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Effect of television viewing on food and nutrient intake among adolescents

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ABSTRACT

Objective: Among the behaviors associated with food intake, exposure to television is particularly important given the number of adolescents exposed. Also, increased time spent watching television has been associated with physical inactivity and with less desirable dietary intake among adolescents. The aim of this study was to examine the association between television viewing and dietary intake among 13-y-old adolescents.
Methods: A cross-sectional evaluation was carried out in the 2003–2004 school year, including adolescents born in 1990 and enrolled in the schools of Porto, Portugal. Time spent watching TV was collected by self-administered questionnaires and dietary intake was evaluated using a food frequency questionnaire. Included in the analysis were 1436 adolescents.
Results: Spending more than 120 min per day watching TV was significantly associated with higher intake of total fat and polyunsaturated fat and with lower intake of magnesium, in both sexes. Additionally, in girls, spending more than 120 min per day watching TV was associated with lower intake of complex carbohydrates, fiber, total vitamin A, folate, vitamin C, calcium, iron, phosphorus, and potassium. In boys, higher intake of saturated fat and cholesterol was found among those spending more time watching TV.
Conclusions: We found that television viewing is associated with higher consumption of foods containing more fats and sugars and a lower consumption of fruits and vegetables. Consequently, adolescents who watched more television had a higher intake of total fat and polyunsaturated fat and a lower intake of minerals and vitamins. This dietary behavior among adolescents may have long-term health implications, not only limited to obesity.

Overweight in children and adolescents is increasing on a global scale [1,2] as result of an energy imbalance in which energy intake is greater than energy expenditure. Among the large number of determinants of obesity, time spent watching TV has been recognized as a risk factor for obesity among children and adolescents [3–5]. Furthermore, TV viewing during childhood and adolescence is associated with overweight in adulthood [6,7].

Some mechanisms have been proposed in attempt to explain how TV affects weight gain. One discussed mechanism is the reduction of energy expenditure, both because it is a sedentary activity but also due to the reduction of time spent participating in more active physical activities [8]. Another mechanism is the effect on dietary intake [8]. Previous studies demonstrate that TV viewing is associated with less desirable dietary behaviors, including increased energy intake [9–12], increased consumption of high-energy foods like snacks, fast-foods, and soft drinks [12–20], and decreased consumption of fruit and vegetables [12,13,16–19,21]. Although this association has been widely studied among children and older adolescents, data from young adolescents are less available.

Transition from childhood to adulthood is called the adolescent period, a time of rapid physical, emotional, and psychological changes, accompanied by biological development characterized by evolving growth and maturation. The definition of the age range of adolescence is variable, but the World Health Organization (WHO) defined it as the period between 10 and 19 y old [22]. During young adolescence, children have progressively more control over what, when, and where they eat, making personal choices and preferences gain priority over eating habits acquired in the family [23,24]. They are also more prone to be

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influenced by their peers, other community members, and advertisements [25]. On the other hand, as the majority of previous studies have addressed the relation between TV viewing and obesity, they have focused their analysis on energy or macronutrient intake. To our knowledge, few studies have examined the association between television viewing and the intake of some vitamins and minerals. Thus, the association between television viewing and nutrient intake among young adolescents is still an important issue, particularly because in this period of life the rapid growth creates an increased demand for some nutrients and an inadequate intake during this period can have long-term health implications [26,27].

Among the behaviors that were described as associated with food intake, exposure to television is particularly important given the number of adolescents exposed. Accordingly, the American Academy of Pediatrics recommends that television viewing for children should be limited to no more than 2 h of quality programming per day [28]. However, results of the 2005–2006 Health Behaviour in School-aged Children (HBSC) project indicate that 70% of 13-y-old adolescents reported watching TV more than 2 h each day in WHO European regions [29]. In Portugal, 82% of girls and 76% of boys reported watching TV more than 2 h/d [29].

The aim of this study was to analyze food and nutrient intake according to time spent watching TV, in young adolescents.

Methods

Participants

A cohort of urban adolescents born in 1990 and enrolled on Porto schools, known by the acronym EPITeen (Epidemiological Investigation of Teenagers' Health in Porto) [30] was evaluated in 2003-2004. We identified 2787 eligible adolescents. Forty-four adolescents (1.6%) could not be reached (absent from classes during the study period), 583 (20.9%) were considered refusals because signed informed consent forms were not returned, and 2160 (1561 public and 509 private school students) agreed to participate and provided information at least for part of the planned assessment. This resulted in a 77.5% overall participation proportion, similar in public and private schools (respectively, 77.7% versus 77%, $P = 0.709$). In Portugal, education is compulsory by law for 13-y-old adolescents, making schools an ideal sampling setting for achieving representativeness.

The Ethical Committee of the University Hospital of São João, Porto, approved the study. Parents and adolescents received written and oral information explaining the purpose and the design of the study. Written informed consent was obtained from both adolescents and their legal guardians.

Data collection

The evaluation comprised two self-administered questionnaires (one completed at home, another at school), and a physical examination performed at school.

The home questionnaire was completed by the adolescents, at home, with help from their parents, and inquired into demographic, social, behavioral, and clinical characteristics of the adolescent and family. At school, during the research team's visit, adolescents responded to an additional questionnaire comprising further information on physical activity, smoking, and alcoholic beverage intake.

As part of the home questionnaire, the amount of time spent watching television (including videos and DVDs but not video games or the computer) was evaluated using an open question, separately for weekdays and weekend days. The total time per week and the average daily time were computed and participants were classified into three categories: watching $\leq$60 min/d, 61 to 120 min/d, or >120 min/d.

As part of the home questionnaire, dietary intake was evaluated using a food frequency questionnaire (FFQ), previously validated in the Portuguese adult population [31,32] according to dietary data available for our country, namely the Portuguese food balance sheets and other specific studies [33,34]. The FFQ was then adapted for adolescents, including foods more frequently eaten by this age group [35], and the adolescents' version comprised 91 food items or beverage categories and a frequency section with nine possible responses ranging from never to six or more times per day. It also included an open-ended section for foods not listed in the questionnaire, but eaten at least once per week. For each food item, participants were asked to indicate their usual consumption over the prior 12 mo. No specific questions on portion size were included on the FFQ. So to estimate the intake in grams or milliliters a standard portion size, estimated from the four 7-d food records used to validate the FFQ and also based on other studies in adolescents [35] has been considered. Food consumption was converted into nutrients using a U.S. database (software Food Processor Plus version 7.02, ESHA Research, Salem, OR, USA), adapted to Portuguese foods and dishes.

Anthropometric measures were obtained with the participant wearing lightweight clothes and no shoes. Weight was measured, in kilograms, to the nearest tenth, using a digital scale (Tanita TBF-300, Tanita Corporation of America, Inc., Illinois, USA), and height was measured, in centimeters, to the nearest tenth, using a portable stadiometer. Body mass index (BMI) was calculated and classified according to the age- and sex-specific BMI reference percentiles, developed by the U.S. Centers for Disease Control and Prevention [36].

Participants

Of the 2160 participants, 270 did not respond to the home questionnaire, 275 did not answer the FFQ, 63 had no information on time spent watching TV, and 23 presented inconsistent information (values extremely high that were identified as outliers when the boxplot of the variable was performed). An additional 93 participants were not considered for this analysis because their total energy intake was more than three times the interquartile range or their intake of fruit or vegetables was more than 1.5 times the interquartile range. Thus our data comprise 1436 adolescents.

Statistical analyses

Data were analyzed separately for boys and girls. Proportions were compared using the χ^2 test and medians using Anova or Kruskal-Wallis test. A P-value <0.05 was considered statistically significant. Adjustments for parent's education and total energy intake were performed using ordinal logistic regression analysis to estimated proportional odds ratio (POR) and 95% confidence interval (CI). For the ordinal logistic regression categories of cakes, cookies, soft drinks, chocolates, snacks of chocolate, sweets, fruit, and vegetables were based on quartiles. Pizza, hamburger and salty snacks has lower variability on the frequency of intake reported, thus for these items the analysis was based on tertiles.

Results

Adolescents included in this analysis were compared with those excluded. Those excluded had a significantly higher proportion of boys, had less educated parents, and were mostly from public schools. No significant differences were found for BMI and for practicing sports to the point of being breathless.

In these 13-y-old Portuguese adolescents, the median (25th–75th percentiles) time spent watching television was 120 min (77.1–180 min). In both sexes, the proportion of adolescents watching more than 120 min/d of TV was significantly higher in public schools, compared with the private ones; and the median level of parents' education was lower in adolescents spending more time watching TV. No statistically significant differences were found according to BMI. Girls who spend more than 120 min/d watching TV reported to practice sports less frequently (Table 1).

Considering the association between time spent watching TV and food intake, comparing those who watched no more than 60 min of TV, we can state that girls, spending more than 120 min/d had higher intake of cakes (POR, 1.86; 95% CI, 1.26–2.74), soft drinks (POR, 2.01; 95% CI, 1.37–2.94), chocolate (POR, 1.84; 95% CI, 1.26–2.69), chocolate snacks (POR, 2.07; 95% CI, 1.42–3.03), and sweets (POR, 1.70; 95% CI, 1.16–2.49), and lower intake of vegetables (POR, 0.92; 95% CI, 0.42–0.90). Boys who reported watching more than 120 min/d were more likely to consume sweets (POR, 1.91; 95% CI, 1.27–2.88), hamburgers (POR, 1.72; 95% CI, 1.13–2.61), and salty snacks (POR, 1.73; 95% CI, 1.07–2.80), and were less likely to consume fruit (POR, 0.68; 95% CI, 0.45–1.01) (Table 2).

Intakes of total energy and nutrients according to categories of time watching TV are shown in Table 3 for girls and Table 4 for