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ARTICLE

Association Between Television, Movie, and Video Game Exposure and School Performance

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ABSTRACT

BACKGROUND. The relationship between media exposure and school performance has not been studied extensively in adolescents.

OBJECTIVE. The purpose of this work was to test the relative effects of television, movie, and video game screen time and content on adolescent school performance.

METHODS. We conducted a population-based cross-sectional survey of middle school students (grades 5–8) in the Northeastern United States. We looked at weekday television and video game screen time, weekend television and video game screen time, cable movie channel availability, parental R-rated movie restriction, and television content restriction. The main outcome was self-report of school performance (excellent, good, average, or below average). We used ordinal logistic-regression analysis to test the independent effects of each variable, adjusting for demographics, child personality, and parenting style.

RESULTS. There were 4508 students who participated in the study; gender was equally represented, and 95% were white. In multivariate analyses, after adjusting for other covariates, the odds of poorer school performance increased with increasing weekday television screen time and cable movie channel availability and decreased with parental restriction of television content restriction. As compared with children whose parents never allowed them to watch R-rated movies, children who watched R-rated movies once in a while, sometimes, or all of the time had significantly increased cumulative odds of poorer school performance. Weekend screen time and video game use were not associated with school performance.

CONCLUSIONS. We found that both content exposure and screen time had independent detrimental associations with school performance. These findings support parental enforcement of American Academy of Pediatrics guidelines for media time (particularly weekdays) and content limits to enhance school success.

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Key Words
television, media exposure, school performance, parenting

Abbreviations
CI— confidence interval
OR— odds ratio

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OVER THE PAST 20 years, US children have been participants in what is called, a "mass media explosion." In 2000, 97% of American homes with children had television sets, 97% had a video cassette recorder, and 89% had a personal computer or other video game-capable equipment.[1] More than 70% of US homes had >1 television set, 69% had cable television, and 15% had satellite television service.[2] As a result, children spend ~40 hours per week consuming all forms of media; more than half of this time is spent watching television, movies, or videos.[3]

Television exposure has been linked to obesity, aggression, and high-risk behavior.[4–10] However, studies of the relationship between television exposure and school performance have focused primarily on exposure during the preschool years and have yielded conflicting results.[10–17] One longitudinal study found that increased television screen time during the preschool years was related to higher grades for boys and lower grades for girls during high school.[14] Content of television programs viewed had a differential effect on school performance for boys and girls. For example, exposure to more violent programming was related to worse academic performance for girls during high school. However, for both boys and girls, exposure to educational programming was related to less aggression and higher grades during high school.[14] More recently, both a longitudinal and a cross-sectional study found an association between increased television screen time and worse academic achievement.[15–17] However, these studies were criticized for not also assessing the content of television programs viewed.[18]

We hypothesized that both screen time and media content would have independent associations with school performance. Based on previous studies, screen time is an obvious choice as a mediator for a detrimental effect on school performance, because it "displaces" time that would normally be spent doing schoolwork, reading for pleasure, or engaging in other educational activities. Studies have documented a relationship between increased screen time and decreased time spent reading and doing homework,[19,20] and Anderson et al[14] have referred to this mechanism as the "displacement hypothesis." Content of television, movies, and videos could also affect school performance. Although educational content could enhance school function (as demonstrated by Anderson et al[14]), increased exposure to violence, sexuality, and so forth has been shown to enhance engagement in more high-risk behaviors,[4–10] which is associated with poorer school performance.[21] This mechanism has been referred to as the "content hypothesis."[14]

In the present analysis, we sought to provide information on the association among television, movie, and video game use and school performance among adolescents, a group for which few data are available. In addition, we aimed to separate the effects of screen time versus content to test both the displacement or content hypotheses.

METHODS

Design/Setting/Participants

We invited middle school students to participate in a survey about "the effects of media on children." Students were recruited from 15 New Hampshire and Vermont middle schools (grades 5–8), limiting eligibility to those with ≥150 students. The communities served by these schools ranged from towns with <2000 persons to cities of ≥100 000. The population was predominantly white, and most parents had graduated from high school. A confidential student survey was administered during class time by survey proctors during September 1999. Additional details about the study sampling method are available elsewhere.[9] The study protocol was approved by the Dartmouth College Human Subjects Committee.

Of 5902 total students, 128 parents or students (2.2%) refused participation, and 380 students (6.4%) were absent (average participation rate by school: 91.4%). Of the 5394 students who completed the survey, 886 were excluded because of missing data for ≥1 covariate, providing a final sample of 4508 adolescents.

Survey Measures: Main Outcome

School performance was assessed by self-report responses to the following question: "How would you describe your grades last year?" (excellent, good, average, or below average). Past reports have corroborated self-reports of student school performance by adolescents with teacher reports.[22]

Screen-Time Measures

To test the displacement hypothesis, we used 4 variables that measured time spent with visual media: television/movie weekday screen time, television/movie weekend screen time, video game weekday screen time, and video game weekend screen time. We hypothesized that if the displacement hypothesis was most important, then weekday screen time would have a stronger relationship with school performance than weekend screen time, because it would conflict with demands to complete homework for the following school day. The weekday (and weekend) screen-time variables were derived from the responses to the following questions: "On school days (or weekends), how many hours a day do you watch TV? (Include the time you spend watching TV or movies on video, but NOT time you spend playing video games)" (0 = none, 1 = <1 hour, 2 = 1–3 hours, 3 = 4–7 hours, 4 = ≥8 hours) and "On school days (or weekends), how many hours a day do you play video games? (0 = none, 1 = <1 hour, 2 = 1–3 hours, 3 = 4–7 hours, 4 = ≥8 hours).

Content Measures

To test the content hypothesis, we used 3 variables: cable movie channel availability, parental television content restriction, and parental R-rated movie restriction. To measure cable movie channel availability, subjects responded to the following question: "Do you have any of these special channels at home? Check all that you have." (Cinemax, The Movie Channel, HBO, and Showtime). The variable was coded to reflect the number of channels checked as available in the home. We postulated that exposure to more cable movie channels would increase the likelihood of exposure to adult themes depicted in the movies and programs delivered by these channels.

The parental television restriction variable coded responses to: "Are you allowed to watch anything you want on TV?" (yes or no). The parental R-rated movie restriction variable reflected responses to the following question: "How often do your parents let you watch movies and videos that are rated R?" (never, once in a while, sometimes, or all the time). We asked specifically about R-rated movies because in the United States, the Motion Picture Association of America uses the "R" rating to designate a movie that is intended for older adolescents and adults ("Under 17 requires accompanying parent or adult guardian").

Validation of Media Measures

We expected content measures to be more highly associated with viewing adult media venues than screen-time measures. To validate this presumption, we assessed their relationship with an R-rated movie exposure variable. The R-rated movie exposure variable was derived from an assessment of movie exposure that has been described previously,[9] for which we randomly selected 50 movie titles from a pool of 601 popular contemporary movies (each adolescent responded to a unique list of 50 movie titles, 23 of which were R-rated titles). Adolescents in this study sample had seen a median of 3 (interquartile range: 1–7) of the 23 R-rated movie titles on their movie list. We regressed the number of R-rated movies seen against the media variables, controlling for age, gender, school, parent education, parenting style, rebelliousness, sensation seeking, and self-esteem (see below for a full description of the covariates), and accounting for clustering by school. As predicted, the 3 media content measures were significantly associated with the outcome, with the number of R-rated movies increasing by an average of 0.57 (interquartile range: 0.46–0.68) for each 1 point increase in cable movie channel availability, decreasing by an average 0.59 (interquartile range: 0.32–0.86) with television content restriction, and decreasing by an average of 1.50 (95% confidence interval [CI]: 1.29–1.71) for each 1 point increase in parental R-rated movie restriction. There was no association between any of the 4 measures of time spent with media and R-rated movie exposure. Thus, parental R-movie restriction, cable movie channel availability, and television content restriction are associated with exposure to adult entertainment media, whereas weekday and weekend screen time are not, validating the notion that these 2 classes of variables may be used to distinguish between the content and the displacement hypotheses.

Measured Covariates

We sought to distinguish between the effects of media exposure and the effects of other variables (confounders) that might affect school performance and also be related to media exposure. We present these variables in 3 general classes: parenting style, child personality, and demographics.

Parenting Style

Parental television and R-rated movie restriction could simply reflect the general effect of parenting style on school performance. Increased parental support, communication, and limit setting have been related to less high-risk behavior[23] and better school performance[24,25] in adolescents. Hence, we believed parenting style to be an important potential confounder in the relationship between adolescent television, movie, and video game use and school performance. Moreover, we thought it important to distinguish between general measures of parenting style and media-specific parenting, such as R-rated movie restrictions, which were specifically hypothesized to influence school performance by affecting media content.

To capture parenting style, subjects responded to questions about their mothers, based on Baumrind's[26] authoritative parenting construct, and using items validated previously in adolescents by Jackson et al.[27] Authoritative parenting captures 2 domains: maternal support (also termed responsiveness) and maternal control (which taps monitoring and limit setting and is also referred to as demandingness). Responses to 4 questions ("she makes me feel better when I'm upset," "she listens to what I have to say," "she wants to hear about my problems," and "she is too busy to talk to me") were combined to create a maternal support index (range: 0–12). Responses to another 4 questions ("she tells me what time I have to be home," "she asks me what I do with my friends," "she knows where I am after school," and "she always makes me follow her rules") were combined to create a maternal control index (range: 0–12). A higher value on both indexes indicates a more authoritative parenting style, which has been related in previous studies to decreased high-risk behavior and better school outcomes in adolescents.[23–27] Cronbach's α for the maternal support index (.77) and the maternal control index (.60) have been published previously.[9]

Child Personality

Previous work has shown that adolescents with low self-esteem and high levels of rebelliousness or sensation seeking have increased media exposure.[7–9] These factors are also linked with engagement in high-risk behaviors and worse school performance[28–30]; hence, we included these child personality characteristics as covariates in this analysis. Items for the indexes used to capture these domains and their Cronbach's α have been published previously.[9] The self-esteem index (range: 0–24; Cronbach's α = .74) included the following items: "I will be successful when I grow up," "I wish I was someone else," "I like myself the way I am," "I am happy with how I look," " I wish I was better looking," "I worry that other kids don't like me," "I feel tired all the time," and "I often feel sad." Items for the rebelliousness index (range: 0–21; Cronbach's α = .73) included: "I get in trouble in school," "I argue a lot with other kids," "I do things my parents wouldn't want me to do," I do what my teachers tell me to do," "I sometimes take things that don't belong to me," "I argue with my teachers," and "I like to break the rules." Items for the sensation-seeking index (range: 0–18; Cronbach's α = .69) included: "I like to do scary things," "I get bored being with the same friends all the time," "I would like to try drinking alcohol or beer," "I like to do dangerous things," "I often think there is nothing to do," and "I like to listen to loud music."

Demographics

Demographics and socioeconomic status could be associated with media exposure and school performance. Subjects answered questions about their gender, current grade in school, and their age. Because previous work has demonstrated that "age for grade" is a risk factor for poor school performance,[31] we created a dichotomous variable to code for whether a subject was younger than the modal age for his grade and another to indicate whether a subject was older than the modal age for grade.

Previous investigators have suggested that television use by children of lower socioeconomic status may be particularly beneficial to their school performance.[12–14,32] In a study by Fetler,[12] among children in lower socioeconomic class homes, those who watched little/no television had worse academic performance than those who watched moderate amounts of television. Conversely, among children from higher socioeconomic class homes, children who watched little/no television had better academic performance than those who watched moderate amounts.[12,13] Hence, we believed that socioeconomic status may be an important confounder of the relationship between television, movie, and video game use and school performance. A categorical variable was created to reflect whether parents had graduated from high school (both parents, 1 parent, or neither parent). In addition, because we did not have rich individual measures of family socioeconomic status, we used data from the New Hampshire and Vermont Departments of Education Web sites to obtain socioeconomic data (percent of students eligible for free lunch) for each of the 15 schools.[33,34] We categorized school socioeconomic status into the following groups: ≥30% of students receive free lunch, 6%–29% of students receive free lunch, and <6% of students receive free lunch.

Statistical Analysis

First, to test whether subjects included in this study differed from those with missing data, we compared demographics and media use for the 2 groups. We used Student's t test to compare means for continuous data. The χ^2 test was used to compare proportions for categorical variables.

To test the assumption that the covariates detailed above were indeed potential confounders of the relationship between media use and school performance, we examined the relationship between media use and each covariate. Because the media use variables were ordered categorical scales, we used nonparametric statistics, calculating Spearman correlations.

To evaluate the association between poorer school performance and media use, we used ordinal logistic regression with an ordinal school performance variable (excellent, good, average, or poor) as the dependent variable so that we were modeling the odds of performing more poorly. To test the suitability of using the linear form of our media exposure indices in the final regression equation, we plotted line graphs with the x-axis representing the media exposure categories and the y-axis representing the proportion of subjects with excellent, good, average, and poor school performance for each category.

We used ordinal logistic-regression analysis to calculate adjusted odds ratios (ORs) and 95% CIs for the relationship between school performance and each of the media use variables while adjusting for parenting style, child personality, demographics, and clustering by school. This model gives cumulative ORs modeling the probability of being in any higher category on the school performance variable given a baseline category. With an ordered dependent variable, these models have the advantage of retaining information that would be lost by combining the data into 2 arbitrary groups, as one does when using logistic regression. Finally, we tested for interactions between each of the media use variables and the following covariates for which effect modification has been suggested in previous studies: gender, parental education, and socioeconomic status.

RESULTS

Participant Characteristics

We received complete data for all of the variables for 4508 subjects. Forty-nine percent of subjects were boys.

The median age was 12 years (range: 9–15 years); 8% were fifth graders, 26% sixth graders, 31% seventh graders, and 35% eighth graders. The modal age for each grade was as follows: fifth grade: 10 years; sixth grade: 11 years; seventh grade: 12 years; and eighth grade: 13 years. Overall, 3291 subjects (73%) were at the modal age for their grade. Ninety subjects (2%) were younger than the modal age for their grade, and 1129 (25%) were older than the modal age for their grade.

Table 1 details the differences between study subjects as compared with those excluded for having missing data. Study subjects reported significantly better school performance than did excluded subjects. Study subjects also reported slightly but significantly less weekday screen time and weekend screen time and cable movie channel availability than subjects who were excluded for missing data. Parental R-rated movie and television restriction did not differ between the 2 groups. Overall, study subjects reported significantly higher levels of maternal support, maternal control, and self-esteem and less rebelliousness. Retained subjects also had higher parental education and came from schools with a higher socioeconomic status.

Correlates of Media Use

Table 2 details the relationship between media use and the covariates. There were significant correlations between all of the covariates and the media use variables. Weekday screen time, weekend screen time, and cable movie channel availability all decreased with increasing maternal support, maternal control, child self-esteem, grade, parental education, and school socioeconomic status and increased with increasing rebelliousness, sensation seeking, and older age for grade. Parental R-rated movie and television content restriction increased with maternal support, maternal control, child self-esteem, parental education, and school socioeconomic status and decreased with increasing grade, rebelliousness, and sensation seeking, and the correlations with these last 2 variable were particularly strong. As compared with girls, boys reported higher weekday and weekend screen time and less parental restriction of television content and R-rated movie viewing.

Relationship With School Performance

Overall, 36% of subjects reported excellent school performance, 38% reported good performance, 20% reported average performance, and 7% reported below average performance. The line plots in Fig 1 illustrate the relationship between school performance and each of the media use variables. The proportion of subjects with below average performance rose beyond 3 hours of weekday television screen time (Fig 1A) or 1 hour of weekday video game screen time (Fig 1B) but was not affected by weekend screen time except at the highest level of exposure (Fig 1 C and D). The proportion of students with excellent school performance seemed more sensitive to the effect of weekday media time; for example, the proportion of students with excellent performance dropped from 50% for adolescents with no television weekday screen time to 24% for adolescent with 4–7 hours of screen time (Fig 1A). Again, the effect of weekend screen time was weaker.

The line plots in Fig 2 show the relationship between media content measures and school performance. All of the measures of content were linked strongly with excellent and poor school performance, with the strongest association being seen with parental R-rated movie restriction (Fig 2C). For example, whereas only 0.4% of adolescents who were never allowed to view R-rated movies reported below average grades, 13% of those reporting no restriction reported below average grades.

After adjusting for other covariates, the cumulative odds of poorer school performance increased with higher weekday television screen time and cable movie channel availability (Table 3). The odds of poorer school performance decreased substantially with report of television content restriction and with higher levels of parental R-rated movie restriction. The effect size for the content restriction variables on poor school performance exceeded that of other important influences, including parenting style and child self-esteem and rebelliousness. All else being equal, weekend screen time and video game use were not associated with school performance.

Testing for interaction effects revealed interactions by gender for cable movie channel availability and R-rated movie restriction (Table 4). The effects of these media exposure variables varied for girls versus boys. The association between exposure to cable movie channels and poor school performance was greater in girls than in boys (1.11 vs 1.04; $P = .02$). On the other hand, the association between parental R-rated movie restriction and poorer school performance was greater for boys. As compared with never watching R-rated movies, boys who were allowed to watch R-rated movies "once in a while," "sometimes," or "all the time" had a consistent 64% increased odds of poorer school performance. Although the association between R-rated movie restriction and school performance was weaker and not statistically significant in girls, the odds of poorer school performance increased in a stepwise fashion with more laxity of parental R-rated movie restriction (Table 5).

DISCUSSION

We found a strong detrimental relationship between measures of media use and school performance in middle school children. This relationship persisted after controlling for a number of potential confounding influences. Our study supports both the displacement and the content hypotheses, with exposure to adult content having the strongest and most consistent negative impact on school performance. In addition, increased television

TABLE 1 **Comparison of Study Subjects Versus Subjects Excluded for Missing Data**

Variable	Study Sample ($N = 4508$)	Incomplete Data ($N = 886$)	P
School performance, %			
Excellent	36	30	<.001
Good	38	35	
Average	20	25	
Below average	7	10	
Screen Time			
Weekday television/movies, %			
0	5	6	<.001
<1 h	21	19	
1–3 h	55	51	
4–7 h	15	17	
>8 h	4	7	
Weekend television/movies, %			
0	2	3	<.001
<1 h	8	9	
1–3 h	38	32	
4–7 h	36	35	
>8 h	16	21	
Weekday video games, %			
0	47	44	.003
<1 h	30	28	
1–3 h	19	19	
4–7 h	3	4	
>8 h	2	5	
Weekend video games, %			
0	37	35	.06
<1 h	24	23	
1–3 h	23	23	
4–7 h	10	11	
>8 h	6	8	
Content, %			
Cable movie channel availability			
0	50	45	.008
1	16	14	
2	9	11	
3	9	11	
4	16	19	
Allowed to watch anything on television			
No	40	39	
Yes	60	61	.74
Allowed to watch R-rated movies			
Never	16	17	.59
Once in a while	25	24	
Sometimes	28	28	
All the time	32	31	
Parenting style, mean (SD)			
Maternal support	9.2 (2.8)	8.9 (2.9)	.05
Maternal control	8.0 (2.8)	7.6 (2.9)	.001
Child personality, mean (SD)			
Self-esteem	17.4 (4.8)	16.9 (4.9)	.005
Rebelliousness	3.3 (3.8)	3.7 (3.9)	.012
Sensation-seeking	5.3 (3.7)	5.2 (3.8)	.31
Demographics, mean (SD)			
Age	12.2 (1.1)	11.8 (1.2)	<.001
Grade, %			
Fifth	8	16	<.001
Sixth	26	32	
Seventh	31	29	
Eighth	35	23	
Age for grade, %			
Young for grade	2	2	.48
Modal age for grade	73	71	
Old for grade	25	27	
% male	49	50	.80
Parental education, %			
Neither completed high school	5	7	<.001
One completed high school	17	23	
Both completed high school	78	70	
School socioeconomic status, %			
<6% receive free lunch	33	24	<.001
6%–29% receive free lunch	23	23	
≥30% receive free lunch	44	53	

Comparisons between study subjects and those who were excluded for missing data. Student's t test was used to compare means; χ^2 was used to compare proportions.

TABLE 2 **Correlation Between Television/Movies and Video Game Use and Covariates in 4508 Middle School Students**

Variable	Television/Movie Screen Time		Video Game Screen Time		Cable Movie Channel	Watch Anything on Television	R-rated Movie Viewing
	Weekday	Weekend	Weekday	Weekend			
Maternal support	−0.10	−0.08	−0.07	−0.05	−0.03	−0.18	−0.20
Maternal control	−0.10	−0.04	−0.10	−0.06	−0.06	−0.21	−0.24
Child self-esteem	−0.13	−0.14	−0.00[a]	0.01[a]	−0.05	−0.13	−0.13
Child rebelliousness	0.18	0.14	0.24	0.21	0.14	0.27	0.40
Child sensation seeking	0.20	0.16	0.23	0.22	0.15	0.28	0.44
Grade	0.01[a]	−0.01[a]	−0.03[a]	−0.05	−0.07	0.21	0.29
Age for grade	0.02[a]	0.00[a]	0.07	0.05	0.04	0.09	0.13
Gender (male→female)	−0.08	−0.11	−0.48	−0.52	−0.02[a]	−0.07	−0.18
Parental education	−0.11	−0.04	−0.02[a]	−0.00[a]	−0.10	−0.07	−0.13
School socioeconomic status (high→low)	0.08	0.03[a]	0.07	0.06	0.13	−0.02[a]	0.08

Values for Spearman correlation.
[a] $P \geq .05$.

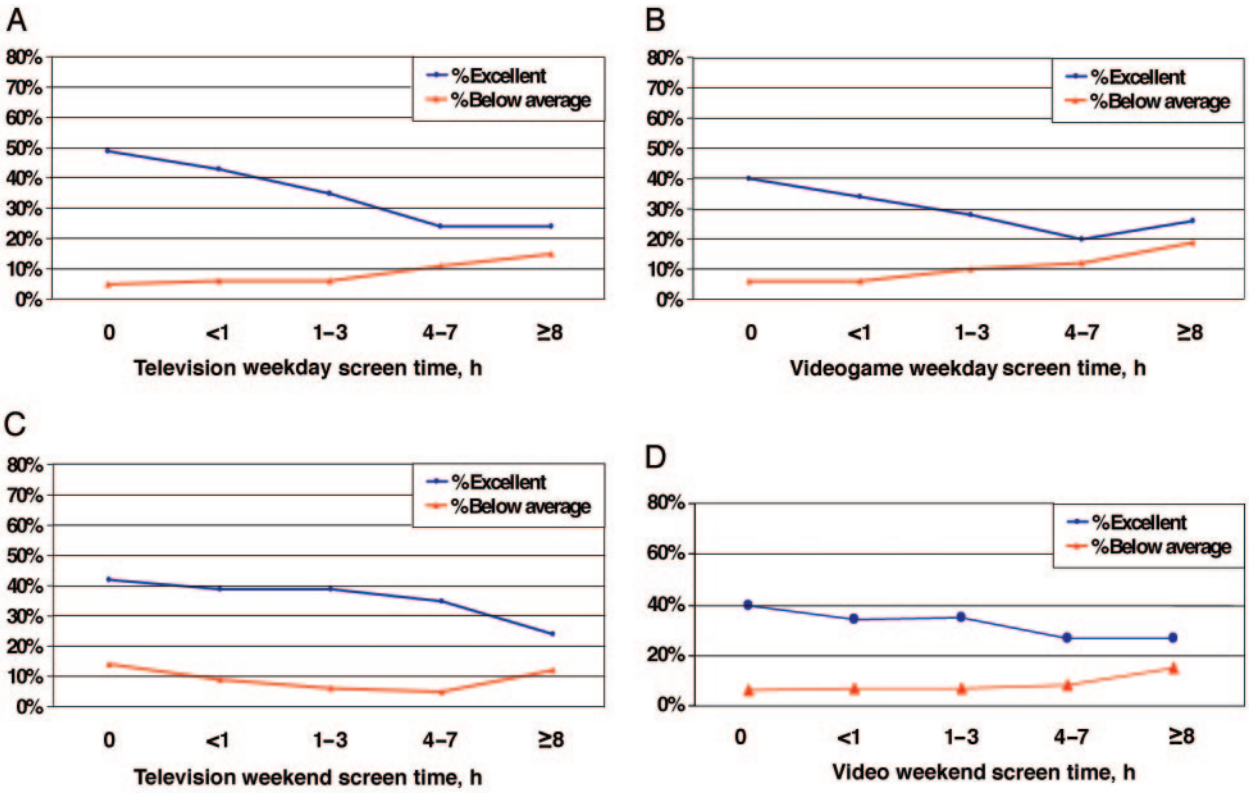

FIGURE 1
Relationship between screen time and school performance.

weekday screen time had a detrimental impact on school performance, consistent with recent reports by others.[15–17] Weekend screen time was not associated with school performance, lending some support to the displacement hypothesis, in that weekend screen time would be less likely to displace school work due on the following day. Taken as a whole, our findings add empirical support to the importance of American Academy of Pediatrics guidelines[35] for parental limits on media time (particularly weekdays) and content as a way to enhance the chances of success in school during adolescence.

This study has several strengths, including theory-based measures of media exposure, large sample size, and controls for a number of personality and parenting characteristics. The finding that television, movie, and video game use during the middle school years is uniformly associated with a detrimental impact on school performance despite extensive controls speaks to the strength of the media-school performance relationship. The finding that weekday, rather than weekend, media exposure time is more strongly associated with poor school performance adds to the notion that weekday exposure displaces time that might have otherwise been

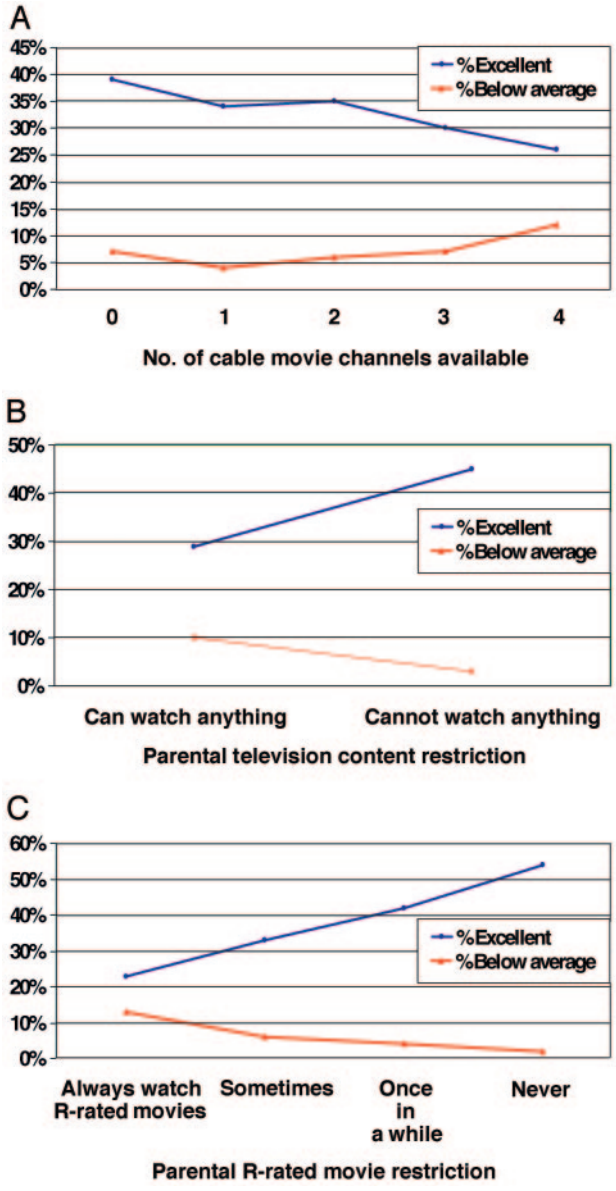

FIGURE 2
Relationship between media content and school performance.

TABLE 3 **Association Between Television/Movies and Video Games Use and School Performance in 4508 Middle School Children**

Variable	Risk for Poorer School Performance, Cumulative OR (95% CI)	
	Crude	Adjusted
Screen time		
Weekday television/movies	1.42 (1.34–1.50)	1.13 (1.05–1.22)
Weekend television/movies	1.23 (1.16–1.30)	1.02 (0.93–1.13)
Weekday video games	1.28 (1.22–1.35)	1.00 (0.93–1.08)
Weekend video games	1.17 (1.12–1.22)	0.97 (0.91–1.03)
Cable movie channel availability	1.16 (1.12–1.20)	1.11 (1.07–1.16)
Parental media content restriction		
Television content restriction		
No (can watch anything)	Reference	Reference
Yes (can't watch anything)	0.47 (0.43–0.50)	0.89 (0.82–0.98)
R-rated movie viewing		
Never	Reference	Reference
Once in a while	1.62 (1.38–1.91)	1.25 (1.03–1.51)
Sometimes	2.40 (2.04–2.82)	1.36 (1.20–1.53)
All the time	4.37 (3.72–5.12)	1.43 (1.15–1.78)
Maternal support	0.84 (0.81–0.86)	0.95 (0.92–0.98)
Maternal control	0.89 (0.87–0.91)	0.98 (0.97–1.00)
Self-esteem	0.90 (0.89–0.91)	0.96 (0.95–0.97)
Rebelliousness	1.26 (1.24–1.28)	1.17 (1.13–1.21)
Sensation seeking	1.18 (1.16–1.20)	1.00 (0.98–1.02)
Grade		
Fifth	Reference	Reference
Sixth	1.40 (1.16–1.69)	1.53 (0.96–2.43)
Seventh	2.08 (1.72–2.50)	1.99 (1.24–3.21)
Eighth	3.09 (2.56–3.72)	2.57 (1.57–4.21)
Age for grade		
Young for grade	0.97 (0.69–1.38)	1.50 (1.03–2.19)
Modal age for grade	Reference	Reference
Old for grade	1.52 (1.35–1.70)	1.18 (0.97–1.42)
Gender		
Male	Reference	Reference
Female	0.67 (0.61–0.74)	0.79 (0.68–0.91)
Parental education		
Neither completed high school	Reference	Reference
One completed high school	0.81 (0.63–1.05)	0.95 (0.74–1.2)
Both completed high school	0.34 (0.27–0.44)	0.55 (0.45–0.67)
School socioeconomic status		
<6% receive free lunch	Reference	Reference
6%–29% receive free lunch	1.18 (1.04–1.35)	1.20 (0.88–1.65)
≥30% receive free lunch	1.66 (1.48–1.86)	1.56 (1.39–1.75)

Results of ordinal logistic-regression analysis are shown. Dependent variable: school performance (excellent/good/average/below average). Shown are cumulative odds for poorer school performance. SEs (represented in CIs) were adjusted for clustering by school.

spent doing schoolwork and suggests that pediatricians should instruct parents to pay particular attention to media exposure on school days. The finding that exposure to adult media content may have impact over and above the impact of media exposure time suggests that other mechanisms are in play. Future studies should consider the strong correlation we have found between exposure to adult media content and sensation seeking/rebelliousness. One potential causal pathway could be from exposure to adult media content, to higher levels of sensation seeking and rebelliousness, to poor school performance.

Our findings contrast with the findings of Anderson et al,[14] who found overall positive effects of educational television exposure during preschool years on adolescent school performance. Although we are unable to comment on a potential beneficial effect of viewing educational programming during adolescence, we suspect that educational viewing declines as adolescents start to make more independent choices in the content of the media they use.[3] The varied susceptibility to the detrimental effects of cable movie channel availability or R-rated movie exposure by gender is interesting and deserves additional exploration. In the present study, we found that girls were more vulnerable if there were more cable movie channels in the home, whereas boys were more vulnerable if R-rated movie viewing was not

TABLE 4 **Interactions Between Media Variables and Gender**

Interaction Term	*P*
Weekday television/movies * gender	.968
Weekend television/movies * gender	.271
Weekday video games * gender	.394
Weekend video games * gender	.869
Television content restriction * gender	.574
Cable movie channel availability * gender	.023[a]
Watch R-rated movies once in a while * gender	.004[a]
Watch R-rated movies sometimes * gender	.036[a]
Watch R-rated movies all the time * gender	.420

[a] Statistically significant interactions.

TABLE 5 **Effect Modification by Gender: Adjusted Cumulative Odds of Poorer School Performance**

Variable	Females ($N = 2281$), OR (95% CI)	Males ($N = 2227$), OR (95% CI)
Cable movie channel availability	1.11 (1.07–1.15)	1.04 (1.00–1.08)
R-rated movie restriction		
Never watch	Reference	Reference
Once in a while	1.01 (0.83–1.22)	1.64 (1.21–2.22)
Sometimes	1.15 (0.92–1.44)	1.66 (1.45–1.90)
All the time	1.32 (0.96–1.80)	1.64 (1.28–2.10)

Results for the ordinal logistic-regression analysis, stratified by gender.

restricted. In addition, whereas the risk of poorer school performance for boys increased dramatically with any loosening of R-rated movie restriction, for girls the risk increased incrementally with loosening of these restrictions. We struggled to explain why response to 2 different content measures would affect boys and girls differently. Preliminarily, the results suggest that girls respond poorly to the ability to access more adult content and boys respond poorly to a lessening of parental control over access to content. Previous work has documented that children's patterns of media use differ by gender.[36] A study in college students found that exposure to media content had different effects on girls' and boys' attitudes and behaviors; for girls, the greatest impact on high-risk behavior was exposure to music videos.[37] Given the borderline statistical significance for our interaction results, they should be viewed with caution. Additional studies are warranted to examine the underlying mechanisms through which media exposure affects school performance and with an emphasis on how boys may respond differently from girls.

This study is also subject to several limitations. We used a self-report measure of school performance as our main outcome. Use of self-report for school performance is supported by previous studies showing that, whereas students may inflate their grades,[14,38] self-reports generally correlate with teacher reports. Specifically, Anderson et al[14] reported that whereas self-reported grades were inflated from 0.26 to 0.37 points on a 4-point scale, they were highly correlated with transcript grades ($r = 0.71–0.82$). Hence, we believe that despite the probable grade inflation, the substantial and statistically significant correlative associations between the self-reported grades and all of the covariates are internally valid. The study was conducted in a limited geographic area, so it is possible that the findings may not hold true for children in other areas of the country. A national sample would be needed to determine whether the relationships between media use and school performance apply across populations, especially among minority populations. In addition, it is always possible that there are other unmeasured confounders that would explain the association between television exposure and school performance. Notably, our study did not include any measure of child intelligence quotient. It is possible that children with low intelligence quotient perform more poorly in school and, as a result, have less interest in school and greater interest in television, movie, and video game use. Finally, whereas we have established a relationship between exposure to adult content in television and movies and poorer school performance, because of our cross-sectional design, we cannot infer a before-and-after relationship between content exposure and school performance. Additional work is needed to clarify directionality, along with the intervening processes between adult content exposure and school performance. A longitudinal study, with data on potential mediators, as well as school performance, could be helpful in studying this relationship.

CONCLUSIONS

We found a strong, independent relationship between measures of exposure to media and poor school performance. The findings in this study add support to the recommendation that parents of young adolescents limit not only the amount but also the content of their child's media exposure. Specifically, our data support the recommendation that parents limit weekday television and video game time to ≤1 hour and restrict access to adult media by limiting exposure to cable movie channels and R-rated movies and videos.

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