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Association of a Television in the Bedroom With Increased Adiposity Gain in a Nationally Representative Sample of Children and Adolescents

Diane Gilbert-Diamond, ScD, **Zhigang Li, PhD**, **Anna M. Adachi-Mejia, PhD**, **Auden C. McClure, MD**, and **James D. Sargent, MD**

Section of Biostatistics and Epidemiology, Department of Community and Family Medicine, Geisel School of Medicine at Dartmouth, Lebanon, New Hampshire (Gilbert-Diamond, Li); Cancer Epidemiology and Chemoprevention Research Program, Norris Cotton Cancer Center, Lebanon, New Hampshire (Gilbert-Diamond, Li); Department of Pediatrics, Geisel School of Medicine at Dartmouth, Lebanon, New Hampshire (Adachi-Mejia, McClure, Sargent); Cancer Control Research Program, Norris Cotton Cancer Center, Lebanon, New Hampshire (Adachi-Mejia, McClure, Sargent); The Dartmouth Institute for Health Policy and Clinical Practice, Lebanon, New Hampshire (Adachi-Mejia, McClure, Sargent)

Abstract

IMPORTANCE—Obesity affects health in children and adolescents. Television viewing is an established risk factor for obesity in youth. No prospective study has assessed whether a bedroom television confers an additional risk for obesity in youth.

OBJECTIVE—To assess the prospective association between the presence of a bedroom television and change in body mass index (BMI; calculated as weight in kilograms divided by height in meters squared), independent of television viewing, in a nationally representative sample of US children and adolescents.

Corresponding Author: Diane Gilbert-Diamond, ScD, Department of Community and Family Medicine, Geisel School of Medicine at Dartmouth, Hinman Box 7927, One Medical Center Dr, Lebanon, NH 03756 (diane.gilbert-diamond@dartmouth.edu).

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DESIGN, SETTING, AND PARTICIPANTS—We conducted a random-digit prospective telephone survey that captured children and adolescents from across the United States. Participants included 6522 boys and girls aged 10 to 14 years at baseline who were surveyed via telephone about media risk factors for obesity. Weighted regressions assessed adiposity at 2- and 4-year follow-up, controlling for television and movie viewing, video-game playing, parenting, age, sex, race or ethnicity, household income, and parental educational level.

EXPOSURE—Report of having a television in the bedroom at baseline.

MAIN OUTCOMES AND MEASURES—Age- and sex-adjusted BMI based on self-report and parent report of weight and height at 2- and 4-year follow-up.

RESULTS—Distributions for age, sex, race or ethnicity, and socioeconomic status were similar to census estimates for the US population. Sample weighting methods accounted for higher dropout rates among ethnic minorities and those with lower socioeconomic status. Bedroom televisions were reported by 59.1% of participants at baseline, with boys, ethnic minorities, and those of lower socioeconomic status having significantly higher rates. In multivariate analyses, having a bedroom television was associated with an excess BMI of 0.57 (95% CI, 0.31–0.82) and 0.75 (0.38–1.12) at years 2 and 4, respectively, and a BMI gain of 0.24 (0.02–0.45) from years 2 to 4.

CONCLUSIONS AND RELEVANCE—Having a bedroom television is associated with weight gain beyond the effect of television viewing time. This association could be the result of uncaptured effects of television viewing or of disrupted sleep patterns. With the high prevalence of bedroom televisions, the effect attributable to this risk factor among US children and adolescents is excess weight of 8.7 million kg/y.

More than one-third of children and adolescents in the United States are overweight or obese.[1] These 11 million youth are at increased risk for a myriad of health problems, including obstructive sleep apnea, poor regulation of glucose levels, and hypertension[2,3] compared with their healthy-weight counterparts. In addition, these youth are more likely to become overweight and obese adults[4] who have an increased risk for coronary heart disease, type 2 diabetes mellitus, and several cancers.[5,6]

Persuasive evidence suggests that increased television viewing is related to adolescent weight gain,[7–10] although the causal mechanism of the association remains unknown. Studies[11–14] suggest that children increase their consumption of calories during television viewing, and exposure to food advertisements may cue subsequent energy-dense food consumption.[15–17] Other studies[18] suggest that increased sedentary behavior also mediates the association, but these findings are equivocal.

Several cross-sectional studies[19–23] have found that having a television in the bedroom is associated with an increased risk for child overweight independently of television viewing time. For example, an analysis of the 2007 US National Survey of Children's Health[20] found that adolescents with a bedroom television were 44% more likely to be overweight than those without, even after adjusting for television viewing time. Given that an estimated 71% of 8- to 18-year-old individuals in the United States have bedroom televisions,[24] the

potential effect of this exposure on child and adolescent overweight could be important on a national level.

The cross-sectional studies[19–23] that examined the presence of a television in the bedroom and youth overweight could not explore the temporality of the association, and only a single longitudinal study[25] has examined this association over time. Among 379 French adolescents, a bedroom television was associated with higher adiposity after 3 years in boys but not in girls. That study, however, did not assess the effect of a bedroom television that was independent of television viewing time. The present study is the first, to our knowledge, to examine whether having a bedroom television is prospectively associated with weight gain independently of television viewing time.

Methods

Participants

The methods of the Dartmouth Media Study, an ongoing longitudinal study of US adolescents, have been previously described.[26] In brief, a national sample of 6522 US children and adolescents aged 10 to 14 years was recruited via random-digit dialing and answered a telephone survey at baseline (June 2 to October 5, 2003) and during 4 years of follow-up by trained interviewers from Westat, Inc, Rockville, Maryland. Of the 6522 baseline participants, 4575 were available for follow-up at 2 years and 3055 at 4 years after baseline. All adolescents provided assent, and their parents provided oral consent before participation. The study was approved by the Dartmouth Committee for the Protection of Human Subjects.

Measures

Outcome Measures—Our primary outcomes were body mass index (BMI; calculated as weight in kilograms divided by height in meters squared) 2 and 4 years after baseline based on self-reports and parent reports of participant height and weight. In addition, we determined age- and sex-standardized BMI *z* scores using the Centers for Disease Control and Prevention 2000 reference distributions.[27] In developing the BMI and BMI *z* score outcomes, we first excluded implausible height and weight values using the Centers for Disease Control and Prevention and Pediatric Nutrition Surveillance System edit criteria[27–29]; any value corresponding to the 2000 age- and sex-standardized BMI *z* scores that was less than −5 or greater than 5 for weight and less than −5 and greater than 3 for height was considered biologically implausible. In addition, reported height and weight that resulted in BMI *z* scores of less than −4 or greater than 5 were also considered implausible. Plausible height and weight values from adolescent and parent reports were used to calculate self- and parent-reported BMI and in turn calculate a mean reported BMI and BMI *z* scores for years 2 and 4 of follow-up.

Exposure Measures—We assessed the presence of a bedroom television at baseline by asking the participants, “Do you have a TV in your bedroom?” To assess other baseline media exposure, we asked, “On school days, how many hours per day do you usually watch TV (not including video-game playing time)?” and “On school days, how many hours per

day do you usually spend playing video or computer games?" Possible responses included "none," "less than 1 hour," "1 to 2 hours," "3 to 4 hours," and "more than 4 hours." We also asked, "About how many movies do you watch each week?" and recorded responses as a continuous variable.

Covariates—At baseline, we asked each parent about his or her child's sociodemographic information. Parents were asked whether the child was Spanish, Hispanic, or Latino. They were then asked to identify the child's race as white, black, Hispanic, Pacific Islander, American Indian/Alaskan native, more than one, and other/mixed. We categorized a participant as Hispanic if his or her parent identified him or her as Hispanic regardless of the parent's classification of his or her race. Parents also reported their highest year of completed schooling and reported their household income using the categories listed in Table 1. Parenting style was assessed at baseline by asking the participants 16 questions and calculating a parental responsiveness score (scale, 0–36) and parental demandingness score (scale, 0–28).[30,31] During follow-up years 2 and 4, we asked participants, "How often do you participate in team sports with a coach?" and "How often do you participate in other sports without a coach?" to obtain a proxy for overall physical activity. Response choices were "almost every day," "1 to a few times a week," "1 to a few times per month," and "never."

Sample Weighting—Sampling weights were created by Westat, Inc, to make the sample representative of US children and adolescents aged 10 to 14 years at baseline. These weights compensated for geographic undercoverage, the increased probability of selecting an individual from households with more than 1 residential telephone line, and the decreased probability of selecting an individual from a household with more than 1 age-eligible child or adolescent.[32–34] The baseline weights were also modified for each subsequent follow-up of this longitudinal study to account for sample attrition.[35,36] We used commercially available statistical software (SAS, version 9.3; SAS Institute, Inc) to analyze data using appropriate sampling weights to produce nationally representative estimates of variables and jack-knife replicate weights to estimate variances.

Statistical Analysis

We first examined the distribution of baseline socioeconomic characteristics in weighted and unweighted samples for the baseline participants and the subsets that were followed up at years 2 and 4. Using sampling weights, we then explored the baseline distribution of media exposure, parenting style, and sociodemographic characteristics in participants stratified by baseline television exposure in the bedroom and compared the differences in proportions and means in the strata using χ^2 and unpaired 2-tailed *t* tests with an equal variance assumption, respectively. We calculated Spearman rank correlation coefficients between media exposure measures.

We next examined the association between a bedroom television at baseline and BMI at years 2 and 4 using weighted linear regression. Adjusted analyses included the following covariates: television viewing hours per day, movies viewed per week, video-game playing hours per day, parental responsiveness, parental demandingness, age, sex, race or ethnicity,

household income, and parental education. We then refit models with additional adjustment for sports participation to assess whether sports-related physical activity explained observed associations. To assess whether a bedroom television was associated with BMI change, we fit a model with year 4 BMI as the outcome, adjusting for year 2 BMI in addition to the covariates described. Similarly, we assessed whether a bedroom television was associated with a change in age- and sex-standardized BMI *z* score (without adjustment for age and sex).

Finally, using our sample's weighted height distribution, we converted our estimated excess BMI gain associated with a bedroom television into an estimated excess weight gain. Then, by multiplying this excess weight gain by the estimated number of US adolescents[37] with a bedroom television, we calculated the amount of excess weight in kilograms accumulated every year in the United States that is attributable to bedroom televisions. We calculated the 95% confidence interval of the excess weight gained by repeating the calculation using the lower and upper bounds of the 95% confidence interval for the estimated excess BMI.

Results

At baseline, mean (SD) age of the 6522 participants was 12.0 (0) years, and 51.5% were male. Baseline distributions of race, weight status, household income, and parental educational level were similar to national distributions and thus were only slightly altered by the baseline weighting (data not shown). Greater attrition occurred during follow-up among ethnic minorities and those with lower socioeconomic status (data not shown). Applying the weighting to the sample effectively mitigated the effect of differential attrition, and thus the distributions of participant characteristics on the weighted data set are similar at baseline and years 2 and 4 (Table 1). All further results are based on the weighted data set.

Bedroom televisions were reported for 59.1% of participants at baseline. Boys were 8% more likely to have a bedroom television compared with girls ($P < .001$), and 16% more blacks and Hispanics had bedroom televisions than whites and participants of other races ($P < .001$). Bedroom televisions were also more common among participants with a lower parental educational level and family income ($P < .001$ for both). Participants with a bedroom television had greater mean exposure to television, movies, and video games than those who did not ($P < .001$ for all) (Table 2). Those with bedroom televisions also reported less demanding and less responsive parents (based on mean scale scores) than those without bedroom televisions ($P = .02$ and $P = .003$, respectively).

Media exposure measures were only moderately correlated. Having a bedroom television was positively correlated with television viewing hours per day (Spearman $r = 0.14$; $P < .001$), movies viewed per week (0.13; $P < .001$), and video-game playing hours per day (0.10; $P < .001$). Television viewing was positively correlated with movie viewing (Spearman $r = 0.21$; $P < .001$) and video-game playing (0.22; $P < .001$).

Having a bedroom television at baseline was associated with a mean 1.16 (95% CI, 0.88–1.44) larger BMI at year 2 and 1.31 (0.93–1.70) larger BMI at year 4 (Table 3). After adjusting for television and movie viewing times, video-game playing, parental

demandingness and responsiveness, and sociodemographic factors, the presence of a bedroom television was still associated with a 0.57 (95% CI, 0.31–0.82) larger BMI at year 2 and 0.75 (0.38–1.12) larger BMI at year 4. Television viewing time, age, and lower household income were also independently associated with greater mean BMI at years 2 and 4. Male sex and lower parental educational level were associated with greater BMI at only 1 of the 2 follow-up times in adjusted analyses. In addition, movie viewing, less parental responsiveness, black race, and Hispanic ethnicity were associated with larger BMI in unadjusted analyses; however, the associations did not persist after adjustment. No associations were affected by additional adjustment for physical activity.

Having a bedroom television at baseline was also a significant predictor of BMI gain from year 2 to year 4 of follow-up. Adolescents with a bedroom television at baseline had a mean excess BMI gain of 0.24 (95% CI, 0.02–0.45) from years 2 to 4 compared with those without a bedroom television after adjusting for other media exposure, parenting style, and sociodemographic variables (Table 4). Each hour per day of television viewing time at baseline also independently predicted a mean excess BMI gain of 0.14 (95% CI, 0.02–0.25) from years 2 to 4. These associations were not altered by additional adjustment for sports participation. Our results were also consistent when using age- and sex-specific BMI *z* score as the outcome. A bedroom television at baseline was associated with an increase in BMI *z* score from years 2 to 4 of 0.09 (95% CI, 0.03–0.15). Baseline television viewing hours per day was associated with an increase in BMI *z* score from years 2 to 4 of 0.03 (95% CI, 0.00–0.06).

The excess BMI increase of 0.24 from years 2 to 4 that is associated with a bedroom television is equivalent to an excess of approximately 0.4 kg/y, given the height distribution of our population. With televisions in the bedrooms of 59.1% of the 42.3 million US youth aged 10 to 19 years,[37] this excess weight translates into approximately 8.7 million (95% CI, 0.9 million to 16.4 million) kg/y attributable to the presence of bedroom televisions.

Discussion

Having a bedroom television was a significant predictor of adiposity gain in adolescents in our national study. The association was independent of other predictors of weight gain, such as television viewing time and socioeconomic factors. This association is concerning given that our study and others[38,39] have found that more than half of US adolescents have bedroom televisions. Moreover, a large national study[40] found that more than 40% of children have a bedroom television by 5.5 years of age, suggesting that this modifiable risk factor may be present from an early age for a substantial number of US children.

Other studies[19–22] found a cross-sectional association between a bedroom television and adiposity in children. The 2007 US National Survey of Children's Health (n = 48 687)[20] found that children with a bedroom television were more likely to be overweight compared with those without after adjusting for television viewing time and sociodemographic factors (odds ratio, 1.44 [95% CI, 1.25–1.66]). A regional study of New Hampshire and Vermont schoolchildren (n = 2343)[15] found that having a bedroom television increased the odds of being overweight by 32% after adjusting for media use and sociodemographic factors. A

similar association was found in a national study of low-income preschoolers (n = 2761),[22] among whom having a bedroom television was associated with a 31% increased risk of overweight after controlling for television viewing time and sociodemographic factors.

These cross-sectional studies were unable to elucidate the temporal relation between the presence of bedroom televisions and child overweight. A single longitudinal study[25] has previously examined whether a bedroom television is associated with children's weight in repeated measurements over time. In that study of 379 French children aged 12 years comparing those with and without a bedroom television, having a bedroom television at baseline was associated with mean increases in BMI of 1.5, waist circumference of 3.7 cm, and fat mass of 2.4% during 3 years in boys. No associations were found in girls. These models only adjusted for child sexual maturity but remained significant after also adjusting for socioeconomic status. Because the study did not adjust for baseline anthropometry, whether the differences in adiposity over time simply reflect differences at baseline that persisted during the 3-year study remains unclear. Our study extends previous studies by being the first, to our knowledge, to examine how the presence of a bedroom television is related to a gain in adiposity over time.

Several factors related to whether a child was likely to have a bedroom television. Being older, male, nonwhite, and from a household with a lower socioeconomic status were all associated with an increased likelihood of having a bedroom television in our sample, consistent with results from other studies.[19,20,22,38,41,42] In addition, having a bedroom television was strongly associated with increased television viewing in our study and others.[19,20,22,38,39] Increased television viewing is of concern, given that our study and others[7,8] have observed that television viewing is associated with adiposity gain in children, even after controlling for earlier adiposity.

Our results suggest that having a bedroom television is associated with childhood adiposity gain independently of television viewing time. In fact, an average adolescent with a bedroom television gained an additional 0.4 kg/y in excess of his or her peers without a bedroom television, independent of total television viewing. This finding is consistent with those of cross-sectional studies[19–23] that also report increased adiposity related to the presence of a bedroom television after controlling for television viewing time. All of the studies discussed, including our own, relied on self-report of bedroom televisions and television viewing time. The presence of a bedroom television may be reported with greater accuracy than television viewing time so that we are actually observing the uncaptured effects of television viewing time on obesity. However, having a bedroom television may also confer additional risk to children beyond that of television viewing time.

One possible mechanism by which bedroom televisions might affect weight gain is through sleep pattern alterations.[20,40,43] In the US National Survey of Children's Health,[20] children with a bedroom television were 20% less likely to get adequate sleep after adjusting for socioeconomic factors and television viewing time. Shorter sleep duration has consistently predicted subsequent weight gain in children (reviewed by Magee and Hale[44]) and thus is a plausible mechanism through which a bedroom television may increase child adiposity. Unfortunately, our study did not assess sleep, so we are unable to examine this potential

causal pathway. Further longitudinal studies are necessary to determine whether having a bedroom television is prospectively associated with shorter sleep duration.

Another possible mechanism might be greater exposure to child-targeted food advertising when viewing bedroom televisions compared with other shared televisions. Children viewing bedroom televisions might have more control over the programs viewed and might therefore be more highly exposed to advertisements that target their demographic. Further studies are necessary to characterize food advertising exposure and subsequent caloric consumption from bedroom televisions vs other shared televisions in the home.

This study suggests that removing bedroom televisions may be an important step in our nation's fight against child obesity. In contrast to limiting screen time, which may require consistent parental monitoring, removing a child's bedroom television is a structural change in the child's electronic media environment that is potentially long lasting. This study and others[19–23,25] provide important motivation for pediatricians to prescribe television-free bedrooms to their patients, as is recommended by the American Academy of Pediatrics Committee on Public Education.[45] Although dispensing such a recommendation may be fairly simple, further interventional research is needed to understand how best to support parents and caregivers in implementing and sustaining television-free bedrooms for their children.

Our study is limited by our use of child- and parent-reported height and weight, which are not as accurate as measured values[46,47]; however, obtaining measured height and weight data in our large national cohort was financially and logistically prohibitive. At the conception of this study, televisions were the dominant form of available visual media. The media landscape for children is rapidly changing, and future studies should also evaluate whether other types of electronic media devices, such as smartphones, tablets, and laptop computers, also contribute to weight gain and whether interventions to limit the presence of such devices in bedrooms can reduce the risk for obesity in children and adolescents.

Conclusions

Having a bedroom television is a significant risk factor for adiposity gain during childhood and adolescence, even after controlling for television viewing time. Given the pervasiveness of bedroom televisions and the epidemic prevalence of child obesity, this association may have a profound effect on the health of our children. This work underscores the need for interventional studies to explore whether removing televisions from child bedrooms results in lower adiposity gain.

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Table 1

Characteristics of Participants in the Baseline Survey and Subsamples With Follow-up Years 2 and 4 Data[a]

	Weighted Data		
		Follow-up	
Characteristic	**Baseline (n = 6522)**	**Year 2 (n = 4575)**	**Year 4 (n = 3055)**
Age, mean (SE), y	12.0 (0.0)	14.0 (0.0)	15.8 (0.0)
Sex			
Male	51.5	51.6	51.3
Female	48.5	48.4	48.7
Race/ethnicity			
White	61.6	61.7	61.7
Black	15.1	15.1	15.0
Hispanic	16.1	16.1	16.2
Other	7.1	7.1	7.1
Weight status[b]			
Healthy (<85th percentile)	NA	72.3	73.6
Overweight (85th to <95th percentile)	NA	16.4	14.3
Obese (≥95th percentile)	NA	11.3	12.1
Household income, $[c,d]			
≤10 000	6.3	6.3	5.7
10 001–20 000	9.8	9.7	9.7
20 001–30 000	11.2	11.1	10.9
30 001–50 000	22.6	22.8	23.1
50 001–75 000	22.0	21.9	21.8
≥75 001	28.1	28.3	28.8
Parental educational level[c]			
Less than high school	16.1	15.6	13.9
High school degree	23.0	22.5	22.0
Some beyond high school	21.8	21.2	21.7
Associate’s degree	8.8	8.8	9.0
Bachelor’s degree	18.5	19.4	19.8
Some graduate	11.7	12.4	13.5
Bedroom television present	59.1	64.5	64.5

Abbreviation: NA, not available.

[a] Data are part of the Dartmouth Media Study of participants aged 10–14 years. Data were summarized with weighting to account for unbalanced baseline sampling and attrition. Unless otherwise indicated, data are expressed as percentage of participants.

[b] Based on the 2000 reference curves from the Centers for Disease Control and Prevention.[27] Weight status was not measured at baseline. Weight data were missing for 3% at year 2 and 1% at year 4.

[c] Assessed at baseline.

[d] Owing to parental nonresponse, 7% of the sample were missing data.

Table 2

Baseline Characteristics of Participants Stratified by Presence of a Bedroom Television[a]

	Bedroom Television		
Baseline Characteristic	**Absent**	**Present**	***P* Value[b]**
Media, mean (SE)			
Television viewing time, h/d	2.9 (0.0)	3.2 (0.0)	<.001
Movies viewed, No./wk	2.8 (0.0)	3.0 (0.0)	<.001
Video-game playing, h/d	2.0 (0.0)	2.2 (0.0)	<.001
Parenting style score, mean (SE)			
Parental demandingness (scale, 0–28)	23.5 (0.1)	23.3 (0.1)	.02
Parental responsiveness (scale, 0–36)	29.6 (0.1)	29.2 (0.1)	.003
Sociodemographic data			
Age, mean (SE), y	11.9 (0.0)	12.1 (0.0)	<.001
Sex			
Male	36.9	63.1	<.001
Female	45.1	54.9	
Race/ethnicity			
White	46.2	53.8	<.001
Black	25.1	74.9	
Hispanic	34.1	65.9	
Other	44.1	55.9	
Household income, $			
≤10 000	26.1	73.9	<.001
10 001–20 000	32.3	67.7	
20 001–30 000	35.3	64.7	
30 001–50 000	34.5	65.5	
50 001–75 000	43.4	56.6	
≥75 001	51.2	48.8	
Parental educational level			
Less than high school	31.3	68.7	<.001
High school degree	30.5	69.5	
Some beyond high school	35.4	64.6	
Associate’s degree	41.8	58.2	
Bachelor’s degree	55.5	44.5	
Some graduate school	61.0	39.0	

[a] Data are part of the Dartmouth Media Study of participants aged 10 to 14 years. We used 6522 participants to create weighted estimates. Unless otherwise indicated, data are expressed as percentage of participants.

[b] Calculated from an unpaired, 2-tailed *t* test with an equal variance assumption to analyze the difference in means and a χ^2 test to analyze the difference in proportions of participants with and without bedroom televisions by the different baseline characteristics.

Table 3

Unadjusted and Adjusted Difference in BMI at Follow-up Years 2 and 4 by Baseline Media, Sociodemographic, and Physical Activity Predictors[a]

	BMI Difference (95% CI)			
	Year 2		Year 4	
Baseline Exposure	**Unadjusted[b]**	**Adjusted[c]**	**Unadjusted[b]**	**Adjusted[c]**
Media				
Has a bedroom television	1.16 (0.88 to 1.44)	0.57 (0.31 to 0.82)	1.31 (0.93 to 1.70)	0.75 (0.38 to 1.12)
Television viewing time, h/d	0.68 (0.49 to 0.87)	0.44 (0.25 to 0.64)	0.62 (0.40 to 0.83)	0.36 (0.14 to 0.59)
Movies viewed, No./wk	0.48 (0.29 to 0.68)	0.16 (−0.05 to 0.37)	0.48 (0.23 to 0.73)	0.19 (−0.10 to 0.49)
Video-game playing time, h/d	0.07 (−0.10 to 0.24)	−0.07 (−0.28 to 0.14)	0.25 (0.04 to 0.46)	0.03 (−0.21 to 0.27)
Parenting style score				
Parental demandingness (scale, 0–28)	−0.03 (−0.08 to 0.02)	0.06 (0.004 to 0.11)	−0.03 (−0.09 to 0.03)	0.05 (−0.02 to 0.12)
Parental responsiveness (scale, 0–36)	−0.09 (−0.13 to −0.04)	−0.05 (−0.10 to 0.01)	−0.09 (−0.14 to −0.03)	−0.05 (−0.12 to 0.01)
Sociodemographic data				
Age	0.56 (0.45 to 0.67)	0.55 (0.43 to 0.67)	0.44 (0.30 to 0.58)	0.45 (0.30 to 0.60)
Sex, male	0.28 (0.03 to 0.53)	0.20 (−0.08 to 0.48)	0.58 (0.21 to 0.95)	0.53 (0.12 to 0.94)
Race/ethnicity				
White	0 [Reference]	0 [Reference]	0 [Reference]	0 [Reference]
Black	1.54 (0.92 to 2.15)	0.56 (−0.07 to 1.19)	1.06 (0.20 to 1.92)	0.24 (−0.55 to 1.03)
Hispanic	1.38 (0.89 to 1.86)	0.50 (−0.01 to 1.01)	0.79 (0.20 to 1.39)	−0.11 (−0.73 to 0.50)
Other	1.05 (0.47 to 1.62)	0.67 (0.08 to 1.26)	0.62 (−0.01 to 1.25)	0.28 (−0.41 to 0.96)
Household income	−0.50 (−0.60 to −0.40)	−0.29 (−0.40 to −0.17)	−0.57 (−0.74 to −0.39)	−0.39 (−0.57 to −0.21)
Parental education level	−0.22 (−0.28 to −0.17)	−0.06 (−0.11 to 0.00)	−0.22 (−0.29 to −0.15)	−0.07 (−0.15 to 0.00)

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared).

[a] Data were part of the Dartmouth Media Study of participants aged 10 to 14 years. Weighted associations for follow-up years 2 and 4 were estimated using 4143 and 2812 participants, respectively.

[b] Coefficients were from linear regression models with BMI as the outcome. Household income and parental education were modeled as ordinal predictors, with categories as listed in Table 1.

[c] Indicates models adjusted for all variables listed in the Table.

Table 4

Adjusted Change in BMI from Follow-up Years 2 to 4 by Baseline Media, Parenting Style, and Sociodemographic Predictors[a]

Variable	Change in BMI (95% CI)[b]
Media	
Has a bedroom television	0.24 (0.02 to 0.45)
Television viewing time, h/d	0.14 (0.02 to 0.25)
Movies viewed, No./wk	−0.02 (−0.17 to 0.13)
Video-game playing time, h/d	0.04 (−0.08 to 0.16)
Parenting style score	
Parental demandingness (scale, 0–28)	−0.01 (−0.05 to 0.03)
Parental responsiveness (scale, 0–36)	0.00 (−0.03 to 0.03)
Sociodemographic data	
Age	−0.11 (−0.19 to −0.03)
Sex, male	0.34 (0.12 to 0.57)
Race/ethnicity	
White	0 [Reference]
Black	−0.01 (−0.54 to 0.52)
Hispanic	−0.17 (−0.48 to 0.14)
Other	0.07 (−0.33 to 0.47)
Household income	−0.03 (−0.12 to 0.07)
Parental educational level	−0.04 (−0.08 to 0.00)

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared).

[a] Data were part of the Dartmouth Media Study of participants aged 10 to 14 years. Weighted associations were estimated using 2812 participants.

[b] Coefficients were from linear regression models with year 4 BMI as the outcome and year 2 BMI and all other variables in the table as predictors. Household income and parental education were modeled as ordinal predictors, with categories as listed in Table 1.