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Media Violence Exposure and Physical Aggression in Fifth-Grade Children

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Abstract

Objective: To examine the association of media violence exposure and physical aggression in fifth graders across 3 media types.

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SUPPLEMENTARY DATA

Supplementary data related to this article can be found online at http://dx.doi.org/10.1016/j.acap.2014.09.008.

Methods: We analyzed data from a population-based, cross-sectional survey of 5,147 fifth graders and their parents in 3 US metropolitan areas. We used multivariable linear regression and report partial correlation coefficients to examine associations between children's exposure to violence in television/film, video games, and music (reported time spent consuming media and reported frequency of violent content: physical fighting, hurting, shooting, or killing) and the Problem Behavior Frequency Scale.

Results: Child-reported media violence exposure was associated with physical aggression after multivariable adjustment for sociodemographics, family and community violence, and child mental health symptoms (partial correlation coefficients: TV, 0.17; video games, 0.15; music, 0.14). This association was significant and independent for television, video games, and music violence exposure in a model including all 3 media types (partial correlation coefficients: TV, 0.11; video games, 0.09; music, 0.09). There was a significant positive interaction between media time and media violence for video games and music but not for television. Effect sizes for the association of media violence exposure and physical aggression were greater in magnitude than for most of the other examined variables.

Conclusions: The association between physical aggression and media violence exposure is robust and persistent; the strength of this association of media violence may be at least as important as that of other factors with physical aggression in children, such as neighborhood violence, home violence, child mental health, and male gender.

Keywords

aggressive behavior; media; media violence; violent behavior

Several Systematic Reviews and meta-analyses suggest that children's media violence exposure, particularly from television and video games, is associated with physical and nonphysical aggression in those children.[1-6] Although the link has been examined and documented in correlational and longitudinal studies, this area of research remains contentious, in part because of concerns that potentially confounding variables such as home and community violence exposure and child mental health could explain some variation in aggressive behavior.[3] Inclusion of these potentially cofounding variables with media violence exposure variables can facilitate comparisons of effect sizes of the association between media violence and physical aggression in children relative to other environmental exposures to violence during childhood. However, previous studies have reported differing conclusions.[7-10]

Additionally, most children will be exposed to media violence through multiple types of media, with varying levels of exposure to each. Recent studies of the association between media violence and aggressive behavior in children have accounted for violence exposure from multiple media sources because children with high levels of violence exposure in one media type may have high exposures to other media types as well that could also account for an association with physical aggression.[11-16]

Despite the numerous studies examining the association between media violence exposure with physical aggression in children, few studies have investigated this association among

large population-based samples of children that include key violence and mental health–related covariates, as well as media violence exposure across multiple media types. This type of information is critical to add to the literature, address these areas of contention, and ultimately consider effective societal-level strategies to reduce physical aggression by altering patterns of exposure to media violence among youth.

This study's objective was to examine the association of media violence exposure and physical aggression in 10- to 11-year-old children across 3 media types, controlling for potentially confounding variables that could explain some variation in children's aggression. Using data from a multisite cross-sectional study of over 5,000 children, we examined associations between physically aggressive behavior in children and media violence exposure, controlling for sociodemographics and other potentially confounding variables, including home and community violence exposure and child mental health.

Methods

We used fifth-grade data from Healthy Passages, a multisite study of health and its correlates among youth conducted from August 2004 through September 2006.[17] Healthy Passages uses parent and child interviews to collect data on health behaviors, health outcomes, and risk and protective factors from a cohort of 5,147 fifth graders. Institutional review boards at each study site and the Centers for Disease Control and Prevention approved the study.

Study Population and Sampling

Participants were recruited from public schools in: 1) 10 contiguous public school districts in and around Birmingham, Alabama, 2) 25 contiguous public school districts in Los Angeles County, California, and 3) the largest public school district in Houston, Texas. Eligible schools had enrollment of at least 25 fifth graders. To ensure adequate sample sizes of non-Hispanic black, Hispanic, and non-Hispanic white students, we took a random sample of schools using probabilities as a function of how closely a school's racial/ethnic mix corresponded to the site's racial/ethnic target (described elsewhere).[17]

The 118 sampled schools had 11,532 enrolled fifth graders. Each student's parent or other primary caregiver (henceforth "parent") received a letter requesting permission for contact by study personnel, 6,663 of whom either agreed to be contacted or who were unsure were invited to participate; 77% of them completed an interview at their home, a study center, or another preferred location. Each parent and child completed 2 types of interviews, an interviewer-administered survey, and for a subset of more sensitive items (eg, questions on home and neighborhood violence and on delinquent or aggressive behavior), a computer-assisted survey.[18] Before interviews, parents gave informed consent for their and their child's participation; children gave assent. Interviews were conducted separately with both child and parent.

Measures

To measure physical aggression in children, we used the physical aggression subscale of the Problem Behavior Frequency Scale. The subscale includes 7 questions assessing whether the child engaged in violent/threatening behavior in the past 30 days, such as hitting,

pushing another child, threatening to hurt a teacher or physically harming another child, or threatening someone with a knife or gun (Appendix). Previous studies of these items report excellent test–retest reliability[19]; we found an α value of 0.74 in our sample. A subset of these items (pushed or shoved someone, threatened to hurt or hit someone, had a physical fight, and slapped someone) has been validated in samples of sixth to eighth graders (n = 8,948) against teachers' independent ratings of students' physical aggression, as well as other measures and predictors of aggression including the number of fights and injuries due to fights in school.[20]

Children could report that over the past 30 days, the physically aggressive behavior occurred never, 1 to 2, 3 to 5, 6 to 9, 10 to 19, or ≥20 times. Each response had a numerical score of 1 to 6 (1 = never, 2 = 1 to 2 times, 3 = 3 to 5 times, 4 = 6 to 9 times, 5 = 10 to 19 times, 6 = 20 or more times). We calculated a continuous score (sum of all 7 items), for a possible range of 7 to 42.

Media and Media Violence Exposure

For media violence exposure, we considered the type, quality, and quantity of media consumed. We used questions to assess media violence exposure that were similar to those used in previous studies.[21,22] Child self-report of media time (TV viewing and video game use on weekdays and weekends) has been validated against 7-day logs of media use among 11- to 15-year-olds[23]; test-retest reliability ranges by study from 0.61 to 0.94.[23,24] Children answered questions for 1) TV shows and movies (henceforth "TV"), 2) video, computer, and Internet games (henceforth "video games"), and 3) music.

Violent Content—Children were asked how often each media category that they used showed (for TV and video games) or talked about (for music) physical fighting, hurting, shooting, or killing, and responded almost never, sometimes, often, or almost always. This approach to measuring media violence exposure has been previously validated in a large sample of seventh to eighth graders with a strong correlation between child report and expert ratings ($r = .75$).[25] We performed a linear trend test on this measure and found it significant ($P < .05$, results not shown), and we therefore used a linear parameterization for more efficient estimation. We created a linear variable from 0 to 4 for each media type, where 1 = almost never, 2 = sometimes, 3 = often, and 4 = almost always (0 indicates that the child does not use that media type).

Media Time—Children reported the amount of time spent consuming each media type. They were asked to indicate the number of hours they spent watching TV on a usual school day, on a usual school night, on a usual Friday night, and on a usual Saturday and Sunday. Response options were 1) does not watch TV at that time, 2) <1 hour, 3) 1 to 2 hours, 4) >2 and ≤4 hours, 5) >4 and ≤7 hours, and 6) >7 hours; the number of response options varied from 4 to 6 depending on the total number of hours available in the day for TV viewing (eg, fewer hours for a weeknight compared to a Saturday). To create a continuous variable for total hours of TV time, we assigned an approximate time in hours for each categorical response option for each item, ranging from 0 to 8 hours, and summed these approximated hours of TV time across all days. To account for multiple occurrences, we weighted "school

day" 5 times (Monday to Friday) and "school night" 4 times (Monday night to Thursday night). The variable for TV time reports total hours per week; Cronbach's coefficient was 0.75, demonstrating good internal consistency.

Video Games and Music—For video games, respondents were asked how many minutes/hours on a usual day they play video games on the TV, computer, Internet, at an arcade, or on a handheld device. For music, children reported the number of minutes or hours spent listening to music on a usual day. For each of these variables, we report hours spent per day on each media.

Covariates

Child Mental Health Symptoms—We adapted questions from the Diagnostic Interview Schedule for Children (DISC) Predictive Scales[26] to assess presence of mental health disorder symptoms that may be related to media violence exposure and physically aggressive behavior: parent-reported symptoms of oppositional defiant disorder (12 yes/no items) and conduct disorder (8 yes/no items), and child-reported symptoms of depression (6 yes/no items) during the previous 12 months. We created a continuous variable for each disorder, defined by the total symptom score for each scale. Higher numbers reflect more symptoms.

Nonmedia Exposure to Violence—To assess children's exposure to nonmedia sources of violence, we included data on home and neighborhood violence exposure. Children reported whether they had seen someone beaten up, or threatened or injured with a knife or a gun in the past 12 months, and if so, if it occurred at home or in their neighborhood. We also collected data on domestic violence at home; parents reported any physical expression of hostility between themselves and their partner in front of the child. All measures were scored dichotomously as 1 (presence) or 0 (absence).

Other Covariates—Sociodemographic covariates included child race/ethnicity, gender, household income, household composition, highest household educational attainment. Because there were no significant differences in our analyses when accounting for household size in the income variable (by using the federal poverty level), we used the covariate for annual household income.

Statistical Methods

Chi-square tests of homogeneity compared child characteristics. We used adjusted linear regression models and reported partial correlation coefficients (PCC) to assess associations between physical aggression and media violence and media time for TV, video games, and music. We calculated PCCs as a measure of effect size for physical aggression by media violence and time for TV, video games, and music in 3 separate models, and all 3 media types in a fourth model. We report PCCs from our regression analyses to allow comparisons of the magnitude of association of different predictors with reported physical aggression, despite their varying units of measurement. PCCs can be interpreted on the same scale as standard correlation coefficients, using Cohen's classification as a general guide (0.1 as a small effect size, 0.3 as medium effect size, and 0.5 as large effect size).[27] All regression

models also included a mean-centered variable to measure the effect of the interaction between reported media violence and time.

We checked for levels of multicollinearity among independent variables that would be problematic to analyses.[28] All multivariable analyses use design and nonresponse weights and account for both the effects of weights and of the clustering of children within sites using Stata SE 11 (StataCorp, College Station, Tex).[29-31]

Covariates in the multivariable linear regression models included child gender, mental health problems, and home and neighborhood violence exposure; parent educational attainment and intimate partner violence exposure; and household composition and income.

Results

Twenty-nine percent of children were non-Hispanic black, 44% Hispanic, 22% non-Hispanic white, and 5% other race/ethnicity; 61% had household income <$35,000, and 31% were in households where the highest parental educational attainment was less than high school completion (Table 1).

One percent of children reported spending no time watching TV, 8% reported spending no time listening to music, and 17% reported no time playing video games. Mean TV time was 22.29 hours per week (standard deviation [SD] 12.30; range 0–58.5). Mean video game time was 1.68 hours per day (SD 1.99; range 0–20). Mean music time was 1.35 hours per day (SD 1.67; range 0–10). Reported media violence for TV (mean 1.92, SD 1.07), video games (mean 1.47, SD 1.07), and music (mean 1.51, SD 0.93) ranged from 0 to 4.

Our measure of physically aggressive behavior had a mean of 8.34 (SD 2.10; range 7–25). The residuals of the aggression variable as the dependent variable in the adjusted linear regression model for TV had moderate positive skew (2.22), but the tests of association linear regression coefficients are quite robust to this degree of skewness with a sample size of 5,147.[32,33] No problematic multicollinearity was noted among the independent variables. In adjusted analyses (Table 2), reported media violence was positively associated with physical aggression for TV, music, and video games, and reported media time was positively associated with physical aggression for TV and music. The association of physical aggression with media violence (PCC 0.14–0.17) was stronger than the association with media time (PCC 0.05–0.06). For TV, the media time–media violence interaction variable was nonsignificant. However, for video games and music, the interaction was positive and significant. In model 3 (music), for every 1 standard deviation increase in media time, the partial correlation between media violence and physical aggression increased by 0.08.

In models 1 to 3, the association between physical aggression and media violence can be categorized by Cohen's classification[27] as small (0.14–0.17). For video games, the effect becomes larger when video game usage increases by 1 (0.15 + 0.5 = 0.20) or 2 standard deviations (0.15 + 0.5 + 0.5 = 0.25). For music, the PCC of reported music violence and physical aggression also increases as time listening to music increases by 1 (0.22) or 2 (0.30) standard deviations.

By reporting PCCs from the regression models, we are able to compare effect sizes of the association of physical aggression with different variables. In model 1 (TV), the magnitude of the association of physical aggression with TV violence (0.17) was greater than most other covariates (male gender [0.11], neighborhood violence [0.11], and symptoms of conduct disorder and oppositional defiant disorder [0.05–0.13]) except for depressive symptoms (0.19). Notably, symptoms of depression had the highest effect size (0.19–0.20) across all media types. A similar pattern was seen for model 2 (video games). In model 3 (music), both male gender (0.15) and depressive symptoms (0.20) had a larger effect size than music violence exposure (0.14). In models 2 and 3, for children who report media time use at least 1 standard deviation above the mean reported time, the effect size of violence (0.20 video games, 0.22 music) is greater than any of these other variables.

In model 4, the effect sizes of violence exposure in each media type remained positive and significantly associated with physical aggression, controlling for level of time and violence exposure for the other media types.

Discussion

We found an association between media violence exposure and physical aggression in children with multivariable adjustment for sociodemographics, home and neighborhood violence, and child mental health symptoms. This association was present and independent for media violence exposure in each of the 3 types of media examined (TV, video games, and music). Effect sizes increased with increasing time spent consuming video games and music.

Multiple studies have reported an association with either media use or media violence exposure with physical and nonphysical aggression in children. Systematic reviews and meta-analyses suggest that across all study designs (experimental, cross-sectional, and longitudinal), such a link exists, particularly for TV and video games.[1-6] There is less evidence of links with violence exposure through listening to music[4]; most studies for music violence have focused only on older adolescents and college students, and general music preferences rather than music violence exposure.

There are concerns within the media violence literature that other factors sometimes not accounted for in analyses may account for much of the association, and in some cases, these variables may have an association with physical aggression that is larger in magnitude than the association with media violence.[3,4] For example, a 2009 study of 603 predominately Latino children in Texas found that when including several child and environmental factors (eg, child depressed mood, delinquent peers, family conflict), neither TV nor video game violence exposure were associated with child aggression.[7] Another study with a sample of 707 families found that mean TV viewing time at age 14 was significantly associated with aggressive behavior at age 14 and 22, even when controlling for child and environmental covariates (eg, unsafe neighborhood, psychiatric disorders).[10] Our findings suggest that the association with media violence exists even when controlling for some child and environmental factors, and that the effect size of the association for media violence is greater than the effect size of some of these potentially confounding factors such as neighborhood

and home violence, and child mental health conditions such as conduct disorder. The effect size of the association with physical aggression and depressive symptoms was greatest in magnitude across all other covariates, including media violence exposure. This highlights the importance of depression in assessing risks for physical aggression among children, and is consistent with clinical features of depression in children.[35]

Our findings also suggest that TV, video games, and music violence exposure each had an independent association with physical aggression. Previous studies have examined the link between media violence and physical aggression across multiple media types within a single study.[11-16] In a cross-sectional study of 1,588 10- to 15-year-olds, the unadjusted odds of reporting seriously violent behavior increased as the number of different types of media increased,[11] but the authors did not find an association with violent behavior for TV, music, or video games when examined separately in a multivariable model. They did find a positive association for Internet violence. Another study found a positive association between violence exposure from TV, movies, and video games and violent behavior among 430 third to fifth graders in Minnesota.[13] In a study of Canadian sixth to 10th graders, researchers examined the association of TV, computer, and video game time with violent behavior, but did not include media violence exposure.[12] Other studies examined the relationship between violence exposure and aggression or delinquency for TV and film compared to video game violence exposure.[36,37]

This study has several limitations. First, the data were collected from 2004 to 2006. Although there have been important changes in children's media exposure since, violence exposure from TV and video games continues to be a concern for families. Nonresponse bias may be present because we did not have permission to contact all parents for inclusion in the study. However, the sampling weights account for differential nonresponse by gender, race/ethnicity, and school, ensuring the representativeness of the weighted sample with respect to these characteristics and reducing potential nonresponse bias. This study used cross-sectional data and was not designed to determine causation or directionality. Our data do not allow us to determine whether the association is observed because children who have greater media violence exposure are more likely to report aggressive behavior, because children with more aggressive behavior are more likely to consume violent media, or because some third variable is associated with both other constructs. Available longitudinal studies on media violence and aggression suggest there may be a bidirectional causal nature to the relationship.[13,38] Further, we relied on self-reported data; children and parents may have under- (or over-) reported violent behaviors, mental health symptoms, and nonmedia violence exposure. Child self-reported data on the level of violence in consumed media may be inferior to a more objective measure, although it is less costly and time-consuming to collect and reflects their perceptions. The study used an audio computer-assisted survey instrument (A-CASI) to ensure the respondents' privacy and improve reporting of sensitive information.[17,18]

There are also limitations specific to our analysis. First, we included child mental health symptoms as a covariate in our analysis; however, to the extent that these symptoms (ie, conduct disorder and oppositional defiant disorder symptoms) overlap with aggressiveness, we may have underestimated effect sizes for media violence exposure and other factors in

our multivariable analyses.[39] Second, our measures of media time did not include self-report of other extracurricular activities. Finally, because of multiple testing involving 3 media types, separately and combined, *P* values only slightly less than .05 should be interpreted with caution.

Despite these limitations, this study has important implications for public discourse on media violence exposure and physical aggression in children. Children spend an average of 7.4 hours per day consuming media, and they now have even more access to multiple media types through handheld devices.[40] As access to media increases and parents' ability to monitor use becomes more complicated, it is critical to understand how exposure to violence across various media types relates to the association between media violence and physically aggressive behavior in children. Our findings suggest that greater exposure to media violence is associated with physical aggression in 10- to 11-year-olds, and that violence exposure, via any of the 3 examined media, is positively associated with physical aggression, even after controlling for various child- and family-related factors, including child gender and mental health symptoms, and home and community violence. The strength of this association was greater in magnitude than the association with most other covariates we examined.

Our results have implications for various stakeholders. Parents may need support from health care providers, ratings boards, and the media industry to navigate various media types and select nonviolent media choices with their child. The media industry might consider more appropriate levels of violence to include in their products marketed to school-age children. Policy makers might consider opportunities to use media as a tool to reduce aggression in communities.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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What's New

In a large population-based sample, child-reported media violence was associated with physical aggression after adjustment for child mental health and neighborhood and home violence, and was greater in magnitude than the association with physical aggression for most other factors examined.

Table 1.

Sample Characteristics of 5147 Subjects

Characteristic	Unweighted, n	Weighted, %
City		
Birmingham	1594	31
Houston	1783	35
Los Angeles	1770	34
Child race/ethnicity		
Non-Hispanic black	1755	29
Hispanic	1813	44
Non-Hispanic white	1256	22
Non-Hispanic other*	321	5
Child male	2536	51
Parent age†		
18–34 y	1638	34
35–44 y	2409	47
≥45 y	1048	18
Annual household income		
Under $20,000	1826	39
$20,000 to $34,999	1024	22
$35,000 to $69,000	1022	20
$70,000 and over	1243	20
Parent educational attainment‡		
Less than high school	1224	31
High school/some college	2352	45
4-year college degree or more	1449	24
Household composition		
2 parents	2915	59
1 parent	2008	37
Other (nonparent, foster)§	185	3
Violence exposure		
Domestic	867	18
Physical—home	281	6
Physical—neighborhood	904	18
Mental health symptoms		
Conduct disorder	436	8
Oppositional defiant disorder	408	8
Major depression disorder	368	7

*"Other" category includes non-Hispanic multiracial children.

†Parent age is for the parent responding to survey.

‡Highest level of educational attainment in the household.

[§]Most in this category are living with nonparent (eg, grandparent) primary caregivers.

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Table 2.

Partial Correlation Coefficients for Media Time and Violence for Three Media Types, Adjusted for Person-Level Characteristics

Characteristic	Model 1: TV Only	Model 2: Video Games Only	Model 3: Music Only	Model 4: TV, Video Games, and Music
Television				
Time	0.05**			0.03
Violence	0.17***			0.11***
Time–violence interaction†	0.02			0.01
Video games				
Time		0.01		−0.01
Violence		0.15***		0.09***
Time–violence interaction		0.05*		0.02
Music				
Time			0.06***	0.05**
Violence			0.14***	0.09***
Time–violence interaction			0.08***	0.06**
Child race/ethnicity				
Non-Hispanic black	0.09***	0.09***	0.06**	0.06**
Hispanic	0.04	0.03	0.03	0.04
Non-Hispanic white	Referent	Referent	Referent	Referent
Non-Hispanic other	0.01	0.01	0.01	0.01
Child male	0.11***	0.09***	0.15***	0.10***
Annual household income				
Under $20,000	Referent	Referent	Referent	Referent
$20,000 to $34,999	−0.03	−0.03	−0.02	−0.03
$35,000 to $69,000	−0.03	−0.03	−0.03	−0.03
$70,000 and over	−0.05	−0.05	−0.05*	−0.05*
Parent educational attainment				
Less than high school	Referent	Referent	Referent	Referent
High school/some college	0.01	0.01	0.01	0.01

Characteristic	Model 1: TV Only	Model 2: Video Games Only	Model 3: Music Only	Model 4: TV, Video Games, and Music
≥4-year college degree	−0.02	−0.02	−0.02	−0.01
Household composition				
2 parents	Referent	Referent	Referent	Referent
1 parent	0.002	0.004	−0.001	−0.003
Other‡	0.03	0.03	0.03	0.02
Violence exposure				
Domestic	−0.01	−0.02	−0.01	−0.02
Physical—home	0.04**	0.04**	0.05**	0.04**
Physical—neighborhood	0.11***	0.11***	0.10***	0.09***
Mental health symptoms				
Conduct disorder	0.05*	0.06**	0.04	0.05*
Oppositional defiant disorder	0.13***	0.13***	0.13***	0.12***
Major depression disorder	0.19***	0.19***	0.20***	0.18***

*$P < .05$

**$P < 0.01$

***$P < 0.001$.

†Mean centered.

‡Nonparent, foster, adoptive.