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Relation of Adolescent Video Game Play to Time Spent in Other Activities

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Abstract

Objective—To examine the notion that playing video games is negatively related to the time adolescents spend in more developmentally appropriate activities.

Design—Nonexperimental study.

Setting—Survey data collected during the 2002–2003 school year.

Participants—A nationally representative sample of 1491 children aged 10 to 19 years.

Main Outcome Measure—Twenty-four–hour time-use diaries were collected on 1 weekday and 1 weekend day, both randomly chosen. Time-use diaries were used to determine adolescents' time spent playing video games, with parents and friends, reading and doing homework, and in sports and active leisure.

Results—Differences in time spent between game players and nonplayers as well as the magnitude of the relationships among game time and activity time among adolescent game players were assessed. Thirty-six percent of adolescents (80% of boys and 20% of girls) played video games. On average, gamers played for an hour on the weekdays and an hour and a half on the weekends. Compared with nongamers, adolescent gamers spent 30% less time reading and 34% less time doing homework. Among gamers (both genders), time spent playing video games without parents or friends was negatively related to time spent with parents and friends in other activities.

Conclusions—Although gamers and nongamers did not differ in the amount of time they spent interacting with family and friends, concerns regarding gamers' neglect of school responsibilities (reading and homework) are warranted. Although only a small percentage of girls played video

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games, our findings suggest that playing video games may have different social implications for girls than for boys.

THE RAPID GROWTH OF VIDEO game popularity has generated concern among practitioners, parents, scholars, and politicians. Not since the advent of TV has an entertainment medium been subjected to such wildly ambivalent reactions or such skyrocketing sales. In 1998, revenues totaled $6.3 billion in the United States and 90% of US households with children had rented or owned a video or computer game.[1] Particularly during adolescence, when social interactions and academic success lay the groundwork for health in adulthood, there is concern that video games will interfere with the development of skills needed to make a successful transition to adulthood.[2]

Although it is generally assumed that most American adolescents spend a large portion of time playing video games, the veracity of this assumption has received little empirical attention. This was remedied by the Kaiser Family Foundation in 1999[3] and 2004[4] in representative surveys of media use among 8- to 18-year-olds in America. It was found that 39% of youth played video games on a typical day in 1999 and 41% did so in 2004. Although sizable, this proportion is far from capturing the majority of American youth. Moreover, gamers spent an average of 26 minutes per day playing in 1999 and 32 minutes per day playing in 2004.

Even if most youth do not regularly play video games, it is still possible that game play will have deleterious effects for those who do play. This reflects another concern regarding adolescent video game play, that such play will distract from important academic, social, and physical activities. If time spent in activities is zero-sum, then the assumption that time playing video games encroaches on time available for other activities makes intuitive sense. This is essentially the notion of the displacement effect.[5]

Evidence from the few existing relevant studies shows mixed support for the displacement effect. Egli and Meyers[6] found little support that playing video games interfered with adolescents' involvement in family life, reduced participation in active sports, or was related to poor school performance. The Kaiser Family Foundation[3,4] found that young people who were heavy media users spent *more* time with parents, pursuing hobbies, and being physically active. Conversely, Sel-now[7,8] found negative relationships between adolescent use of arcade video games and participation in clubs and organizations. Kline[9] found that adolescents who reported heavy game play were more likely to put off doing homework, chores, and family activities.

It is important to note that, to our knowledge, no existing study uses a time sampling method that would allow for assessment of actual displacement of other activities by video game play. Empirical examination of displacement requires a full account of all activities engaged in over a 24-hour period. Otherwise, it is impossible to accurately assess the relationships among activities in which adolescents engage.

This study uses 24-hour time-use diaries from a nationally representative sample of adolescents in 2002 drawn from the Child Development Supplement. Our overarching goal is to examine the notion that video game play interferes with the time that adolescents spend

in more developmentally beneficial activities. We focus on the relationship between video game play and time spent in 5 activities: (1) interacting with parents; (2) interacting with friends; (3) reading; (4) doing homework; and (5) participating in sports and active leisure (eg, football, roller-skating). We address the following questions: (1) How common is adolescent video game play? (2) Do adolescents who play video games spend their time differently from those who do not play video games? And (3) Is there a significant relationship between time playing video games and time spent with others as well as in developmental activities?

METHODS

PROCEDURES AND SAMPLE

Data for this study come from the Panel Study of Income Dynamics Child Development Supplement, a representative survey of children aged 5 to 19 years in the 2002–2003 school year (see http://psidonline.isr.umich.edu for further detail regarding measures and procedures).

The current study used adolescents (aged 10–19 years) with at least 1 time-use diary and complete data on all variables and covariates of interest (n=1491). Family median annual income was $59 500. Seventeen percent of household heads had less than a high school diploma, 31% had graduated from high school, 42% had some college or a bachelor's degree, and 10% had postgraduate degrees. Sixty-five percent of the sample were white, 16% were black, 12% were Hispanic, and 7% were of other ethnicities. The study was approved by the institutional review boards of the University of Michigan, where the data were collected, and the University of Texas at Austin, where analyses for this study were conducted.

TIME-USE DIARIES

Adolescents' time-use information was collected during the school year using 24-hour time-use diaries on 1 randomly chosen weekday and 1 randomly chosen weekend day. The time-use diary gives a detailed account of type, number, duration, location, and other persons involved in primary and secondary activities on each day. Time-use diary data were obtained directly from the adolescent or with help from a caregiver. A large body of research[10–13] documents the validity and reliability of such diaries as representations of the way both children and adults spend their time.

ADOLESCENTS' TIME USE

Time spent in activities are detailed in Table 1 and Table 2. Totals include reports of activities as either primary or secondary, but they do not include concurrent use of game play and other activities examined. For example, time spent doing homework while playing video games was counted in neither the video game time nor the homework time variables. This prevented overlap between predictors and criteria in the analyses.

For time spent playing video games, the sum of the minutes of video game play on the weekday or weekend day, with no concurrent displacement activities reported, was determined.

When the adolescent's mother, father, stepmother, and/or stepfather were reported as participating directly with the adolescent in an activity, the activity was counted as time with parents. When the activity was playing video games with a parent, the activity was counted as game play with parents.

When an activity occurred with the adolescent's friend participating, it was considered time spent with friends. When the activity was playing video games and a friend was participating, the activity was considered playing video games with friends.

Time spent in other activities was determined. These activities included reading or being read to (from books, magazines, newspapers, and letters), homework (studying, reading, computer-related homework, and conducting research related to class work), and sports and other active leisure activities (organized and unorganized sport activities [eg, basketball, swimming, martial arts, and Frisbee]).

COVARIATES

Factors known to be related to adolescents' time use—income-needs ratio, household head education, age, ethnicity, parent work hours, and time spent in school and at work—were treated as covariates.

Socioeconomic and demographic characteristics included the family income-needs ratio (computed by dividing family income by the 2000 poverty threshold provided by the US Census Bureau appropriate for family size; mean [SD], 4.29 [5.62]), number of years of education completed by the head of the household (mean [SD], 13.09 [2.92] years), child age (mean [SD], 13.94 [2.53] years), and child ethnicity (974 white and 517 nonwhite), with nonwhite children as the reference group.

Because the amount of time parents spend working per week (mother: mean [SD], 29.04 [18.57] hours; father: mean [SD], 35.60 [21.12] hours) can influence the amount of time they have available to spend with their child, we controlled for parents' average weekly work hours.

Because the amount of time adolescents spend at school (weekday: mean [SD], 358.89 [188.80] minutes; weekend: mean [SD], 7.09 [52.32] minutes) affects the amount of time they have to spend in discretionary activities, we controlled for time spent at school.

Because the amount of time adolescents spend at work (weekday: mean [SD], 19.03 [81.93] minutes; weekend: mean [SD], 24.98 [96.66] minutes) affects the amount of time they have to spend, we controlled for time spent at work.

ANALYSIS PLAN

Descriptive analyses were used to examine the prevalence of playing video games. Multivariate analyses of covariance were conducted to analyze differences between game

players and non-players in time spent with parents, with friends, reading, doing homework, and in sport activities.

To examine the relationship between time spent playing video games and other activities, it was necessary to limit the sample to those adolescents who played games only (n=534). There were no significant differences between the main sample and the gamer subsample with regard to income, education, or ethnicity.

Hierarchical ordinary least squares multiple regressions were conducted on the gamer-only sample to assess whether time spent in video game play was related to the amount of time gamers spent with others and in other activities (ie, with parents, with friends, reading, doing homework, and in sports and active leisure). Each of these activities was treated as a separate criterion. For the prediction of time spent with parents or friends, video game play with and without the presence of parents or friends, respectively, were the predictors of interest. For all of the other activities, the predictor of interest was video game play (with no concurrent activities).

Analyses were conducted using Stata 8.0 statistical software (Stata Corp, College Station, Texas). Because the structure of adolescents' time, particularly their discretionary time, differs on weekdays and weekends, day types were analyzed separately.[12,14] Owing to sibling pairs in the data, standard errors were corrected for nonindependence. All of the analyses were weighted using recalibrated sampling weights to yield nationally representative coefficient estimates.

RESULTS

PREVALENCE OF VIDEO GAME PLAY

Five hundred thirty-four adolescents (36%) played video games. Most (425 [80%]) of these gamers were boys, and far fewer (109 [20%]) were girls. Female gamers spent an average of 44 minutes playing on the weekdays and 1 hour and 4 minutes playing on the weekends. Male gamers spent an average of 58 minutes playing on the weekdays and 1 hour and 37 minutes playing on the weekends.

DIFFERENCES IN TIME SPENT BETWEEN GAMERS AND NONGAMERS

Differences between gamers and nongamers in time spent in activities are presented in Table 1. There were no sig nificant differences between gamers and nongamers in the time they spent with parents, with friends, or in sport and active leisure activities on either day. Gamers spent less time reading than nongamers on the weekdays and less time doing homework than nongamers on both the weekdays and weekends.

There was an interaction between game play and gender on the weekends ($_{F1,1380}$=5.306, P=.02) such that female nongamers (mean [SD], 30.82 [68.98] minutes) spent more time doing homework than female gamers (mean [SD], 8.51 [26.70] minutes) and both male gamers and male nongamers (mean [SD], 11.33 [35.64] minutes and 17.04 [47.69] minutes, respectively).

RELATING VIDEO GAME PLAY TO TIME SPENT INTERACTING AND IN OTHER ACTIVITIES

Means and standard deviations for time spent in all activities among gamers are presented in Table 2. Because the unstandardized regression coefficients are interpretable as proportions of an hour, it is possible to calculate the average decrease or increase in the number of minutes spent interacting or in other activities for every hour spent playing video games.

Time Spent Playing Video Games and With Parents—Table 3 shows analyses examining the relationship between time spent playing video games and time spent interacting with parents and friends. For boys on the weekends and for girls on the weekdays, more time spent playing video games without parents was related to less time spent with parents doing other activities. The coefficients represent a 13-minute (6%) decrease for boys and a 35-minute (26%) decrease for girls. On both day types, the more time female gamers spent playing with their parents, the more time they spent in other activities with parents as well. The effect size for this relationship was sizable, with the coefficient representing a 1-hour 53-minute (84%) increase on the weekdays and a 2-hour 25-minute (69%) increase on the weekends. For boys, game play with parents was unrelated to doing other activities with parents.

Time Spent Playing Video Games and With Friends—The more time boys and girls spent playing video games without their friends on the weekends, the less time they spent with their friends in other activities. The coefficients represent a 24-minute (16%) decrease for boys and a 42-minute (33%) decrease for girls. This was true for boys on the weekday as well; for every hour boys played without friends, they spent 15 minutes less with their friends in other activities (a 21% decrease).

The more time boys and girls played video games with friends on the weekends, the more time they spent with friends doing other activities. The coefficients represent a 19-minute (13%) increase for boys and a 1-hour 29-minute (70%) increase for girls. On the weekdays, playing video games with friends and spending time with friends were not related for either gender.

Time Spent Playing Video Games and in Other Activities—Results of the ordinary least squares regressions examining the relationship between video game play and reading, homework, and sport activities are presented in Table 4.

Time Spent Playing Video Games and Reading: For every hour boys played video games on the weekdays, they spent 2 minutes less reading. Because boys spent an average of 8 minutes reading, this represents a 30% decrease. There were no significant relationships between reading and video game play on the weekends among boys, and there were no significant relationships for girls on either day type.

Time Spent Playing Video Games and Doing Homework: For boys, there was no significant relationship between time spent playing video games and time spent doing homework on either day. For girls on the weekdays, every hour of video game play was related to 13 minutes less doing homework (a decrease of 34%). On the weekends, video game play and homework were unrelated for girls.

Time Spent Playing Video Games and in Sports and Active Leisure: On the weekends, for every hour boys played video games, they spent 8 minutes less in sports and active leisure activities (a decrease of 12%). Video game play and time spent in sport activities were unrelated for boys on the weekdays and unrelated for girls on either day type.

COMMENT

The purpose of this study is to empirically examine popular notions regarding the prevalence and impact of adolescent video game play among US youth. In this large representative sample, only 36% of adolescents played video games, and those who played did so for 1 to 1½ hours on average. It is worth noting that adolescents spend 3 times this amount of time watching TV.[3,4,15,16]

Second, gamers did not spend less time than nongamers interacting with parents and friends. These findings do not support the notion that adolescents who play video games are socially isolated. However, among gamers, time spent playing without parents or friends was related to a decrease in the amount of time they spent doing other things with parents or friends, and this was particularly true for girls. Interestingly, among girls, time spent playing with parents and friends was related to large increases in time spent with parents and friends in other activities. This was not the case for boys, whose play with parents or friends was either unrelated or minimally related to interactions with others.

Our findings do indicate that concerns regarding video game play as a distraction from school-related activities may be warranted. Gamers spent less time reading and doing homework than nongamers. Among gamers, on school days in particular, female gamers spent 34% less time doing homework and male gamers spent 30% less time reading. Although reading and doing homework are not direct measures of academic achievement, they are indicators of school engagement.

The notion of displacement rests on 2 fundamental assumptions: (1) that the relationship between time spent in one activity and another is zero-sum (time spent playing video games means less time available for another activity); and (2) that adolescents would be involved in more appropriate activities (eg, social interactions, educational tasks) if they were not playing video games. However, the cross-sectional nature of most displacement studies does not allow causal claims.[17] This limitation exists in these data as well. Although our findings are relevant to the magnitude and direction of the relationship between video game play and time spent in other activities, they cannot determine the direction of effects. We cannot assume that if adolescents were not playing video games, they would be interacting with their parents or friends or spending more time doing homework. For example, although gamers spent less time in academic activities, some research shows that students who are high academic achievers actually spend less time doing homework.[18] Thus, gamers may be more efficient in completing homework assignments and as a result spend less time doing them. It is also true that some have found positive relationships between electronic game play and academic outcomes in correlational studies.[19] The nature of the relationship between video game play and academic outcomes is an important question for further research in this area.

CONCLUSIONS

Video game play is often assumed to be endemic to adolescent life. Our results do not support this notion. It does appear that game play is an important part of life for a limited number of adolescents and that many more of these adolescents are boys than girls. Understanding the role video game play has in their lives and its implications for academic and social outcomes will be an important area of further inquiry. Gender differences regarding the context of play are also of great interest. There seems to be a small number of girls who are indeed gamers, and our results indicate that game play has different social implications for girls and boys who play. Future studies aimed at understanding how and why girls vs boys use game play to fulfill different social needs are warranted. Although we focused on the relationship between time spent in video game play and other activities among adolescents, an important next step for future research will be to assess the ways in which video game play is related to academic and social outcomes among American youth. As interactive media and technology become more and more a part of the fabric of American daily life, it is crucial to understand and distinguish the ways in which video game play does and does not influence adolescent development.

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Table 1

Mean Differences in Activities for Gamers and Nongamers[a]

Activity	Weekday Time, Mean, min			Weekend Time, Mean, min		
	Gamers (n = 534)	Nongamers (n = 957)	Univariate $F_{10,1380}$	Gamers (n = 534)	Nongamers (n = 957)	Univariate $F_{10,1380}$
Time with parents[b]	121.66	127.36	4.96[c]	238.77	236.45	2.86
Time with friends[b]	74.96	87.62	0.13	141.59	160.67	0.66
Reading[d]	9.49	14.74	5.25[c]	15.16	15.91	0.17
Homework[d]	37.74	56.40	5.73[c]	10.72	26.47	9.73[e]
Sports and active leisure[d]	36.36	36.90	3.48	64.70	55.46	1.39

[a]Means reported have been adjusted for the following covariates: family income-needs ratio, educational level of household head, parental average weekly work hours, child's age, time spent at school and work, and child's ethnicity (0 = white, 1 = nonwhite).

[b]In all other activities except playing video games.

[c]$P<.05$.

[d]With no concurrent video game play.

[e]$P<.01$.

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Table 2

Means and Standard Deviations for Minutes Spent in Activities and With Family Members Among Gamers

	Weekday Time, Mean (SD), min		Weekend Time, Mean (SD), min	
	Boys	**Girls**	**Boys**	**Girls**
Criteria				
Time with parents[a]	113.62 (117.89)	134.98 (148.43)	235.59 (194.48)	209.58 (186.86)
Time with friends[a]	69.73 (124.78)	92.33 (129.97)	146.88 (189.36)	126.76 (181.05)
Reading[b]	8.26 (22.59)	12.00 (28.97)	14.46 (43.48)	17.37 (40.15)
Homework[b]	38.49 (53.51)	36.43 (52.22)	11.75 (36.89)	9.38 (29.12)
Sports and active leisure[b]	39.76 (65.15)	26.53 (61.02)	70.04 (99.17)	47.32 (83.14)
Predictors				
Video game play[c]	57.90 (80.50)	43.51 (60.32)	96.61 (107.47)	63.76 (65.13)
Video game play without parents	54.97 (79.01)	42.06 (60.83)	90.21 (105.25)	59.25 (64.33)
Video game play with parents	2.93 (20.05)	2.60 (15.54)	6.40 (32.60)	4.51 (18.94)
Video game play without friends	46.87 (68.75)	29.48 (47.43)	68.38 (88.48)	48.18 (63.94)
Video game play with friends	11.03 (45.50)	14.03 (42.34)	28.23 (72.77)	15.58 (39.03)

[a] In all other activities except playing video games.

[b] With no concurrent video game play.

[c] With no concurrent activities (ie, adolescents could not be reading, doing homework, or in sports and active leisure activities while playing video games).

Table 3

Regression Analyses Predicting Time Spent With Parents and Friends[a]

Criteria and Predictors	Gender	Weekday B	Weekday SE	Weekday R^2b	Weekend B	Weekend SE	Weekend R^2b
Time spent with parents (in non–video game activities)							
Video game play without parents	Boys	−0.13	0.07	0.09[c]	−0.22[d]	0.07	0.12[c]
	Girls	−0.58[e]	0.22	0.21[c]	−0.31	0.22	0.16[e]
Video game play with parents	Boys	−0.09	0.15	0.08[c]	−0.04	0.13	0.10[c]
	Girls	1.88[c]	0.44	0.19[c]	2.42[d]	0.74	0.25[d]
Time spent with friends (in non–video game activities)							
Video game play without friends	Boys	−0.25[d]	0.09	0.16[e]	−0.40[c]	0.07	0.11[c]
	Girls	−0.26	0.19	0.22[e]	−0.70[d]	0.23	0.18[e]
Video game play with friends	Boys	0.21	0.16	0.14[e]	0.31[d]	0.12	0.08[d]
	Girls	−0.08	0.30	0.19	1.49[d]	0.46	0.25[c]

[a]Controlling for family income-needs ratio, educational level of household head, parental average weekly work hours, child's age, time spent at school and work, and child's ethnicity (0 = white, 1 = nonwhite). Minutes are the units of measurement for both predictors and criteria.

[b]R^2 is the total variance explained for the full model including covariates.

[c]$P<.001$.

[d]$P<.01$.

[e]$P<.05$.

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Table 4

Regression Analyses Predicting Time Spent in Activities From Time Spent Playing Video Games[a]

	Weekday			Weekend		
Criteria	**B**	**SE**	R^2**b**	**B**	**SE**	R^2**b**
Time spent reading						
Boys	−0.04[c]	0.01	0.09[c]	−0.03	0.02	0.06[c]
Girls	−0.07	0.07	0.11	0.12	0.09	0.19[d]
Time spent doing homework						
Boys	−0.04	0.04	0.06[e]	−0.01	0.02	0.10[d]
Girls	−0.21[d]	0.09	0.23[e]	−0.04	0.03	0.31[e]
Time spent in sports and active leisure						
Boys	−0.05	0.05	0.08[e]	−0.14[c]	0.04	0.08[e]
Girls	−0.05	0.17	0.19	−0.18	0.14	0.26[e]

[a]Controlling for family income-needs ratio, educational level of household head, parental average weekly work hours, child's age, time spent at school and work, and child's ethnicity (0 = white, 1 = nonwhite). Minutes are the units of measurement for both predictors and criteria.

[b]R^2 is the total variance explained for the full model including covariates.

[c]$P<.01$.

[d]$P<.05$.

[e]$P<.001$.

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