast during childhood and their association with the development of obesity.

Methods

Participants and sampling procedures

The study was conducted in the greater metropolitan Athens area, in Heraklion, the capital City of the Island of Crete and in three main counties of the Peloponnese peninsula (Sparta, Kalamata, Pyrgos), during the school years 2014–2015 and 2015–2016. The specific regions were selected since they represent large urban and rural municipalities and therefore a more representative sample was obtained. Schools were selected using random sampling from a list of schools provided by the Greek Ministry of Education. In total, 47 schools were selected (32 from Athens, 5 from Heraklion, Crete, 3 from Pyrgos, 2 from Kalamata, and 5 from Sparta, Peloponnese). Parental written consent was obtained before enrolling children in the study. Participation rate ranged from 95% to 100% between schools, without any significant differences between the studied areas. A total of 1728 students (785 males), aged 10–12 years of age, attending the 5^{th} and 6^{th} grade of primary school, were enrolled in the study. All children's parents were also invited to participate, with 68.9% response rate being achieved (n = 1190). The working sample was adequate to evaluate effect size measures' differences of 20% at <5% level of significance, achieving 85% statistical power.

Children and parent questionnaires

Each child was asked by the study's researcher or the school teacher to complete an anonymous questionnaire. To increase the accuracy of responses, the study's investigators, in collaboration with children's teachers, assisted using practical examples. Children's questionnaire consisted of questions assessing daily activities, such as, dietary habits, physical activity (frequency and type), as well as questions about self-perceptions and stress management. For the purpose of the present study, information on (a) demographic characteristics (age, gender), (b) anthropometric measurements (height, weight, for BMI calculation) using scale and tape measure, over skin-tight clothes and (c) lifestyle characteristics (physical activity, overall dietary habits, as well as frequency of breakfast consumption, i.e., meals and snacks consumed daily, foods usually consumed for breakfast) were evaluated. Furthermore, adherence to Mediterranean diet was evaluated by a special and validated tool, the KIDMED score (Mediterranean Diet Quality Index for children and adolescents). The index is derived from 16 components, which summarize the inherent characteristics of the diet and the theoretical score ranges from 0 to 12. [10]

Parental questionnaires were given to the children, to be completed by any of their parents at home and they were asked to return the completed questionnaires to the school setting. In most cases, questionnaires were completed by one parent, usually by the mother (75%). Parental questionnaires consisted of questions on (a) anthropometric self-reported data (height, weight, for BMI calculation), (b) various family Socio-Economic Status (SES) (maternal and paternal educational level, maternal and paternal profession, annual income status) and (e) lifestyle characteristics (physical activity level).

Breakfast consumption

Specifically, frequency of breakfast consumption for children included the following categories: (i) never/almost never, (ii) 1-2 times/week, (iii) 3-4 times/week, (iv) 5-6 times/week, (v) every day. Meals and snacks consumed daily were categorized into (i) 1-2 / day, (ii) 3 / day, (iii) > 3 / day. The foods usually consumed for breakfast by children included: milk or chocolate milk (full fat or light), yogurt, cereals, fruit juice, honey/jam, bread/rusks, butter/margarine, and various types of cake/tsoureki (a type of sweet brioche)/bagel.

Parental and child weight categorization

For children, weight status was categorized using the age- and gender-specific International Obesity Task Force (IOTF) BMI cutoff criteria, [11] where child's BMI is related to the relevant adult's Body Mass Index (BMI), according to age in months and gender. Children were, therefore, also categorized as underweight, normal overweight, and obese. Under- and normal-weight categories were combined for children since the percent of the population that was underweight was limited. All associations were performed using underweight/normal BMI as the reference category. Weight status, however, was calculated by taking the mean value (for males and females), from the IOTF tables, for each weight category. Parental weight status was defined based on the World Health Organization (WHO) (BMI, in kg/m^2) cutoffs: underweight: <18.5 kg/m^2, normal weight: 18.5–24.9 kg/m^2, overweight: 25–29.9 kg/m^2, and obese: >30 kg/m^2. BMI was calculated as weight (in kilograms) divided by height (in meters) squared.

Socioeconomic status (SES) assessment

Socioeconomic status (SES) indicators included maternal–paternal profession, maternal–paternal educational attainment and annual income status. Educational attainment was categorized into: (i) primary education included all individuals having completes less than 9 years of schooling, (ii) secondary education included individuals having completed 12 years of mandatory formal education or attended to technical schools, (iii) higher education for all those that had a Bachelor degree, and (iv) post-graduate level education. Parental profession included categories usually found in Greece. Specifically, categories included: public servant, private sector employee, freelancer, pensioner, as well as unemployed. Annual family income status was categorized into: (i) <12.000€, (ii) 12-18.000€, (iii) 18-24.000€, (iv) 24-30.000€ and (v) >30.000€, according to the taxation criteria followed in Greece the past decade.

Bioethics

The study was approved by the Institute of Educational Policy of the Ministry of Education and Religious Affairs (code of approval F15/396/72005/C1) and was carried out in accordance with the Declaration of Helsinki (1989). The school principals, teachers, parents, and students were informed about the aims and procedures of the study. A signed parental consent was obtained before the completion of the questionnaires.

Statistical analysis

Group mean differences were tested using *t*-test, for normally distributed variables. Pearson's chi-square test was used to examine associations between categorical variables. Multiple logistic regression was used to determine the likelihood of children being overweight or obese (compared to healthy weight children), according to the frequency of breakfast consumption (never/almost never; 1-2 times/week; 3-4 times/week; 5-6 times/week; everyday). Additionally, multiple logistic regression was used to determine the likelihood of children being overweight or obese (compared to healthy weight children), according to the foods they usually consume for breakfast (milk; yogurt; cereals; fruit juice; honey/jam; bread/rusk; butter/margarine; cake/tsoureki/bagel; chocolate milk). Collinearity between the independent variables was tested using the variance inflation factor. Due to the high level of collinearity observed between KIDMED score and dietary factors entered in the models, the Mediterranean score was not included as confounder, but a stratified analysis by tertile of the KIDMED score was applied, instead. First-order interactions between KIDMED and dietary factors were tested. Two-sided hypothesis tests were considered with the level of significance set at alpha equal to 5%. All analyses were conducted using STATA 14.0 (Stata Corp LP, College Station, Texas, Ltd, M. Psarros and Assoc., Sparti, Greece).

Results

A total of 26.4% of male children were categorized overweight and 5.3% obese, whereas 18.2% of female children were categorized overweight and 3.1% obese (*p for gender differences*<0.001). In addition, 51.2% of fathers and 25.9% of mothers were categorized as overweight, and 18.3% of fathers and 7.2% of mothers were categorized as obese. Among normal weight fathers 19.7% of male and 15.1% of female children were overweight or obese. This increased to 34% and 20.3% for overweight fathers.

In **Table 1**, children and parental characteristics, including anthropometric, socio-economic status, and lifestyle factors, are depicted. No association was observed regarding the frequency of breakfast consumed and overweight or obese status of children (p=0.84). The vast majority of children reported consuming breakfast on an every-day basis. The types of breakfast consumed were: milk (77.8%) or chocolate milk (15.1%) (full fat or light), yogurt (9.9%), cereals (67.7%), fruit juice (27.2%), honey/jam (30.4%), bread/rusks (28.7%), butter/margarine (11.0%) and various types of cake/bagel or tsoureki (21.8%) (a type of sweet brioche). It was observed that overweight or obese children preferred consuming more frequently milk (74.0%) and cereals (64.8%). In addition, children's physical activity found to be associated with weight status, with 25.5% of overweight and 24.1% of obese children reporting that they did not have any kind of physical activity, except from the school program, compared to 19.4% of normal weight children (p=0.04). A strong association was also observed between paternal and children weight status, since the percentage of fathers

being obese was significantly higher among obese children compared to normal weight children (p=0.003). A similar association was also observed between maternal and children weight status ($p < 0.001$).
[Table 1]

To further evaluate the association between frequency and type of breakfast consumed, multi-adjusted analysis was applied. **Table 2** summarizes the odds of the frequency of breakfast consumption on the development of childhood overweight/obesity. Eating breakfast either occasionally or everyday seemed to reduce the possibility of becoming overweight or obese for the children; however, this association did not seem to be significant in any of the adjusted models (models were also adjusted for Socio-Economic Status (SES) indicators of the family). No significant interaction was observed between frequency of breakfast consumption and KIDMED score (p=0.78); nevertheless, stratified analysis by KIDMED score tertile revealed no differences in the odds of being overweight/obese in relation to frequency of breakfast consumed, by level of adherence to the Mediterranean diet (data not shown here).
[Table 2]

Table 3 shows the odds between the food items frequently consumed as breakfast by the children and their weight status. From the 9 foods only the consumption of bread or rusks and chocolate milk were found to have a negative association with childhood overweight or obesity (OR: 0.519; 95% CI: 0.340, 0.794 and OR: 0.500; 95% CI: 0.285, 0.879, respectively). Milk, yogurt, cereals and honey or jam were found to be negatively associated with overweight or obesity, while fruit juice, butter or margarine and cake/tsoureki or bagel were positively associated with overweight or obesity, nevertheless none of these associations were statistically significant. Moreover, no significant interaction were observed between all foods and beverages consumed during breakfast and KIDMED score (all p's >0.3).
[Table 3]

Discussion

The study aimed to examine the association between breakfast consumption, type of breakfast, and child overweight and obesity. The prevalence of overweight and obesity among children was not significantly associated with the frequency of breakfast consumption. This result did not change even when several potential confounders were considered, i.e., sex, age, physical activity, meals/day, family annual income, parental weight status, parental physical activity level, parental educational level and parental employment status. However, it was observed that consuming breakfast either sometimes or everyday compared to never was associated with a lower odds of becoming overweight or obese, although the association was not statistically significant. Moreover, it was revealed that children consuming bread or rusks (mainly whole grain) and chocolate milk for breakfast had significantly lower odds to become overweight or obese. Apart from that, milk, yogurt, cereals and honey or jam for breakfast were also found to have a protective role against overweight or obesity, while fruit juice, butter or margarine and cake/tsoureki or bagel were found to increase the odds of becoming overweight or obese, but none of these findings were significant. It is of interest that the presented findings did not alter by the level of adherence to the Mediterranean diet, as it was evaluated by the KIDMED score.

Almost 6 out of 10 of normal-weight, or overweight and 7 out of 10 of obese children reported consuming breakfast every day, while only 5-6 out of 10 of them, reported never/rarely eating breakfast. Frequency of breakfast consumption was not associated with overweight/obesity, an observation which is opposed to several previous studies indicating a significant negative association among children of the same age [9, 12, 13], but on the other hand, is consistent with recent studies, including children at the same age group, which found that overweight or obesity was not associated with breakfast consumption. [14-16] A possible explanation for the lack of such association could be the fact that the number of children not consuming breakfast at all was very small and as it has been noted in previous studies, skipping breakfast is more common among older children compared to younger ones. [9, 16, 17] Adolescence is a period when a lot of changes happen. During adolescence, children want to feel that they are making their own choices and sometimes they try to be opposed to their parents, so skipping breakfast may be part of that attitude. [17, 18] Since the sample of this study consisted of pre-adolescent children, they may not have those concerns so far, so they have not changed any of their habits yet, including breakfast consumption on a regular basis.

In addition, the different definitions and cut-off points for the diagnosis of obesity could also explain the different results of the studies. The current study was based on the age- and gender-specific International Obesity Task Force (IOTF) Body Mass Index (BMI) cut-offs for children. [11] However, World Health Organization (WHO) has recommended different cut-offs for overweight and obese children 5-19 years old, that are widely used in many studies. [19] Apart from that, there are other criteria used to define weight status among children across the studies, making it difficult to make comparisons among the studies. [20, 21] Moreover, the definitions of "breakfast" and "skipping breakfast" are not the same across the different studies, varying in type, time and frequency, so the different results may reflect these differences too. [22]

The study indicated that the consumption of bread or rusks (mainly whole grain) for breakfast reduces the risk of overweight/obesity at approximately 50%. This comes in contrast to the belief that bread and rusks

consumption leads to excess weight. In line with the above result, bread consumption and especially whole grain bread seems to have a possible protective role against weight gain, while the results for white bread are inconsistent. [23] The consumption of whole grain products, has been associated with lower BMI because of their lower energy density, lower glycemic index, increased content of dietary fibre, resistant starch and oligosaccharides and their ability to modulate intestinal microflora. [24] Regardless the type of bread or rusks consumed, they consist an important part of a healthy diet due to their source of protein, minerals and vitamins. [25] Thus, a moderate consumption of breakfast may not be as unhealthy as most people believe. Awareness about the impact of whole grain products on obesity might influence obese children to consume such products (and breakfast more frequently) so as to control their weight status.

Another outcome of this study was that children who used to consume chocolate milk for breakfast were 50% less likely to be overweight or obese. This observation is in agreement with most of the studies indicating a potential positive effect of flavored milk on weight management and health. [26] Both white and flavored milk were found to contribute very little to total energy, saturated fat, sodium, or added sugars, while they provided vitamin A, vitamin D, calcium, potassium, magnesium, and phosphorus. [27] However, it is also supported that flavored milk consumers had in general higher intake of total energy, saturated fat and added sugars daily compared to non-consumers, which may influence weight management. [28, 29] A randomized controlled trial indicated that the consumption of flavored milk had a beneficial effect on weight management among children who were overweight or obese. [30] Given the similarity of chocolate and white milk on energy and nutrients, chocolate milk could be very helpful in weight management, since the consumption of dairy products has been very helpful in weight control. [31, 32] Moreover, normal weight children might be more free to consume chocolate milk than overweight or obese children, which may influence the current observation.

Limitations

This was an observational cross-sectional study and has, therefore, some limitations that should be considered. No temporal relationship and, hence, causal inferences can be made. There is also a possibility that the findings of the present work might hide a reverse causality phenomenon, especially taking also into consideration the publicity that frequent breakfast and cereal consumption has taken nowadays for the prevention of overweight and obesity, dietary habits regarding breakfast may have been over/under reported. Furthermore, the sample was originated from specific parts of Greece, which limits the generalizability of the findings to the entire Greek children's population aged 10–12 years. However, due to the stratified random sampling scheme that was implemented and the large sample size, its representativeness could be considered high for urban settings. However, the study provides an up-to-date insight into the relationship between breakfast consumption and childhood obesity, an area that has not been extensively studied. A potential limitation may also be reporting bias due to the self-reporting questionnaires. The presence of trained investigators throughout the study for addressing any potential misconceptions increases the validity of the given responses. Parental weight and height were self-reported; thus, they may be subjected to bias due to over or underestimation height and weight, respectively. [33]

Conclusion

The frequency of breakfast consumption and childhood overweight and obesity were not associated, even after assessing various social and lifestyle factors. However, the type of breakfast seems to play a key role in children weight status. Childhood overweight and obesity remain an alarming public health concern, worldwide. It is therefore recommended that health promotion strategies and community intervention programs should aim to the promotion of nutritious breakfast that contains whole grain products, such as bread or rusks, and foods which are natural sources of minerals and vitamins that are essential for a balanced and healthy diet.

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Disclosure Statement

The authors declare no conflict of interest.

Authorship contribution

GC conceived the research idea, designed the entire study; VN designed the entire study, revised the manuscript critically for technical details; CP & EK have made substantial contribution to the study design, data collection and study's organizational structure; MK, AV & MM have made substantial contribution to the

data collection and study's organizational structure; GA performed data analyses and interpreted the results; APRG has made substantial contribution to the data collection and study's organizational structure; ENK & AL have made substantial contribution to the article drafting and revised manuscript for important intellectual content; DBP conceived the research idea, designed the entire study, supervised data analysis and gave the final approval of the version to be published. All authors read and approved the final version of the manuscript.

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Tables

TABLE 1. Children and parental characteristics of the study's sample.

	Normal weight	**Overweight**	**Obese**	***p***
Age (years)	11.2 ± 0.8	11.1 ± 0.7	11.1 ± 0.7	0. 50
Sex (Boys %)	43.8%	51.9%	52.3%	0. 01
Frequency of breakfast consumption				
Never/Almost never	5.8%	6.2%	5.7%	0. 84
1-2 times/week	14.1%	14.1%	10.3%	
3-4 times/week	9.4%	11.1%	10.3%	
5-6 times/week	7.2%	6.8%	3.4%	
Everyday	63.4%	61.9%	70.1%	
Meals and snacks/day				
1-2/day	13.7%	16.0%	10.0%	0. 20
3/day	36.3%	34.5%	47.5%	
>3/day	50.0%	49.6%	42.5%	
Physical activity of child (Yes %)	80.6%	74.5%	75.9%	0. 04
Paternal weight status				
Underweight	2.0%	1.4%	2.3%	0. 003
Normal	30.8%	17.2%	29.5%	
Overweight	47.4%	53.4%	40.9%	
Obese	19.8%	28.1%	27.3%	
Maternal weight status				
Underweight	12.5%	10.0%	6.8%	<0. 001
Normal	55.9%	47.3%	25.0%	
Overweight	22.5%	30.5%	38.6%	
Obese	9.1%	12.1%	29.5%	
Paternal physical activity				
Never	40.0%	47.8%	51.1%	0. 16
1-2 times/week	38.1%	32.5%	26.7%	
>3 times/week	21.9%	19.7%	22.2%	
Maternal physical activity				
Never	37.2	42.4%	42.9%	0. 60
1-2 times/week	40.4%	36.8%	33.3%	
>3 times/week	22.3%	20.8%	23.8%	
Paternal profession				
Public servant	21.7%	20.6%	8.2%	0. 08
Private sector employee	38.6%	31.9%	42.9%	
Freelancer	28.5%	31.9%	32.7%	
Pensioner	4.3%	3.8%	4.1%	
Unemployed	6.9%	11.8%	12.2%	
Maternal profession				
Public servant	20.9%	22.2%	8.7%	0. 54
Private sector employee	31.0%	30.9%	31.3%	
Freelancer	14.2%	11.9%	13.0%	
Pensioner	3.3%	4.1%	2.2%	
Unemployed	15.1%	18.5%	19.6%	
Homemaker	15.5%	12.3%	17,4%	
Annual income status of parent				
<12.000€	25.5%	25.9%	29.5%	0. 61
12-18.000€	22.0%	27.2%	27.3%	
18-24.000€	18.1%	18.1%	20.5%	
24-30.000€	16.7%	13.4%	13.6%	
>30.000€	17.7%	15.5%	9.1%	
Type of breakfast (Yes%)				
Milk	79.5%	73.9%	74.4%	0.05
Chocolate milk	14.8%	15.9%	11.6%	0.59

Yogurt	10.6%	8.6%	8.1%	0.44
Cereals	68.8%	64.4%	66.3%	0.28
Fruit juice	27.7%	25.5%	26.7%	0.70
Honey/Jam	31.5%	26.4%	34.9%	0.11
Bread/Rusk	30.2%	23.1%	34.9%	0.01
Butter/Margarine	10.2%	10.8%	19.8%	0.02
Cake/Tsoureki/Bagel	20.4%	23.4%	29.1%	0.10

Significance was evaluated using Chi-square test for all categorical variables; Weight status is defined based on BMI cut-offs for adults and on IOTF cut-off criteria for children. (IOTF=International obesity task force, BMI=Body mass index)

TABLE 2: Results from logistic regression odds ratio (95% confidence interval) on children's likelihood of being overweight-obese compared to normal-weight.

	Model 1	**Model 2**	**Model 3**	**Model 4**
Frequency of breakfast consumption				
Never/Almost never	*(ref)*	*(ref)*	*(ref)*	*(ref)*
1-2 times/week	0.677 (0.309, 1.486)	0.688 (0.313, 1.516)	0.672 (0.301, 1.502)	0.613 (0.262, 1.439)
3-4 times/week	0.858 (0.370, 1.993)	0.847 (0.363, 1.977)	0.857 (0.362, 2.028)	0.735 (0.296, 1.825)
5-6 times/week	0.662 (0.255, 1.720)	0.652 (0.249, 1.706)	0.730 (0.275, 1.938)	0.798 (0.284, 2.240)
Everyday	0.867 (0.440, 1.707)	0.870 (0.439, 1.721)	0.944 (0.469, 1.899)	0.847 (0.406, 1.771)
Girls vs. Boys		0.628 (0.452, 0.873)	0.616 (0.441, 0.861)	0.628 (0.442, 0.892)
Age (per 1 year)		1.001 (0.817, 1.227)	0.976 (0.793, 1.199)	0.992 (0.794, 1.240)
Physical activity *(Yes vs. No)*			0.572 (0.380, 0.861)	0.561 (0.359, 0.876)
Meals and snacks/day				
1-2/day			*(ref)*	*(ref)*
3/day			0.716 (0.422, 1.214)	0.750 (0.430, 1.305)
>3/day			0.731 (0.436, 1.224)	0.673 (0.390, 1.240)
Annual income status				
<12.000€			*(ref)*	*(ref)*
12-18.000€			1.496 (0.926, 2.416)	1.449 (0.842, 2.494)
18-24.000€			1.076 (0.641, 1.808)	1.120 (0.601, 2.088)
24-30.000€			0.822 (0.469, 1.441)	0.873 (0.446, 1.708)
>30.000€			0.787 (0.454, 1.364)	0.853 (0.420, 1.730)
Paternal weight status				
Underweight				*(ref)*
Normal				0.672 (0.154, 2.939)
Overweight				1.139 (0.264, 4.914)
Obese				1.144 (0.259, 5.062)
Maternal weight status				
Underweight				*(ref)*
Normal				1.164 (0.648, 2.093)
Overweight				1.758 (0.948, 3.258)
Obese				2.407 (1.112, 5.210)
Paternal physical activity				
Never				*(ref)*
1-2 times/week				0.912 (0.591, 1.408)
>3 times/week				0.882 (0.526, 1.479)
Maternal physical activity				

Never				*(ref)*
1-2 times/week				0.924 (0.602, 1.416)
>3 times/week				1.113 (0.658, 1.884)

Results are presented as Odds Ratios (OR) and 95% confidence intervals.
Model 1: frequency of breakfast consumption; Model 2: frequency of breakfast consumption, sex and age of children; Model 3: frequency of breakfast consumption, sex, age, physical activity, meals and snacks consumed daily and annual income status; Model 4: frequency of breakfast consumption, sex, age, physical activity, meals and snacks consumed daily, annual income status, paternal and maternal weight status, paternal and maternal physical activity.

TABLE 3: Results from logistic regression odds ratio (95% confidence interval) on children's likelihood of being overweight-obese compared to normal-weight according to foods usually consumed for breakfast (vs. not consuming the specific food or beverage).

	Odds Ratio (95% CI)
Model for: *Milk*	0.85 (0.56, 1.29)
Model for: *Chocolate milk*	0.50 (0.28, 0.87)
Model for: *Yogurt*	0.54 (0.27, 1.11)
Model for: *Cereals*	0.96 (0.65, 1.40)
Model for: *Fruit juice*	1.08 (0.73, 1.60)
Model for: *Honey/Jam*	0.65 (0.45, 1.02)
Model for: *Bread/Rusk*	0.51 (0.34, 0.79)
Model for: *Butter/Margarine*	1.12 (0.64, 1.96)
Model for: *Cake/Tsoureki/Bagel*	1.06 (0.68, 1.64)

Each model was adjusted for: age, sex, physical activity, frequency of breakfast consumption, meals and snacks per day, annual income status, parental weight status, parental physical activity, parental educational level and parental profession.