

Daily Violent Video Game Playing and Depression in Preadolescent Youth

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Abstract

Most studies on the impact of playing violent video games on mental health have focused on aggression. Relatively few studies have examined the relationship between playing violent video games and depression, especially among preadolescent youth. In this study, we investigated whether daily violent video game playing over the past year is associated with a greater number of depressive symptoms among preadolescent youth, after controlling for several well-known correlates of depression among youth. We analyzed cross-sectional data collected from 5,147 fifth-grade students and their primary caregivers who participated in Wave I (2004–2006) of Healthy Passages, a community-based longitudinal study conducted in three U.S. cities. Linear regression was conducted to determine the association between violent video game exposure and number of depressive symptoms, while controlling for gender, race/ethnicity, peer victimization, witnessing violence, being threatened with violence, aggression, family structure, and household income level. We found that students who reported playing high-violence video games for ≥ 2 hours per day had significantly more depressive symptoms than those who reported playing low-violence video games for < 2 hours per day ($p < 0.001$). The magnitude of this association was small (Cohen's $d = 0.16$), but this association was consistent across all racial/ethnic subgroups and among boys (Cohen's d values ranged from 0.12 to 0.25). Our findings indicate that there is an association between daily exposure to violent video games and number of depressive symptoms among preadolescent youth. More research is needed to examine this association and, if confirmed, to investigate its causality, persistence over time, underlying mechanisms, and clinical implications.

Introduction

THE EFFECTS OF EXPOSURE TO MEDIA VIOLENCE in general and of playing violent video games in particular on the mental health of children and adolescents have been of great concern to researchers, health professionals, and public policy makers for many decades.^{1–11} Based on the preponderance of scientific evidence, several professional organizations, including the American Academy of Pediatrics, have issued a policy statement on media violence warning about the risks posed by violent video game content.^{12–14} Although the empirical basis for these policy statements has been questioned using the results of a few studies,^{15,16} compre-

hensive, meta-analytic reviews of the research on media violence and its effects indicate that both short-term and repeated long-term exposure to media violence, including video games, increase the likelihood of aggression and violent behavior.^{17–22}

Unlike the association between playing violent video games and aggression, the association between playing violent video games and depression has not been well studied. The link between violent video game content and depression is plausible in light of research indicating that children's and adolescents' exposure to real-life violence, either as victims or witnesses, is associated with poor mental health outcomes including anxiety, depression, and post-traumatic stress

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disorder.^{23–30} Specifically, studies have found that high exposure to both violence and violent events is associated with increased levels of depression among children and adolescents.^{24,26,28,30} In addition, studies have found that depression is related to exposure to community violence, such as witnessing a violent event.^{23,25,27,29} Because time spent each day playing video games, most of which contain highly realistic violent content,³¹ continues to increase among U.S. adolescents,³² it is important to investigate if there is a relationship between playing violent video games and depression.

Of the few studies that have investigated the relationship between video games and depression, most did not evaluate violent content specifically, and few examined this relationship in preadolescent or adolescent youth. Moreover, these studies have yielded mixed results: some have found an association, which differed by gender, whereas others have not found any association.^{33–36} In a cross-sectional study examining the health risk correlates of video game playing among U.S. adults, Weaver et al.³³ found that video game playing was associated with depression only among females. Desai et al.,³⁴ in a study of video game playing among U.S. high school students, found that ever playing video games was associated with depression among girls but not boys. They also found that students who reported problematic video gaming (those who reported impulse-control symptoms related to video gaming) were more than three times as likely to report being depressed as students who did not report problematic video gaming. However, in a longitudinal study of media exposures and depression among U.S. adolescents, Primack et al.³⁵ found no association between the development of depression and exposure to video games. Only one study has examined the association between video gaming and mental health status among preadolescent youth. In their cross-sectional study conducted in Iran, Allahverdipour et al.³⁶ found no association between video game playing and severe depression among middle school students. However, they did find that “excessive” gamers (those playing video games for >10 hours per week) and “non-gamers” had a poorer mental health status than “moderate” gamers.

To our knowledge, only two studies have directly examined the relationship between exposure to violent video games and depression.^{15,16} Both studies examined whether participants had more depressive symptoms after being frustrated to induce irritation and then being briefly exposed to violent video games. Neither study found an association between being experimentally exposed to violent video games and increased depressive symptoms immediately following this exposure. One study did find that after controlling for a history of depression, real-life violent video game playing history was predictive of an immediate decrease of depressive symptoms following the frustration task.¹⁵ These two studies, however, have important limitations in their experimental design. For instance, both studies used relatively small samples of predominantly Hispanic young adults ($n = 103$ and $n = 100$), and measured depression immediately after a single exposure to violent video game content (in each study, participants played a violent video game for <1 hour). Moreover, they measured depression using the Beck Depression Inventory-II, which measures depressive symptoms in the prior 2 weeks, and thus lacks the sensitivity to measure either the effects of brief violent video

game exposure on depression or the association between real-life violent video game playing history and depression, after controlling for pre-test Beck Depression Inventory-II scores collected 2 hours prior to the experiment.

In sum, no studies have examined the association between long-term exposure to violent video game content and depression among a large, ethnically diverse preadolescent sample. Furthermore, because time spent each day playing video games with violent content continues to increase among U.S. adolescents, especially 11- to 14-year-olds,³² it is important to determine if there is a relationship between violent video game playing and depression. Accordingly, in this study, we investigated whether daily violent video game playing over the past year is associated with a greater number of depressive symptoms in a large, ethnically diverse sample of U.S. fifth-grade students, after controlling for several variables that are well-known correlates of depression among youth.

Methods

Study population and procedure

In this cross-sectional study, we analyzed data collected from fifth-grade students and their primary caregivers who participated in Wave I (2004–2006) of Healthy Passages, a community-based longitudinal study of risk and protective factors associated with adolescent health.^{37,38} Briefly, students attending public schools in three U.S. geographic areas were recruited: the largest public school district in Houston, Texas; 10 contiguous public school districts in and around Birmingham, Alabama; and 25 contiguous public school districts in Los Angeles County, California. Students were sampled from randomly selected schools to ensure adequate sample sizes of African Americans, Hispanics, and whites. In each school sampled, letters requesting permission to contact the child’s primary caregivers were distributed among all fifth-grade classrooms. Of the 11,532 students enrolled in the 118 sampled schools, 6,663 agreed to be contacted or were unsure but were invited to participate, and 5,147 (77%) parent–child dyads completed computer-assisted personal interviews and audio–computer-assisted self-interviews (for sensitive questions) in English or Spanish. Data were weighted and imputed to ensure accurate statistical representation of population, and analysis accounted for the complex sample design, including the clustering of students within schools. The study protocol was approved by institutional review boards at each study site and at the Centers for Disease Control and Prevention. Additional details of the Healthy Passages study protocol, sampling plan, participant enrollment, and data weighting and imputation are provided elsewhere.³⁷

Measures

Sociodemographic variables. Parents reported student gender, age, race/ethnicity, family structure, and household income level. Students reported all other measures.

Depression. To assess the presence of symptoms of depression, we included six dichotomous items from the Major Depressive Disorder Scale of the DISC Predictive Scales.³⁹ Items assessed (a) lack of pleasure, (b) lack of interest in

activities, (c) concentration difficulties, (d) low energy, (e) low self-worth, and (f) suicidal ideation over the past 12 months. The total score was the number of items endorsed.

Video game time exposure. We used two questions to assess the amount of time students spent playing video games during the past 12 months. These questions asked (a) how many minutes or hours in a usual day the students played video games on a TV, computer, or the Internet, or at an arcade; and (b) how many minutes or hours in a usual day they played video games on a Game Boy or other handheld device. Times were converted to minutes, and responses to each question were combined. Video game exposure was then categorized as either “low time” (0–119 minutes per day) or “high time” (120 minutes or more per day). Because there are no established cutoff points for video game playing time, we chose 2 hours *a priori* because this time cut point adheres to the American Academy of Pediatrics’ recommendation of no more than 2 hours of entertainment media screen time per day.⁴⁰

Video game violence. We assessed video game violence by asking students how often video games they played on all platforms (i.e., TV, computer, Internet, and handheld device) showed physical fighting, hurting, shooting, or killing. Response options were: “does not use,” “almost never,” “sometimes,” “most of the time,” and “always.” Responses were recoded as “low violence” (“does not use,” “almost never,” “sometimes”) and “high violence” (“most of the time,” “always”).

Composite video game time and video game violence exposure. We created a composite variable (video game time–video game violence exposure) by combining video game time exposure and video game violence into four categories: (a) low time and low violence (used as the reference value); (b) low time and high violence; (c) high time and low violence; and (d) high time and high violence.

Covariates. We controlled for several well-known correlates of depression among youth, such as race/ethnicity, gender, household income, and household structure. Because exposure to real-life violence and aggressive behavior could confound the relationship between playing violent video games and depression, we also controlled for peer victimization, witnessing violence, being threatened with violence, and aggression. Peer victimization (both physical and non-physical) experienced in the past 12 months was measured using the mean score of a six-item scale.⁴¹ Items assessed how often (“never,” “once or twice,” “a few times,” “about once a week,” and “a few times a week”) students’ peers (a) kicked or pushed them, (b) said nasty things about them, (c) threatened them, (d) called them names, (e) ostracized them, and (f) avoided sitting near them. Witnessing violence was measured by asking the students if they had witnessed (a) someone being told that they would be beaten up, (b) someone being beaten up, (c) someone being threatened with a gun, and (d) someone being threatened with a knife. If students answered “yes” to any of these questions, they were categorized as having witnessed violence. Being threatened with or exposed to violence was measured by asking students if they had been (a) threatened to be beaten up, (b) threatened with a gun, (c) threatened with a knife, and (d) beaten up to

an extent requiring medical attention. If students answered “yes” to any of these questions, they were categorized as having been threatened with violence. Aggression was measured using a four-item scale adapted from Little et al.⁴² Students were asked how often it was true (“never,” “hardly ever true,” “sometimes true,” or “true most of the time”) that (a) when someone makes them angry, they fight back; (b) when someone hurts them, they pick on them or put them down; (c) when someone hurts them, they say mean things back to them; and (d) when they are mad at others, they spread rumors about them.

Data analysis

We used chi-square analysis to test differences in time spent playing video games per day by gender and race/ethnicity. To determine if high violent video game exposure was associated with having more depressive symptoms, we constructed linear regression models using the continuous dependent variable, depressive symptoms, and the composite exposure variable, video game time–video game violence exposure. The dependent variable measuring depression was calculated as the sum of reported depressive symptoms for a given individual, yielding the interpretation that a positive regression coefficient indicates that the average number of depressive symptoms is higher for a given group relative to the referent. As the regression coefficient moves away from zero, the larger the magnitude of the difference becomes. Effect sizes were estimated to enable a standardized comparison of effect sizes across groups. All models were fit for the total sample, as well as within gender and race/ethnicity strata. To help isolate the true relationship between the dependent variable and the composite exposure variable, we adjusted all models for race/ethnicity, gender, family structure, and household income level. Because peer victimization, witnessing violence, being threatened with violence, and aggression could also increase the risk of depression and be related to increased likelihood of playing violent video games, these variables were also controlled for in all models. All models were constructed using IBM SPSS Statistics v19 software (IBM Corp., Armonk, NY) for complex samples to account for the sampling structure of the data.

Although all analyses were conducted with all racial/ethnic subgroups, results of subgroup analyses are not reported for Asian students or those categorized as having an “Other” race/ethnicity because their small numbers did not allow sufficient statistical power to estimate the associations-of-interest among these subgroups.

Results

Table 1 presents the sociodemographic characteristics of the total analytic sample ($N=5,147$). Student mean age was 11.2 years ($SD=0.58$). As shown, the sample was diverse in terms of race/ethnicity, family structure, and household income level.

Overall, 34.5% of the sample reported playing video games for ≥ 2 hours per day. Video game time differed significantly by gender, with boys being more likely than girls to play video games for ≥ 2 hours per day (47.6% vs. 20.8%, respectively; $p<0.001$). Video game time also differed significantly by race/ethnicity, with African Americans being more likely than Hispanics or whites to play video

TABLE 1. SOCIODEMOGRAPHIC CHARACTERISTICS OF THE TOTAL ANALYTIC SAMPLE (N=5,147)

Characteristic	% ^a
Student age, years Mean (\pm SD)	11.2 (0.58)
Student gender	
Male	48.9
Female	51.1
Student race/ethnicity	
White	22.1
Hispanic	44.4
African American	29.1
Other	4.5
Household income level	
<\$25,000	38.0
\$25,000–\$49,999	24.5
\$50,000–\$99,999	16.5
\$100,000+	12.3
Unknown	8.7
Family structure	
2 parents	47.9
1 parent and 1 stepparent or other	37.5
1 parent only	10.3
Other	4.3

^aPercentages were calculated with weights to reflect sampling. SD, standard deviation.

games for ≥ 2 hours per day (45.1% vs. 31.6% vs. 26.5%, respectively; $p < 0.001$).

Overall, 18.1% of the sample reported playing high-violence video games, and 12.9% played these video games for ≥ 2 hours per day. Table 2 shows the distribution of video game time–video game violence exposure by gender and race/ethnicity. Overall, boys were significantly more likely than girls to play high-violence video games for ≥ 2 hours per day (15.7% vs. 2.2%, respectively; $p < 0.001$). For each gender, video game time–video game violence exposure varied significantly by race/ethnicity. Among boys, African

Americans were more likely than Hispanics or whites to play high-violence video games for ≥ 2 hours per day (19.0% vs. 14.7% vs. 13.2%, respectively; $p < 0.001$). Among girls, African Americans were also more likely than Hispanics or whites to play high-violence video games for ≥ 2 hours per day (4.5% vs. 1.2% vs. 1.2%, respectively; $p < 0.001$).

Table 3 shows the adjusted standardized regression coefficients for the association between video game time–video game violence exposure and the number of depressive symptoms. Overall, students who reported playing high-violence video games for ≥ 2 hours per day had significantly more depressive symptoms than those who reported playing low-violence video games for < 2 hours per day ($p < 0.001$). However, the magnitude of this association was small (Cohen's $d = 0.16$).⁴³ Subgroup analyses revealed that playing high-violence video games for ≥ 2 hours per day was significantly associated with a higher number of depressive symptoms among all racial/ethnic subgroups (African Americans: Cohen's $d = 0.14$; Hispanics: Cohen's $d = 0.13$; whites: Cohen's $d = 0.25$) and among boys (Cohen's $d = 0.16$). Subgroup analyses also revealed that playing high-violence video games for < 2 hours per day was significantly associated with a higher number of depressive symptoms among only African Americans (Cohen's $d = 0.12$).

Discussion

In the present study, we examined the association between daily violent video game playing over the past year and depression in a large, ethnically diverse preadolescent sample. We found that playing high-violence video games for ≥ 2 hours per day is significantly associated with having a higher number of depressive symptoms. This association was consistent across all racial/ethnic subgroups and among boys, and more important, it was observed *after* controlling for aggression and several violence-related variables. The magnitude of these associations was small (Cohen's d values ranged from 0.12 to 0.25). However, these effect sizes are similar to those reported for the association between playing

TABLE 2. VIDEO GAME TIME AND VIOLENCE EXPOSURE BY GENDER AND RACE/ETHNICITY

Gender	Race/ethnicity			
	Overall (N = 4,824) % (SE)	Hispanic (n = 1,813) % (SE)	African American (n = 1,755) % (SE)	White (n = 1,256) % (SE)
Male (n = 2,378)				
Low time, low violence (reference)***	44.1 (0.015)	45.5 (0.016)	34.9 (0.028)	53.5 (0.031)
Low time, high violence*	8.3 (0.007)	7.7 (0.009)	7.6 (0.015)	9.6 (0.017)
High time, low violence***	31.9 (0.012)	32.1 (0.014)	38.6 (0.021)	23.8 (0.022)
High time, high violence***	15.7 (0.009)	14.7 (0.015)	19.0 (0.016)	13.2 (0.017)
Female (n = 2,446)				
Low time, low violence (reference)***	75.6 (0.011)	79.5 (0.013)	64.0 (0.017)	83.2 (0.022)
Low time, high violence	3.6 (0.004)	3.9 (0.008)	3.9 (0.008)	2.3 (0.007)
High time, low violence***	18.5 (0.010)	15.3 (0.013)	27.6 (0.015)	13.3 (0.016)
High time, high violence***	2.2 (0.003)	1.2 (0.004)	4.5 (0.007)	1.2 (0.006)

Note. Results of subgroup analyses are not reported for Asian students or those categorized as having an "Other" race/ethnicity because of small sample size ($n = 323$).

*Percentages within category were significantly different by race/ethnicity at the $p < 0.05$ level.

***Percentages within category were significantly different by race/ethnicity at the $p < 0.001$ level.

SE, standard error.

TABLE 3. STANDARDIZED REGRESSION COEFFICIENTS FROM MULTIPLE LINEAR REGRESSION ANALYSIS OF THE ASSOCIATION BETWEEN VIDEO GAME TIME AND VIOLENCE EXPOSURE AND DEPRESSIVE SYMPTOMS BY RACE/ETHNICITY AND GENDER AFTER ADJUSTING FOR COVARIATES

Video game time and violence exposure	Gender											
	Overall (N=4,824)				Female (n=2,446)				Male (n=2,378)			
	β	SE	p	Cohen's d	β	SE	p	Cohen's d	β	SE	p	Cohen's d
Low time, low violence (Reference)												
Low time, high violence	0.04	0.09	0.665	0.01	0.20	0.17	0.231	0.05	-0.04	0.11	0.730	-0.01
High time, low violence	0.10	0.06	0.118	0.05	0.16	0.09	0.067	0.07	0.05	0.09	0.573	0.02
High time, high violence	0.39	0.07	0.000	0.16	0.21	0.18	0.237	0.05	0.43	0.09	0.000	0.19
Race/Ethnicity												
	Hispanic (n=1,813)				African American (n=1,755)				White (n=1,256)			
Low time, low violence (Reference)												
Low time, high violence	-0.19	0.15	0.221	-0.06	0.39	0.16	0.018	0.12	-0.04	0.19	0.839	-0.01
High time, low violence	-0.02	0.08	0.835	-0.01	0.18	0.11	0.122	0.08	0.25	0.14	0.067	0.10
High time, high violence	0.30	0.11	0.009	0.13	0.40	0.14	0.005	0.14	0.74	0.17	0.000	0.25

Note. Results of subgroup analyses are not reported for Asian students or those categorized as having an "Other" race/ethnicity because of small sample size ($n=323$). Models were adjusted for peer victimization, being threatened with violence, witnessing violence, gender, race/ethnicity, family structure, aggression, and household income level. Statistically significant values are shown in bold. SE, standard error.

violent video games and aggression.¹⁷ Overall, our findings indicate that playing violent video games for a substantial amount of time each day over an extended period is significantly associated with depression in preadolescent youth. They also suggest that this association is unique, given that the number of depressive symptoms was not associated either with playing low-violence video games or with time spent playing video games in general.

Our findings differ from those of the two studies that have directly examined the relationship between violent video game exposure and depression.^{15,16} Unlike those studies, our study found an association between the two variables. Furthermore, we found that this association was consistent across all racial/ethnic subgroups including Hispanics, which is the opposite of what the previous studies reported. Our findings are likely different for several reasons. First, the previous studies used an experimental design to test whether a single exposure to video game violence increased depression, whereas we measured frequency of regular exposure to violent video games. Second, the previous studies had smaller samples and thus may have lacked the power to examine this association among subgroups. Lastly, the previous studies used a depression measure that was not sensitive enough to detect immediate changes in depression after an exposure.

Our finding that the association between playing violent video games and depression was consistent among boys, but not girls, is noteworthy. This gender-specific effect needs to be examined more fully. However, it might be the case that playing violent video games is a gender-associated behavior, as demonstrated by our finding that only 2.2% of girls reported playing high-violence video games for ≥ 2 hours per day. Furthermore, the present study lacked the power to test this association among girls fully. The association between playing violent video games and depression in general and among boys in particular needs to be confirmed in other studies before we can delineate the mechanisms underlying this association or suggest clinical implications, which may

include counseling preadolescents and their parents about the potential harmful effects of excessive violent video game playing.³⁶

The present study's findings contribute to the growing literature examining the relationship between the mental health of children and exposure to violent media in general and to violent video games in particular, but they should be interpreted in light of some important limitations. First, because these data are cross-sectional, the temporal (and causal) relationship between violent video game playing and depression cannot be elucidated. It is plausible that students who endorsed more depressive symptoms may prefer playing video games that have more violent content. To some extent, our key predictor may distinguish preference for violent video games from dose-response associations by distinguishing between low- and high-time categories of high-violence video games, but "reverse causality" is still possible. Moreover, if higher depression reflected *preferences* for violent video games, students with high violence and low time might be expected to have similar coefficients to those with high violence and high time. Second, although ethnically diverse, the analytic sample was drawn from three U.S. geographic regions, so results may not generalize to youth populations in other regions. However, it did include the three largest racial/ethnic groups in the United States. Third, nonresponse bias may be present because we did not have permission to contact all parents for inclusion in the study. However, weights account for differential nonresponse by gender, race/ethnicity, and school, such that the weighted sample is representative with respect to these characteristics, reducing potential nonresponse bias. Finally, all depression measures were gathered through child self-report. However, the DISC Predictive Scales are a widely used, validated measure of depression.³⁹ Despite these limitations, the present study has several strengths, including using a large, ethnically diverse preadolescent sample, which allowed for the examination of the relationship between video game time-video game violence exposure and

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