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Electronic Gaming Characteristics Associated with Class 3 Severe Obesity in Youth Who Attend the Pediatric Weight Management Programs of the COMPASS Network

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Abstract

Background: The prevalence of severe obesity and electronic game use among youth has increased over time.

Methods: We administered a survey assessing gaming and psycho-demographic characteristics to youth aged 11–17 attending five weight management programs. We conducted chi-square and logistic regression analyses to describe the association between class 3 severe obesity and gaming characteristics.

Results: Four hundred twelve youth (51% female, 26% Black, 25% Hispanic, 43% White, and 44% with class 3 severe obesity) completed the survey. There was a stepwise relationship between time spent gaming and class 3 severe obesity, with 28% of those playing 2 to <4 hours a day, 48% of those playing 4 to <6 hours a day, and 56% of those playing ≥6 hours a day having class 3 severe obesity ($p = 0.002$). Compared to youth without class 3 severe obesity, youth with class 3 severe obesity were more likely to have a TV in the bedroom (76% vs. 63%, $p = 0.004$) and play games on a console (39% vs. 27%, $p = 0.03$) and were less likely to report parental limit setting on type of games played (7% vs. 16%, $p = 0.006$). Youth who played games ≥4 hours a day were 1.94 times (95% confidence interval 1.27–3.00) more likely to have class 3 severe obesity than those who played <4 hours a day, after adjustment for demographic, behavioral, and academic variables.

Conclusions: Our study demonstrates a clear association between gaming characteristics, especially time spent gaming, and severe obesity in youth. Further research testing family-based interventions that target gaming behaviors in youth are needed.

Keywords: parenting; pediatric obesity; screen time; sedentary behavior; severe obesity; video game

Introduction

The prevalence of obesity and severe obesity continues to increase among youth in the United States, with ~21% of youth between the ages of 12 and 19 having class 1 obesity (BMI 100%–120% above the 95th percentile for age and sex), 8% having class 2 severe obesity (BMI 120%–140% above the 95th percentile), and 3% having class 3 severe obesity (BMI ≥140% above the 95th percentile).[1] Studies point to increased morbidity

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among youth with class 2 and class 3 severe obesity compared to youth with overweight and class 1 obesity,[2–5] making them a key target population for weight management treatment. Despite this, there have been few studies evaluating factors that contribute to severe obesity in youth.

Among the many factors that are associated with obesity and severe obesity in youth, physical activity and sedentary activities are the two modifiable behaviors that meaningfully influence daily energy expenditure. The majority of studies examining sedentary behaviors in youth suggest that there is a positive association between increased screen time and measures of increased adiposity,[6–10] with the majority of these studies reporting on the total number of hours per day spent watching television or in front of any electronic screen and few studies evaluating the independent role of playing video or other electronic games (''gaming'') on weight status. Yet the rise in obesity and severe obesity among youth in the United States coincides with a substantial increase in not only media use and technology exposure among youth in the United States over time[11–13] but also a related rise in gaming, with one study citing an increase in gaming from 38% to 60% from 1999 to 2009[11] and recent studies reporting that up to 97% of youth partake in gaming.[12] In addition, the total duration that youth spend gaming has also increased, from 49 minutes a day on average in 1999 to 73 minutes a day on average in 2010[11] to 81 minutes a day by recent reports.[13]

Studies examining gaming as an independent predictor of adiposity in youth have been inconsistent, with five out of nine studies showing a positive association in a 2008 review of the literature,[14] no association found in a 2004 meta-analysis of six studies,[15] and two more recent studies in the United States showing either no association[16] or only an association among girls.[17] However, there have been no studies examining gaming behaviors in youth with severe obesity seeking weight management treatment, who may be more sedentary than other patient populations and who are already motivated to engage in behavioral modification treatment. There have also been no studies examining the association between measures of adiposity and other characteristics of gaming beyond the amount of time spent gaming. However, aspects of gaming like addictive gaming behaviors, types of games played, and parental monitoring of gaming are important to consider when evaluating gaming behaviors in youth. Therefore, the aim of this study was to describe the association between 13 a priori gaming characteristics and the degree of adiposity among youth enrolled in tertiary care weight management programs with the hypothesis that time spent gaming and addictive gaming behaviors would be associated with obesity severity.

Methods

Study Design and Participants

We administered a cross-sectional survey to a convenience sample of consecutive patients seeking treatment at five tertiary care weight management programs located within geographically diverse children's hospitals in the Midwest, Mid-Atlantic, and South United States. Sites were recruited from the Childhood Obesity Multi Program Analysis and Study System (COMPASS), a practice-based research network of 25 tertiary care weight management programs across 14 states that was formed in 2012 with the support of the Children's Hospital Association.

Patients were included in the study if they were between the ages of 11 and 17 years and able to complete a survey in English at a sixth grade reading level. Patients were excluded if their BMI was less than the 85th percentile for age and sex, if a legal guardian was not present, or if their legal guardian could not read English or Spanish to complete the e-consent. The study was approved by the institutional review boards of the participating centers. An e-consent was completed by the guardian, and an e-assent was completed by the patient. Surveys were anonymous and could not be linked to the individual patient, which was made clear to patients and their legal guardian on the e-consent and e-assent.

Procedure: Survey Administration

Research staff members recruited patients before a routine visit to the weight management program. Enrolled participants used a tablet or computer to complete an online REDCap survey at four of the sites.[18] At the fifth site, participants completed the survey on paper with data entered into REDCap by a research staff member after survey completion. Participants were permitted to complete the survey on their own or with their guardian's help. Whether the participants completed their survey on their own or with their guardian's help was reported on the survey.

Outcome Variable: Adiposity Severity

Before administration of the survey, a medical assistant measured weight using a digital platform scale and measured height using a wall stadiometer. A research staff member provided measurements for weight and height to participants, and participants were instructed to enter the measurements into the survey. We calculated BMI percentile for age and sex using syntax provided by the CDC[19] and excluded participants who self-reported a BMI <85th percentile for age (which was an exclusion criterion before survey administration). For the purpose of analyses, we categorized BMI percentile dichotomously into two groups of similar size: class 3 severe obesity (BMI ≥140th percentile above the 95th percentile) or not.[3,20,21]

Predictor Variables: Gaming Characteristics

We assessed 13 gaming characteristics in the survey. Similar to prior studies,[22,23] we assessed time spent gaming by asking children to report the typical hours spent gaming before lunch, between lunch and dinner, and after dinner both on a weekday and weekend day. We summed and multiplied by 5 the number of reported hours on a typical weekday and summed and multiplied by 2 the number of

reported hours on a typical weekend, with the sum of these two numbers then representing the number of hours spent gaming per week. We excluded values from analysis if the reported number of hours per week was greater than 100, which was considered unrealistic and likely over-reporting. For the purpose of analysis, we calculated the average number of hours spent gaming per day by dividing the number of hours spent gaming per week by 7 and then grouped into the following categories: <2 hours per day (to align with national guidelines recommending less than 2 hours of screen time a day),[24] 2 to <4 hours per day, 4 to <6 hours per day, and 6 or more hours per day.

We assessed problem gaming or Internet gaming disorder, a construct used to describe gaming behaviors that are characterized by addiction and impaired functioning with a validated instrument used in several large pediatric studies.[23,25–30] This instrument has demonstrated good convergent, predictive, and criterion validity, as well as good reliability with an internal consistency between 0.7 and 0.9.[23,29,31] We used a version of the instrument that was modified in 2013 by the instrument's developer to reflect the nine domains identified for problem gaming in the DSM-V.[17,32] For this pediatric version, item 8 was modified to reflect difficulties at school rather than at work. In addition, two items (items 7 and 11) from the original instrument were retained to assess if the respondent spent less time with friends or family because of gaming and if the respondent skipped sleeping, eating, or bathing because of gaming. The instrument asked participants to rate how much they agreed that each of 11 items was true. ''No'' or ''Don't Know'' was scored as 0, ''Sometimes'' was scored as 0.5, and ''Yes'' was scored as 1. Consistent with scoring on the original instrument from which this instrument was derived and other studies on problem gaming, we calculated a sum of the scores, with a score of 5.5 or more (one half of the maximum possible score) classified as diagnostic of problem gaming.[23,26,32,33]

In addition to the assessment of time spent gaming and problem gaming, we included 11 additional items to assess other gaming characteristics, including location of gaming (bedroom, other room in home, or outside of the home), whether the participants played games rated Mature (the Entertainment Software Rating Board rates most games, with a ''Mature'' rating corresponding to a ''Restricted'' rated movie),[34] devices on which games were played (video game console, movement-based console, handheld device, computer, tablet, or mobile phone), who the child played games with (alone, family members, friends, or online gamers), and parental restrictions on gaming (limits on types of games played, time allowed to play, and who the child plays games with, as well as use of games as a reward). We also asked participants one belief item: ''My gaming affects my weight'' (yes or no).

Covariates: Demographic, Behavioral, Academic, and Visit Characteristics

We asked participants to self-report gender, age (in years), and race and ethnicity (categorized as Non-Hispanic Black, Non-Hispanic White, Hispanic, and Other for analysis). There was no overlap in reported race or ethnicity. Because of the association between excessive gaming with lower academic performance,[23,26,35,36] impaired executive functioning,[37] and psychological comorbidities like attention-deficit/hyperactivity disorder (ADHD),[38,39] we asked additional questions about school performance (most typical grade in school, as typically asked in the Youth Risk Behavioral Surveillance Survey),[40] type of school attended (public, private, or other), and whether or not the participant had been told by a teacher or medical provider that they had a learning disorder or ADHD. We assessed visit characteristics to ensure that these did not impact survey responses, including whether a parent helped the child to complete the survey, whether the visit was an initial or follow-up visit to the clinic, site location, and season (summer or school year) during which the survey was completed.

Statistical Analysis

We performed descriptive analyses to describe the patient population, adiposity severity, and gaming characteristics. We conducted bivariate analyses to describe the association between adiposity severity and the 13 a priori gaming characteristics (listed under Predictor Variables: Gaming Characteristics) and covariates of interest. We then performed backward stepwise logistic regression analysis, with an initial model, including all variables demonstrating a significant association with class 3 severe obesity in bivariate analyses. Subsequent models were performed, removing variables demonstrating nonsignificance in prior models. For the purpose of the logistic regression analysis, we categorized average daily hours of gaming and typical grades in school dichotomously in a way that best approximated a median split for each variable. Finally, we conducted a logistic regression analysis with tests of interaction between independent variables. SPSS 25 (IBM) was used for analyses.

Results

Participants

Participants completed a total of 454 surveys across all sites (99.3% completion rate), with 412 surveys included in this analysis after exclusion for reporting a BMI <85% ($N = 10$) and inaccurate reporting of gaming hours ($N = 32$). Verification of responses and follow-up of incomplete surveys were not possible because of the anonymous nature of the survey. There were no reports of technical problems with the survey. Males (49%) and females (51%) were equally represented. Participants were diverse (26% Black, 25% Hispanic, and 43% White) and representative of the patient populations enrolled in the weight management programs. Mean age of participants was 13.7 years (SD 1.9). The majority of participants had severe obesity, with 9 (2%) having overweight, 87 (21%) having class 1 obesity, 137 (33%) having class 2 severe obesity, and 179 (44%) having class 3 severe obesity.

Association between Adiposity Severity and Gaming Characteristics

Table 1 describes the 13 gaming characteristics and bivariate associations between adiposity severity and the 13 gaming characteristics. There was a significant stepwise relationship between the numbers of hours spent gaming and adiposity severity, with the prevalence of class 3 severe obesity being 28% among those reporting playing 2–4 hours a day, 48% among those reporting playing 4–6 hours a day, and 56% among those reporting playing more than 6 hours a day. Participants with a class 3 severe obesity were more likely to have a TV in the bedroom and play games on a console and were less likely to report parental limit setting on the type of games they played. Notably, 112 participants (27%) believed that gaming affected their weight, but there was no difference in this belief between participants based on adiposity severity.

Association between Adiposity Severity with Demographic, Behavioral, Academic, and Visit Characteristics

Table 2 describes demographic, behavioral, academic, and visit characteristic and bivariate associations between these characteristics with adiposity severity. Black participants were more likely to have a class 3 severe obesity. There was a significant stepwise relationship between typical academic performance in school and adiposity severity, with the prevalence of class 3 severe obesity being 29% among those reporting grades of mostly As in school, 48% among those reporting mostly Bs or Cs, and 62% among those reporting mostly Ds. There were no significant differences between participants based on other demographic, behavioral, academic, or visit characteristics.

Stepwise Logistic Regression Analyses to Predict Adiposity Severity

Table 3 describes the stepwise logistic regression analyses conducted to predict adiposity severity. The best model to predict class 3 severe obesity included time spent gaming, race, and academic performance [$X^2(3) = 26.22$, $p < 0.001$]. In this model, participants who reported playing more than 4 hours of games a day [adjusted odds ratio (aOR) = 1.94 compared to those who reported playing less than 4 hours of games a day, 95% confidence interval (CI) 1.27–3.00], participants of Black race (aOR = 2.00 compared to participants of White race, 95% CI 1.20–3.34), and participants who reported receiving grades that were not mostly As (aOR = 2.50 compared to those who reported receiving grades that were mostly As, 95% CI 1.53–4.11) were more likely to have class 3 severe obesity, with each variable adjusted for each of the other variables in the model. There were no significant interactions between these variables.

Discussion

This is the first study that we are aware of to describe gaming characteristics among youth with severe obesity attending tertiary care weight management programs. Like other studies,[14,17,41–44] ours confirms that increased adiposity is associated with the amount of time that youth spend gaming and having a TV in the bedroom. However, we are able to uniquely describe how these factors impact youth at the extremes of obesity, a group with increasing prevalence and increased morbidity for whom effective strategies are needed.[3] Our study also importantly highlights youth perception of other factors that might influence their gaming behaviors, including parental monitoring of their gaming and their belief that gaming affects their weight. These findings together suggest that gaming may be a modifiable behavior to target in youth seeking treatment in tertiary care weight management programs, with a focus on engaging both youth and their parents in limiting the amount and types of games played.

While earlier studies have been mixed in finding an association between the amount of time youth spend gaming and adiposity,[14–17] our study clearly points to a relationship between the two. There could be several reasons for this difference. First, it is likely that gaming behaviors have changed since these earlier studies were conducted, with the number of youth who engage in gaming behaviors, time that youth spend gaming, and access to electronic games through new technologies all increasing rapidly over time.[12,13] Second, time spent gaming was evaluated most commonly as a continuous measure or with lower thresholds in prior studies; however, our study finds that an increased risk of class 3 severe obesity occurs when youth spend at least 4 hours a day gaming, which may be facilitated by having a TV in the bedroom. Finally, youth with obesity and severe obesity seeking weight management treatment may exhibit different gaming behaviors than typical youth. Indeed, the majority of youth in our study reported gaming for at least 2 hours a day, which is more than the national average of 81 minutes a day.[13] The increased time spent gaming in our study population, especially those with class 3 severe obesity, may be associated with psychosocial risk factors or differences in energy expenditure that may also lead to increased adiposity unique to this patient population.

In our study, we also report on measures related to youth perception about gaming, with youth perception of parental limits on types of games being associated with class 3 severe obesity. Several studies demonstrate that parental monitoring of media use is associated with less screen time,[45] more time spent reading,[46] improved academic performance,[47] improved sleep,[47] and pro-social outcomes[47,48] and that parental monitoring of adolescents is effective in attenuating other risky behaviors.[49,50] While parental monitoring of media use is common in young children, it is less common among older children.[51] However, our findings support parental monitoring of media use into adolescence, including parental monitoring of time spent gaming, types of games played, and access to devices like TVs and gaming consoles in the bedroom. At the same time, our study also provides evidence that some

Table 1. Association between Adiposity Severity and Gaming Characteristics

	Overweight, obesity, or class 2 severe obesity [BMI ≥85 and <140% above the 95%, *n* (%)]	Class 3 severe obesity [BMI ≥140% above the 95%, *n* (%)]	*p*
Average daily hours of gaming			0.002
<2 hours	65 (30.1)	47 (28.5)	
2 to <4 hours	68 (31.5)	27 (16.4)	
4 to <6 hours	40 (18.5)	37 (22.4)	
≥6 hours	43 (19.9)	54 (32.7)	
Meets problem gaming criteria			0.38
Yes	20 (8.6)	20 (11.2)	
No	213 (91.4)	159 (88.8)	
Has TV in bedroom			0.004
No	87 (37.3)	43 (25.1)	
Yes	146 (62.7)	136 (75.9)	
Most frequent location for gaming			0.49
Bedroom	119 (51.1)	99 (55.3)	
Another room in home	99 (42.5)	66 (36.9)	
Outside of home	15 (6.4)	14 (7.8)	
Most frequent gaming companion			0.34
Plays alone	106 (45.5)	88 (49.1)	
Family members	66 (28.3)	37 (20.7)	
Friends	34 (14.6)	32 (17.9)	
Online gamers	27 (11.6)	22 (12.3)	
Most frequently used gaming device			0.03
Video game console	63 (27.0)	69 (38.5)	
Movement-based console	14 (6.0)	9 (5.0)	
Handheld device	16 (6.9)	7 (3.9)	
Computer	28 (12.0)	17 (9.5)	
Tablet	44 (18.9)	18 (10.1)	
Mobile phone	68 (29.2)	59 (33.0)	
Plays video games with mature ratings			0.24
No	164 (70.4)	115 (64.2)	
Yes	69 (29.6)	64 (35.8)	
Parents use games as a reward			0.93
No	196 (84.1)	150 (83.8)	
Yes	37 (15.9)	29 (16.2)	
Parents limit type of games played			0.006
No	195 (83.7)	166 (92.7)	
Yes	38 (16.3)	13 (7.3)	

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Table 1. Association between Adiposity Severity and Gaming Characteristics *continued*

	Overweight, obesity, or class 2 severe obesity [BMI ≥85 and <140% above the 95%, *n* (%)]	Class 3 severe obesity [BMI ≥140% above the 95%, *n* (%)]	*p*
Parents limit gaming time on school days			0.15
No	147 (63.1)	125 (69.8)	
Yes	86 (36.9)	54 (30.2)	
Parents limit gaming time on weekends			0.74
No	183 (78.5)	143 (79.9)	
Yes	50 (21.6)	36 (20.1)	
Parents limit who teen can play with			0.11
No	215 (92.3)	172 (96.1)	
Yes	18 (7.7)	7 (3.9)	
Teen believes that gaming affects weight			0.94
No	170 (73.0)	130 (72.6)	
Yes	63 (27.0)	49 (27.4)	

youth do believe that gaming affects their weight, which may be important to leverage to engage youth as active partners in modifying their behaviors.[52,53]

Finally, our study found that there were demographic and academic factors associated with class 3 severe obesity. As is well described, participants of Black race were more likely to have class 3 severe obesity.[1,5] In addition, participants with class 3 severe obesity were more likely to report poorer academic performance, which is consistent with other studies demonstrating an association between academic performance and weight status, independent of socioeconomic status,[54–56] and supported by still other studies demonstrating neurocognitive deficits associated with obesity.[57–59] This includes impairments in executive functioning, attention, and motor skills, resulting in obesogenic behaviors like overeating, disinhibition of eating, and reduced physical activity. In addition, there is evidence to suggest that sedentary behaviors can contribute to these neurocognitive deficits, while physical activity can enhance neurocognitive health.[60–64] However, while there is an important association between race and neurocognition with adiposity, our study clearly demonstrates an association between the number of hours youth spend gaming and adiposity severity, independent of race and academic performance. Therefore, hours of gaming are still an important behavior to identify in youth as a potential risk factor for class 3 severe obesity.

The most significant limitation of our study was the inability to independently verify responses, including weight and height, a challenge intrinsic to our anonymous survey method. In addition it is possible that reports of gaming behaviors, academic performance, and mental health diagnoses may have been misreported due to social desirability bias. Although we asked about some important academic and behavioral factors in our survey, we were not able to assess a full range of psychosocial risk factors like measures of socioeconomic status or other potential factors like physical activity that might influence the relationship between gaming and weight. Finally, as this was a cross-sectional study, the direction of causality between gaming characteristics and severity of obesity in our population is not known. Despite these limitations, we believe our study is an important step in understanding the role of gaming as a risk factor for severe obesity. As noted earlier, one of the key strengths of our study is its ability to uniquely comment on gaming characteristics among youth with severe obesity, who compromise the majority of patients attending tertiary care weight management programs and for whom effective strategies are needed. In addition, we were able to survey youth of geographically and demographically diverse backgrounds by leveraging the COMPASS network of tertiary care weight management programs across the United States. Through our use of primarily electronic methods and integration of survey administration into clinical workflow, we were able to survey a large number of youth in an efficient and feasible manner. Finally, we were able to collect information on multiple characteristics of gaming and the gaming environment, drawing on the perspective of youth with severe obesity to identify important patient-oriented targets for future intervention.

Conclusions

Our study demonstrates a clear association between gaming characteristics, especially time spent gaming, and adiposity severity in youth and may inform interventions for this group focused on assessing and reducing daily gaming

Table 2. Association between Adiposity Severity with Demographic, Behavioral, Academic, and Visit Characteristics

	Overweight, obesity, or class 2 severe obesity [BMI ≥85 and <140% above the 95%, *n* (%)]	Class 3 severe obesity [BMI ≥140% above the 95%, *n* (%)]	*p*
Age [mean (SE)]	13.60 (0.13)	13.88 (0.14)	0.14
Race/ethnicity			0.001
Non-Hispanic Black	44 (18.9)	64 (35.8)	
Hispanic	64 (27.4)	40 (22.3)	
Non-Hispanic White	109 (46.8)	70 (39.1)	
Other	16 (6.9)	5 (2.8)	
Gender			0.88
Female	118 (50.6)	92 (51.4)	
Male	115 (49.5)	87 (48.6)	
ADHD			0.18
No	176 (75.5)	126 (70.4)	
Yes	50 (21.5)	41 (22.9)	
I don't know	7 (3.0)	12 (6.7)	
Learning disorder			0.86
No	178 (76.4)	134 (74.9)	
Yes	40 (17.2)	31 (17.3)	
I don't know	15 (64.4)	14 (7.8)	
Schooling			0.85
Public	194 (83.3)	149 (83.2)	
Private	26 (11.1)	18 (10.1)	
Other	13 (5.6)	12 (6.7)	
Typical grades in school			0.001
Mostly As	87 (37.3)	35 (19.6)	
Mostly Bs	84 (36.1)	76 (42.4)	
Mostly Cs	40 (17.2)	37 (20.7)	
Mostly Ds	10 (4.3)	16 (8.9)	
Other	12 (5.1)	15 (8.4)	
Site			0.31
Site 1	66 (28.3)	66 (36.9)	
Site 2	51 (21.9)	37 (20.7)	
Site 3	48 (20.6)	35 (19.5)	
Site 4	62 (26.6)	35 (19.5)	
Site 5	6 (2.6)	6 (3.4)	
Parents helped complete survey			0.17
No	156 (67.0)	131 (73.2)	
Yes	77 (33.0)	48 (26.8)	

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Table 2. Association between Adiposity Severity with Demographic, Behavioral, Academic, and Visit Characteristics *continued*

	Overweight, obesity, or class 2 severe obesity [BMI ≥85 and <140% above the 95%, *n* (%)]	Class 3 severe obesity [BMI ≥140% above the 95%, *n* (%)]	*p*
Initial visit to clinic			0.06
No	158 (67.8)	105 (58.7)	
Yes	75 (32.2)	74 (41.3)	
Season			0.21
Summer (June–August)	84 (36.1)	54 (30.2)	
School year (September–May)	149 (63.9)	125 (69.8)	

ADHD, attention-deficit/hyperactivity disorder; SE, standard error.

Table 3. Stepwise Logistic Regression Analyses to Predict Adiposity Severity

Step	Predictor variable or covariate	OR	95% CI	*p*
1	Average daily hours of gaming			
	<4 Hours	Ref	Ref	Ref
	≥4 Hours	1.73	1.11–2.70	0.02
	Most frequently used gaming device			
	Video game console	Ref	Ref	Ref
	Movement-based console	1.05	0.60–1.85	0.86
	Handheld device	0.77	0.29–2.03	0.59
	Computer	0.70	0.25–1.98	0.50
	Tablet	0.74	0.34–1.61	0.45
	Mobile phone	0.68	0.33–1.40	0.30
	Has TV in bedroom	1.45	0.88–2.40	0.15
	Parents limit types of games played	0.53	0.25–1.11	0.09
	Race/ethnicity			
	Non-Hispanic White	Ref	Ref	Ref
	Non-Hispanic Black	1.78	1.04–3.04	0.04
	Hispanic	0.95	0.55–1.67	0.87
	Other	0.42	0.13–1.39	0.16
	Typical grades in school not mostly As	2.26	1.35–3.80	0.002
2	Average daily hours of gaming			
	<4 Hours	Ref	Ref	Ref
	≥4 Hours	1.94	1.27–3.00	0.002
	Race/ethnicity			
	Non-Hispanic White	Ref	Ref	Ref
	Non-Hispanic Black	2.00	1.20–3.34	0.008
	Hispanic	0.97	0.56–1.68	0.91
	Other	0.40	0.12–1.29	0.13
	Typical grades in school not mostly As	2.50	1.53–4.11	0.001

duration. Further research in developing and implementing interventions that target gaming, engaging both youth and their parents in modifying these behaviors, is needed.

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