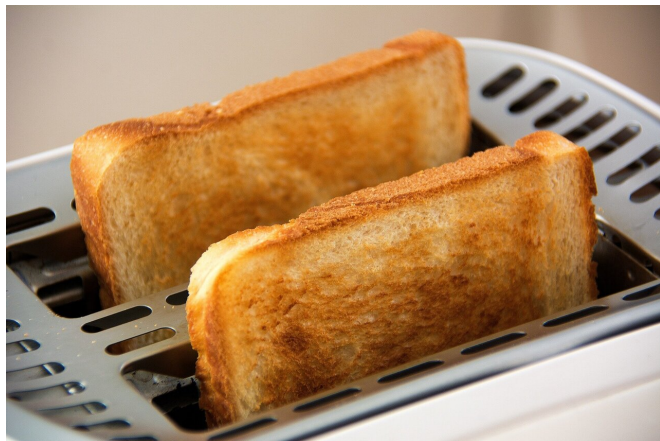


Adolescents who skip breakfast may develop obesity

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A paper published in *Scientific Reports* describes how researchers affiliated with the University of São Paulo's Medical School (FM-USP) in Brazil and colleagues at institutions in Europe evaluated behaviors leading to weight gain in adolescents. Childhood obesity can favor the premature emergence of health issues such as type 2 diabetes and cardiovascular disease.

The main finding is that skipping [breakfast](#), a common habit among teenagers, correlates directly with increased waist circumference and body mass index in this age group. The habit can lead to an unbalanced diet and other [unhealthy behaviors](#), potentially making the adolescents vulnerable to weight gain.

"We found that skipping breakfast is associated with adiposity markers in adolescents regardless of where they live and how much sleep they get, or whether they're male or female," said epidemiologist Elsie Costa de Oliveira Forkert, a member of the Youth/Child Cardiovascular Risk and Environmental (YCARE) Research Group in FM-USP's Preventive Medicine Department.

"By skipping breakfast, millions of children and adolescents around the world are probably replacing a more healthy homemade meal including dairy products, whole-grain cereal and fruit with [fast food](#) at a venue on the way to school, or at the school itself," Forkert said.

"This typically means consuming industrialized hypercaloric foods of low nutritional value, such as deep-fried snacks, pastries, sodas and other sugary drinks, which are all directly associated with the development of obesity."

The study was part of Forkert's postdoctoral research, supported by São Paulo Research Foundation—FAPESP. Scientists at institutions in Austria, Belgium, Germany, Greece, Italy and Spain collaborated.

Analyzing data from two major surveys conducted in Europe and Brazil, the scientists assessed the association between energy balance-related behaviors in adolescence and markers of total and abdominal adiposity.

The European data came from the "Healthy Lifestyle in Europe by Nutrition in Adolescence" cross-sectional study (HELENA-CSS, 2006-07), which involved 3,528 adolescents in 10 major cities. The subjects were between 12.5 years and 17.5 years of age and were stratified by age, gender, region, and socioeconomic status. Males and females accounted for roughly half of the study population each (47.7 percent and 52.3 percent, respectively). The principal investigator was Luis Alberto Moreno, a professor at the University of Zaragoza's Health Science School in Spain.

The Brazilian data came from a survey entitled "Brazilian Cardiovascular Adolescent Health" (BRACAH). Using a similar methodology, this survey was conducted in 2007 in Maringá, the third-largest city in Paraná state. It involved 991 adolescents aged 14-18 years of age. Males

accounted for 45.5 percent and females accounted for 54.5 percent of the study population. The adolescents were assessed for cardiovascular risk factors and health-related behaviors.

The principal investigator for this survey was Augusto Cesar Ferreira de Moraes, a professor in the Epidemiology Department of the University of São Paulo's Public Health School (FSP-USP).

The new study analyzed weight, height and body mass index data as indicators of overall obesity and waist circumference and waist-height ratios as indicators of abdominal obesity.

"Energy balance-related behaviors were measured by means of a questionnaire covering physical activity levels at school or at home, during leisure or while commuting, etc. Approximately 60 or more minutes per day of moderate to vigorous physical activity was considered adequate. Less than that was considered insufficient," Forkert said.

According to Forkert, sedentary behaviors were analyzed in terms of habitual screen time (television, computer, video games), and subjects were asked to specify how many hours they usually slept on weekdays and weekends.

A separate questionnaire was applied to explore attitudes and concerns regarding food choices, preferences, healthy eating habits and lifestyle, and included a specific question about breakfast that asked subjects to agree or disagree (more or less strongly on a scale from one to seven) with the statement "I often skip breakfast."

The scientists used the data from these surveys to investigate whether adolescents who skipped breakfast had higher adiposity markers on average than those who did not.

"Among all the energy balance-related behaviors analyzed, the strongest correlation was between skipping breakfast and the augmented average levels of obesity markers," Forkert said.

Sedentary habits and more calories

Data from both the European and Brazilian surveys

showed that male adolescents were heavier and taller on average and had larger waist circumferences than females.

"For boys who skipped breakfast, the average waist circumference was 2.61 cm larger in Europe and 2.13 cm larger in Brazil than those of boys who usually ate breakfast," Forkert said.

"On the other hand, when we looked at how sleep time influenced the association between the other behaviors and the obesity markers, we found that the average body mass index for European and Brazilian boys who skipped breakfast was 1.29 kg/m² and 1.69 kg/m² higher, respectively, than those who ate breakfast, even when they got sufficient sleep [eight hours or more per day]."

For European and Brazilian boys, skipping breakfast was the predominant energy balance-related behavior that correlated positively with obesity indicators such as body mass index, waist circumference and waist-height ratio.

"The same was true of European girls. Skipping breakfast correlated positively with total and abdominal obesity even when sleep time was adequate," Forkert said. "For example, the average waist circumference increased by 1.97 cm, and the waist-height ratio was 0.02 higher."

In Brazil, girls were more sedentary than boys. In Europe, sedentary habits prevailed less among girls than among boys, but girls were also less physically active, although they were more active than Brazilian boys. The sedentary behaviors of these girls (more than two hours per day) resulted in an increased [waist circumference](#) (1.20 m on average), even when sleep time was adequate.

"However, among Brazilian boys who slept less than eight hours per day, less sleep was protective for total obesity, which fell by 0.93 kg/m² on average," Forkert said.

"The adolescents with more sedentary habits who spent more time watching television, using a computer or playing video games probably had an unbalanced diet and consumed unhealthy food while watching television or playing," she added,

although such behaviors were not investigated in the study. "Sedentary behaviors associated with relatively high calorie consumption lead directly to obesity."

More information: Elsie C. O. Forkert et al, Skipping breakfast is associated with adiposity markers especially when sleep time is adequate in adolescents, *Scientific Reports* (2019). [DOI: 10.1038/s41598-019-42859-7](https://doi.org/10.1038/s41598-019-42859-7)

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