

Association Between Television in Bedroom and Adiposity Throughout Adolescence

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Abstract

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Objective: The objective was to determine if having a television (TV) in the bedroom is associated with physical activity (PA), TV/video viewing, and adiposity throughout adolescence.

Research Methods and Procedures: Longitudinal data (September 2002 through June 2005) were analyzed of 379 initially 12-year-old French adolescents participating as controls in the Intervention Centered on Adolescents' Physical activity and Sedentary behavior (ICAPS). Presence of a TV set in the bedroom (TV_{bedroom}) and leisure activities were obtained by questionnaire. There was annual assessment of BMI, waist circumference, and body fat by bioimpedance.

Results: In boys but not girls, baseline TV_{bedroom} was associated with higher TV/video viewing over time [odds ratio (OR) of high TV/video = 1.87; 95% confidence interval, 1.2 to 2.8] and less no-sport club participation (OR = 0.59; 95% confidence interval, 0.35 to 1.0). Both boys and girls with baseline TV_{bedroom} had lower reading time ($p < 0.0001$ in boys; $p = 0.04$ in girls), while PA did not differ according to TV_{bedroom} for boys or for girls. For boys only, baseline TV_{bedroom} was associated with higher BMI (mean

BMI over time 20.5 ± 0.5 vs. 19.0 ± 0.5 kg/m²; $p = 0.001$), waist circumference (70.9 ± 0.9 vs. 67.2 ± 0.8 cm; $p < 0.001$), and body fat ($15.9 \pm 0.9\%$ vs. $13.5 \pm 0.9\%$; $p < 0.001$), without interaction with time. These relationships remained significant after adjustment for socioeconomic status. TV/video viewing explained 26%, 42%, and 36% of the relationships of TV_{bedroom} with BMI, waist circumference, and body fat, respectively, while addition of other leisure activities in the models only marginally reduced the effects.

Discussion: These results suggest the importance of keeping TV out of an adolescent's bedroom from an obesity prevention perspective but show gender differences.

Key words: adolescents, body fat distribution, physical activity, longitudinal study

Introduction

Obesity is now the most prevalent nutritional problem. More specifically, overweight or obesity during childhood and adolescence is an increasing problem throughout the world. Recent data in the eastern part of France show that 22.7% of 12-year-old adolescents are overweight (1), which is about 7 times higher than the 1970 value. Although obesity-associated morbidities (2,3) occur more frequently in adults, significant consequences of obesity are still present in obese children and adolescents (4), and longitudinal studies indicate that overweight children and adolescents are at significant risk of remaining overweight into adulthood (5,6). Childhood obesity is, thus, an important public health problem needing prevention strategies.

Although genetic factors predispose an individual to developing obesity, its increasing prevalence among children and adults is more likely attributable to different aspects of the modern environment and lifestyle. Among them, the influence of increasing inactivity has been emphasized. Not only are children today less physically active but they spend more and more time in sedentary activities, e.g., television

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(TV)¹/video viewing, video games, and computer use. Studies in children and adolescents have reported a direct relationship between screen time and obesity (7). Similarly, TV viewing during childhood and adolescence has been associated with overweight, poor cardiorespiratory fitness, and raised serum cholesterol in early adulthood (8). Also, a randomized trial has shown that reducing TV viewing time leads to a lower prevalence of obesity during childhood (9). However, studies have found the association between TV viewing or video game use and fatness to be weak or non-significant, and its relevance has been questioned (10).

Recently, a study on low-income preschool children found that the presence of a TV set in the child's bedroom, which has increased greatly in the last decade (11–13), is an even stronger cross-sectional marker of increased risk of overweight than time spent viewing TV/video (11). This association indicating that keeping TV out of the bedroom could be an effective strategy for obesity prevention has still to be confirmed in prospective studies and in populations differing in age and sociodemographic characteristics. Another question concerns the underlying mechanisms. While this stronger association could be due to less observational error in assessing the presence of a TV in the bedroom than in estimating usual TV viewing time, a TV set in the bedroom might also be a more global marker of behaviors contributing to obesity.

Thus, the aim of our study was to examine the longitudinal association between a TV set in the bedroom and adiposity in the control adolescents of the Intervention Centered on Adolescents' Physical activity and Sedentary behavior (ICAPS) program. Our hypothesis was that a TV in the bedroom would be positively related to BMI, waist circumference, and body fat. We also examined the contribution of different physical and sedentary activities to this association.

Research Methods and Procedures

Design and Subjects

ICAPS is an ongoing 4-year randomized intervention study begun in 2002 aimed at encouraging physical activity (PA) to reduce weight gain and cardiovascular risk. The methodology of the study has been presented elsewhere (14). Briefly, 1048 first-level students of 8 randomized public middle-schools of the French department of the Bas-Rhin were eligible to participate. To have a broad socioeconomic context, randomization was carried out after stratification on sociogeographical criteria. Ninety-one percent of the eligible students participated in the study. This study

sample did not differ significantly from the total eligible population in anthropometric data. ICAPS has been reviewed and approved by the local Ethics Committee and the public schools' governing bodies. Consent to participate was obtained from all the children and their parents. The population considered in the present work is represented by the adolescents of the 4 control schools. Of the 488 adolescents seen in 2002, 74% took part in the 2005 survey. The main reasons for lack of follow-up were school absence the day of the questionnaire and school transfer. There was no significant difference in follow-up rates according to baseline characteristics. Due to some missing data, only 379 subjects were included in these analyses.

Data Collection

Surveys were conducted in fall 2002, at the beginning of the first middle-school level, and at the end of the first, second, and third middle-school levels, in June 2003, June 2004, and June 2005, respectively.

Anthropometric Measurements

Standardized anthropometric measurements were performed with the students in underclothing without shoes. Height was measured to the nearest 0.1 cm using a stadiometer. Bioelectrical impedance analysis was used to assess percentage of body fat using a leg-to-leg single frequency (50 kHz) device with an incorporated digital scale for measuring body weight at the same time (Tanita TBF-310, Tanita Corporation, Tokyo, Japan). BMI was calculated as weight/height^2 . Overweight was defined according to the international sex-based percentiles that pass through a BMI value of 25 kg/m² at age 18 (15). Self-assessed Tanner stages were used to determine the sexual maturity of the adolescents.

Sociodemographic and Behavioral Data

Socioeconomic data were collected at baseline from the students and from self-administered questionnaires completed by their parents. The highest occupational class of either parent was taken as an approximation of family socioeconomic status (SES). SES was categorized in three levels (low, medium, high) according to a hierarchical classification of the occupational codes obtained from the French National Institute of Statistics and Economic Studies.

The presence of a TV set in an adolescent's bedroom (TV_{bedroom}) and the behaviors were assessed by questionnaires completed annually by the adolescents. The adolescents' PA was assessed with the Modifiable Activity Questionnaire for adolescents (MAQ) (16). Participation in PA during the past year in a sport club (sport club PA) and outside sport club (free PA) was reported by the students, who gave information on the weekly frequency and usual duration of each session. The number of months that each

¹ Nonstandard abbreviations: TV, television; ICAPS, Intervention Centered on Adolescents' Physical activity and Sedentary behavior; PA, Physical Activity; SES, socioeconomic status; TV_{bedroom}, presence of a TV set in an adolescent's bedroom; MAQ, Modifiable Activity Questionnaire for adolescents; Sport club PA, PA during the last year in a sport club; free PA, PA during the past year outside sport club; OR, odds ratio.

activity was performed over the past year was recorded and the average weekly time devoted to PA calculated. An additional question not present in the original MAQ dealt with active commuting between home and school, which was recorded for each day of a typical week. The time spent in leisure activities (TV/video viewing, reading, and no-sport club participation, e.g., drawing, choral) was recorded for each day of a typical week. Validity and reliability of the MAQ have been reported for junior high school students (17). Reliability of the questionnaire was assessed in a sample of 79 adolescents of the same age as those of our cohort with a test-retest interval of one month. Reliability was found to be reasonably good, with intra-class correlations ranging from 0.71 to 0.83. The behavioral variables were considered as two-class variables defined as follows: sport club and no-sport club as participation or not; free PA, active commuting between home and school, TV/video viewing, and reading times as low or high, with cut-off points corresponding to the median time devoted to each activity throughout the study (6 hours per week, 16 minutes/d, 1 hour 30 minutes/d, and 30 minutes/d, respectively).

Statistical Analysis

All statistical analyses were carried out using the SAS software (version 9.1, SAS Institute Inc., Cary, NC). Two-sided tests were used, and significance was set at 0.05. Separate analyses for gender were computed because of known differences in behavioral habits and risks of overweight and obesity (12). Descriptive data are presented as mean (SE) and percentages. Comparison of baseline characteristics by gender was assessed by χ^2 for categorical variables and *t* tests for continuous variables.

All other analyses were done with longitudinal data analysis methods using generalized linear mixed effects models, with a school variable introduced as a random effect at the level of the intercept to take into account the cluster sampling design (i.e., at a school level). This allowed us to consider the non-independence of data from the same individual over time and the correlation among adolescents in the same school. The analyses were performed using the SAS procedure GLIMMIX, which permits the use of outcome variables with various distributions (e.g., normal but also binary or binomial). All of the models were adjusted for sexual maturity and, when indicated, for SES. Interactions, in particular interaction with time, were tested. Interactions significant at 0.10 are presented.

We first constructed separate mixed models to successively estimate the relationships of baseline physical and sedentary leisure-time activities and of baseline TV_{bedroom} as independent two-class variables, with various continuous anthropometric measures (BMI, waist circumference, body fat) repeated over time. These longitudinal models were used to estimate the least-squares mean levels of BMI (waist

circumference, body fat) according to the activity (TV_{bedroom}) category for each survey.

Mixed models taking into account the binary distribution of the dependent variables were then used to estimate the effect of baseline TV_{bedroom} on the different leisure-time variables over time. These models produced estimates of high leisure-time activity odds ratio (OR), with no baseline TV_{bedroom} as the reference, for each survey. They also produced a four survey mean OR of that activity.

Finally, to evaluate the contribution of the different leisure activities to the relationships between TV_{bedroom} and the anthropometric data, the reduction of the BMI (waist circumference, body fat) variance explained by TV_{bedroom}, observed when introducing the leisure activity variables in the models, was calculated.

Results

Study Population

The baseline characteristics of the subjects are presented in Table 1 by gender. Adolescents were initially 11.6 ± 0.1 years of age. They had a mean BMI of 18.8 ± 0.2 kg/m², and 22.9% of them were overweight.

Girls reported less sport club ($p < 0.0001$) and free PA times ($p < 0.01$) than boys, whereas TV/video viewing, reading, and no-sport club times were similar for both genders. As illustrated in Table 2, sport club and no-sport club participation slightly decreased over time for boys (p for trend = 0.01 and <0.001 , respectively) but not for girls, and both boys and girls reported significantly less reading time in survey 4 than in survey 1 (p for trend <0.0001 for both). In contrast, free PA and TV/video viewing regularly increased from baseline to survey 3 and then were stable or slightly decreased in survey 4 for both genders. Active commuting between home and school increased over time (p for trend = 0.0001 for boys and 0.001 for girls).

The presence of a TV set in the bedroom (Table 2), which at baseline was applicable to 44.1% of the boys and 40.8% of the girls, significantly increased with time (p for trend <0.0001 for boys and <0.001 for girls).

Relationships Between TV_{bedroom} and Leisure-Time Activities

The relationships between baseline TV_{bedroom} and leisure-time activities over time are presented in Table 3. In boys but not girls, TV_{bedroom} was associated with higher TV/video viewing (OR for high TV/video viewing = 1.87, $p < 0.01$) and less no-sport club participation (OR = 0.59, $p = 0.05$). Both boys and girls with baseline TV_{bedroom} had lower reading time ($p < 0.0001$ in boys; $p = 0.04$ in girls), while sport club and free PA did not differ by TV_{bedroom} for boys or for girls. No significant interaction between TV_{bedroom} and time was observed for any of the leisure-time

Table 1. Baseline characteristics of adolescents by gender

	Total (n = 379)	Boys (n = 193)	Girls (n = 186)	p*
Age (years)	11.7 (0.1)	11.7 (0.1)	11.6 (0.1)	0.14
BMI (kg/m ²)	18.8 (0.2)	18.7 (0.5)	18.7 (0.5)	0.98
Body fat (%)	18.0 (0.4)	15.5 (0.9)	20.4 (0.9)	<0.0001
Waist circumference (cm)	64.4 (0.5)	65.7 (0.7)	63.7 (0.7)	<0.001
Overweight (%)	23	23	23	0.98
Socioeconomic status (%)				
Low	18	20	17	0.02
Middle	66	60	72	
High	16	20	11	
Tanner stage (%)				
1	30	48	12	<0.0001
2	54	47	60	
3	16	5	28	

* Comparisons by gender. χ^2 tests were used for categorical variables and *t* tests for continuous variables. Results are given as percentages or as means (SE).

activities. The association of TV_{bedroom} with TV/video viewing and reading remained significant after additional adjustment for SES.

Relationships Between TV_{bedroom} and Anthropometric Variables

For boys, as expected, BMI and waist circumference increased ($p < 0.0001$) over time, whereas body fat progressively decreased ($p < 0.0001$). Compared to no baseline TV_{bedroom}, baseline TV_{bedroom} was associated with higher BMI (mean BMI over time 20.5 ± 0.5 vs. 19.0 ± 0.5 kg/m²; $p = 0.001$), higher waist circumference (70.9 ± 0.9 vs. 67.2 ± 0.8 cm; $p < 0.001$), and higher body fat ($15.9 \pm 0.9\%$ vs. $13.5 \pm 0.9\%$; $p < 0.001$), without interaction with time. All of these relationships, which are illustrated for BMI and body fat in Figures 1 and 2, remained significant after additional adjustment for SES ($p = 0.02$, $p = 0.02$, and $p = 0.07$, respectively, for BMI, waist circumference, and body fat). After adjustment for SES, TV_{bedroom} explained 6% of the variance in BMI, 4% of the variance in waist circumference, and 3% of the variance in body fat.

For girls, BMI (Figure 1), waist circumference, and body fat (Figure 2) increased over time ($p < 0.0001$ for all) but were not significantly associated with TV_{bedroom}.

Contribution of Leisure-Time Activities to Relationships Between TV_{bedroom} and Anthropometric Variables

The association of baseline TV/video viewing and sport club participation with BMI, waist circumference, and body

fat over time is presented in Table 4. In boys but not girls, high baseline TV/video viewing was positively associated with BMI ($p = 0.001$), waist circumference ($p < 0.001$), and body fat ($p < 0.001$), without interaction with time, while baseline sport club participation was inversely associated with BMI ($p = 0.004$), waist circumference ($p = 0.01$), and body fat ($p = 0.06$). Similarly, in boys but not girls, baseline free PA (data not shown) was inversely, although not significantly, associated with BMI ($p = 0.06$), waist circumference ($p = 0.05$), and body fat ($p = 0.10$) over time. All of these relationships were only marginally modified after further adjustment for SES.

Introducing TV/video viewing into the models testing the relationships between TV_{bedroom} and anthropometric data in boys reduced the effect of TV_{bedroom} on BMI, waist circumference, and body fat by 26%, 42%, and 36%, respectively, while sport club and free PA explained only ~4% of the effects of TV_{bedroom}. Altogether, the leisure activities studied here explained 33%, 45%, and 38% of the relationships of TV_{bedroom} with BMI, waist circumference, and body fat, respectively, in boys.

Discussion

This 3-year longitudinal study conducted on French adolescents showed that the presence of a TV set in the bedroom was associated with higher BMI, waist circumference, and body fat throughout adolescence, for boys but not for girls. Our study, which, to our knowledge, is the first one with longitudinal data, extends previous cross-sectional re-

Table 2. Physical and sedentary activities of the adolescents (*n* = 379) over time by gender*

	Survey 1	Survey 2	Survey 3	Survey 4	<i>p</i> †	<i>p</i> for trend
Boys (<i>n</i> = 193)						
Sport club participation (%)	66.4	60.4	59.1	58.0	0.07	0.01
Free PA (h/wk)	6.3 (0.6)	8.2 (0.6)	8.0 (0.6)	6.7 (0.6)	<0.001	0.37
Active commuting between home and school (h/wk)	2.1 (0.6)	2.3 (0.6)	2.2 (0.6)	2.8 (0.6)	<0.0001	<0.0001
TV/video viewing (h/wk)	19.6 (1.3)	21.5 (1.3)	22.8 (1.3)	21.3 (1.3)	<0.01	0.02
Reading (h/wk)	5.1 (0.6)	4.4 (0.6)	3.3 (0.6)	2.4 (0.6)	<0.0001	<0.0001
No-sport club participation (%)	29.1	19.3	16.7	17.1	<0.001	<0.001
Television in bedroom (%)	44.1	45.2	52.5	61.2	<0.0001	<0.0001
Girls (<i>n</i> = 186)						
Sport club participation (%)	45.1	43.7	49.4	41.5	0.16	0.71
Free PA (h/wk)	4.8 (0.4)	5.6 (0.4)	5.9 (0.4)	4.9 (0.4)	0.02	0.70
Active commuting between home and school (h/wk)	2.1 (0.7)	2.5 (0.7)	2.3 (0.7)	2.8 (0.7)	<0.01	<0.001
TV/video viewing (h/wk)	16.6 (1.3)	17.5 (1.3)	19.2 (1.3)	19.2 (1.3)	<0.01	<0.001
Reading (h/wk)	5.7 (0.3)	5.5 (0.3)	3.8 (0.3)	2.7 (0.3)	<0.0001	<0.0001
No-sport club participation (%)	26.1	25.3	27.3	22.8	0.72	0.55
Television in bedroom (%)	40.8	43.0	44.5	51.4	<0.01	<0.001

* Non-adjusted means (SE) and percentages are presented.

† Comparisons between surveys were done using mixed effects models adjusted for sexual maturity and taking into account the school sampling design.

Survey 1, September 2002; Survey 2, June 2003; Survey 3, June 2004; Survey 4, June 2005.

search on low-income preschool children (11). It further suggests that these unfavorable associations are explained largely by higher TV/video viewing habits rather than by the displacement of physical activities. However, the leisure-time activities studied here contributed overall to less

than one half of the relationships between TV in the bedroom and adiposity markers in boys.

During the last decades, the high rates of TV/video viewing have been of special concern in children and adolescents. Different studies have suggested that the home envi-

Table 3. Physical and sedentary activities over time according to baseline TV_{bedroom} by gender

	Boys (<i>n</i> = 193)			Girls (<i>n</i> = 186)		
	OR (95% CI)	<i>p</i> *	<i>p</i> †	OR (95% CI)	<i>p</i> *	<i>p</i> †
High sport club and free PA	0.77 (0.5–1.3)	0.32	0.58	1.11 (0.7–1.7)	0.66	0.49
High active commuting from home to school	0.91 (0.6–1.3)	0.63	0.42	0.98 (0.7–1.4)	0.92	0.57
High TV/video viewing	1.87 (1.2–2.8)	0.003	0.02	1.20 (0.8–1.8)	0.39	0.27
High reading time	0.36 (0.2–0.55)	<0.0001	<0.001	0.65 (0.4–1.0)	0.04	0.03
No-sport club participation	0.59 (0.35–1.0)	0.05	0.13	0.86 (0.5–1.4)	0.54	0.54

* Analyses were done using generalized linear mixed effects models adjusted for sexual maturity and taking into account the school sampling design. Four-survey mean adjusted OR (95% CI) are presented with no baseline TV_{bedroom} as the reference.

† Additional adjustment for socioeconomic status.

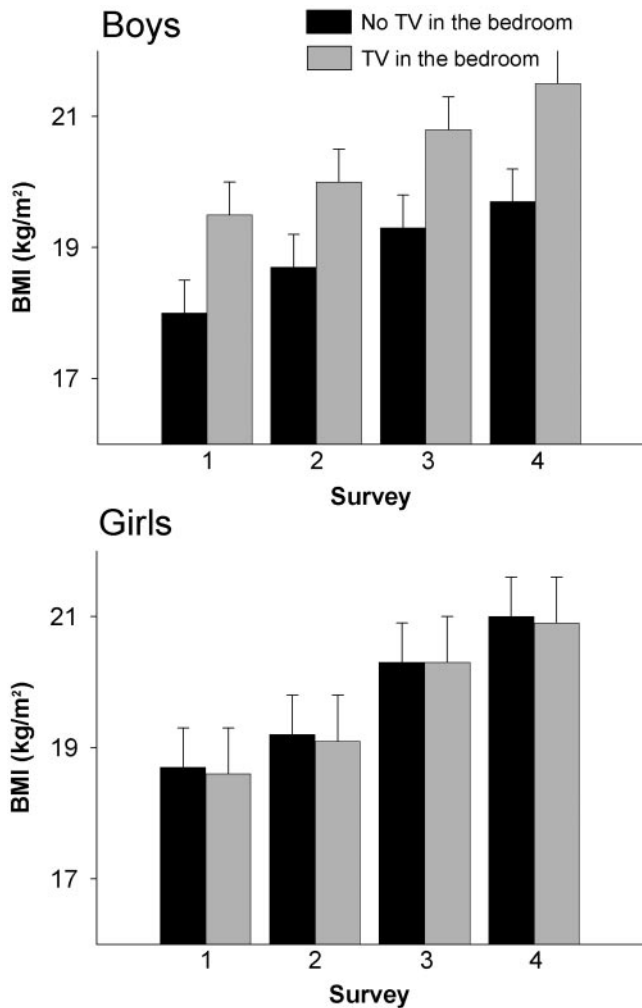


Figure 1. Least squares means (SE) adjusted BMI of the adolescents (193 boys and 186 girls) from survey 1 to survey 4 according to baseline TV_{bedroom}. Analyses were done using generalized linear mixed effects models adjusted for sexual maturity and taking into account the school sampling design. Baseline TV_{bedroom} vs. no baseline TV_{bedroom}: $p < 0.001$ in boys and 0.96 in girls.

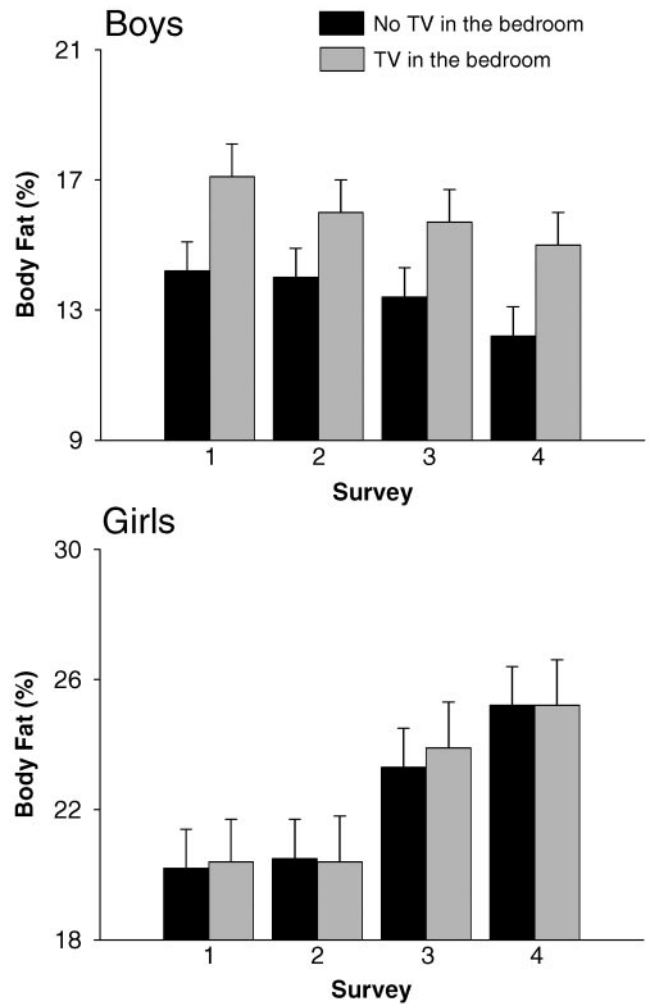


Figure 2. Least squares means (SE) adjusted body fat mass of the adolescents (193 boys and 186 girls) from survey 1 to survey 4 according to baseline TV_{bedroom}. Analyses were done using generalized linear mixed effects models adjusted for sexual maturity and taking into account the school sampling design. Baseline TV_{bedroom} vs. no baseline TV_{bedroom}: $p < 0.01$ in boys and 0.98 in girls.

ronment, and in particular the presence of a TV set in a child's bedroom, influences children's TV watching (18). The high percentage of adolescents having TV in their bedrooms in our study (~50% at baseline) is in line with the 51% to 53% recently reported for 10- to 12-year-old American children (18,19) and with the 65% found for 8- to 18-year-old Americans (20), but higher than that reported for preschool children (11). We found that the presence of TV in the bedroom increased in successive surveys, suggesting a trend with age, although it may also partly reflect time trends (21).

In boys but not girls, as reported for preschool children of both genders (11), a TV set in the bedroom was found to be positively associated with the risk of child overweight,

explaining 6% of the BMI variance in boys. This is higher than the effect generally reported for TV viewing, which explained <0.5% of body fatness variance in a recent meta-analysis (10), consequently calling into question its clinical significance. Imprecise measurement of sedentary behavior is likely to have weakened the relationships observed between TV watching and fatness in the different observational studies, while the presence of a TV set in the bedroom is probably assessed with a higher degree of accuracy (although we did not estimate the reliability of the information given by the adolescents). On the other hand, even if TV/video viewing time explained almost one third of the association between fatness markers and the existence of a TV

in the bedroom, our results suggest that TV in the bedroom is probably a more comprehensive marker for several behaviors, at least for boys.

Our study did not favor the hypothesis that TV in the bedroom affects overweight by simply displacing time that would otherwise be spent on more active pursuits that would lead to higher total energy expenditure. Students without bedroom TV spent more time in reading and no-sport club, but they had similar levels of sport club and free PA. Similarly, Feldman et al. (22) reported that physically active 7th- to 10th-grade high school students spent more time in productive sedentary activities (reading or doing homework) than less physically active ones but had similar TV watching or video game playing time.

Even if it has been suggested that energy expenditure while watching television is lower than during any other activity, and even while doing nothing, there are numerous other mechanisms by which TV_{bedroom} could promote adolescent adiposity, among them higher caloric intake. Different studies have found that high TV viewing is associated with a higher risk of snacking (19,23). Meals taken in front of a TV, which are more frequent when a TV set is present in the bedroom (18), may be less healthy. The increased adiposity associated with TV_{bedroom} might be mediated by higher exposure to food advertisements and differences in the TV/video shows viewed, which may be influenced by the absence of parental control. Also, this absence of control could favor a lower level of cognitive stimulation, which has been suggested to be an independent risk factor for the development of obesity (24). Unfortunately, we did not have sufficient information on the adolescents' dietary habits to explore the possibility that dietary practices might mediate any association between the presence of a TV in the bedroom and obesity.

Interestingly, the associations observed here for boys remained significant after adjustment for SES, indicating that the presence of a TV set in the bedroom is not only a marker of SES. Moreover, while the prior results demonstrating that TV in the bedroom represents a risk of overweight were obtained for low-income children (11), our study was done on a population with a broad socioeconomic range, suggesting that this relationship does not depend on the SES origin of the adolescents. This is in accord with the results of a clinical trial in a relatively highly educated population demonstrating that reductions in TV/video viewing are associated with decreased adiposity (9).

Surprisingly, in girls, TV_{bedroom} was not associated with any of the leisure activities studied here or with adiposity. Since previous data were generally presented with both genders pooled (11), no evidence exists to indicate that TV_{bedroom} use is different for girls and boys. Similarly, it has been shown that the associations of TV watching and PA with adiposity (7,13,25) depend on gender and especially on the age of the children. We can speculate that the

gender differences observed here at least partly reflect maturity differences in these 12-year-olds. At this age, girls might already be influenced more than boys by peer attitudes, behaviors, and activities rather than by TV availability. Studies investigating other contextual variables within the family environment may help to explain these gender differences.

Several limitations of our study should be mentioned, including the examination of only a few behavioral and environmental correlates of bedroom TV and adiposity. In particular, detailed dietary data were not available. Physical activity, leisure-time data, and presence of a TV set in the bedroom were self-reported. Also, we could not analyze the consequences of removing the TV from the bedroom, which was applicable to only a few students during the study. This might have provided arguments for a causal relationship that cannot be inferred from our observational data. One strength is the longitudinal measures of behavioral habits and anthropometry. These repeated assessments yield more stable estimates of a child's behavioral habits during adolescence, as well as of body weight and percentage fat.

In summary, our study supports the hypothesis that the presence of a bedroom TV set is associated with a higher risk of overweight in adolescents, at least in boys. These results justify the recommendation of the American Academy of Pediatrics to remove TV sets from children's bedrooms (26) from an obesity prevention perspective, since it seems easier to keep TV out of adolescents' bedrooms than to impose rules prohibiting the use of this TV.

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