

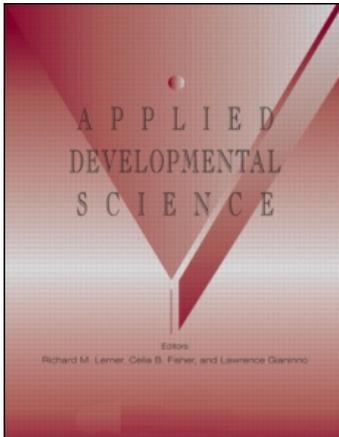
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M-Rated Video Games and Aggressive or Problem Behavior Among Young Adolescents

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This research examined the potential relationship between adolescent problem behaviors and amount of time spent with violent electronic games. Survey data were collected from 1,254 7th and 8th grade students in two states. A “dose” of exposure to Mature-rated games was calculated using Entertainment Software Rating Board ratings of titles children reported playing “a lot in the past six months,” and average days per week of video game play. Analyses were conducted using simultaneous logistic regression for binary outcome variables, and simultaneous multiple linear regression for continuous outcome variables, controlling for a series of potential confounders. M-rated game dose predicted greater risk for bullying ($p < .01$) and physical fights ($p < .001$), but not for delinquent behaviors or being a victim of bullies. When analyzed separately, these associations became weaker for boys and stronger for girls.

Video and computer games have become a fixture of 21st century childhood. A Kaiser Family Foundation (KFF) survey (Roberts, Foehr, & Rideout, 2005) found that on an average day, half (52%) of children aged 8 to 18 played games on a console or handheld player, and one-third (35%) played games on a computer. In 2006, just over half of games designed for sale at retail outlets were rated “E” (deemed suitable for “Everyone”) by the industry-sponsored Entertainment Software Rating Board (ESRB, 2006). However, a substantial minority

were rated as not appropriate for children under 13: 23% were rated “T” (Teen—may be suitable for ages 13+) and 8% were rated “M” (Mature—may be suitable for ages 17+), most often due, at least in part, to violent content. The KFF study asked children in grades 7 to 12 whether they had ever played four popular video games. The top choice, by 65% of respondents, was the M-rated *Grand Theft Auto* series.

With advances in game technology, the depiction of violence and blood can be increasingly realistic. Researchers and policymakers have raised concerns that exposure to game violence could be a risk factor or trigger for aggressive or violent behavior (Funk, 2005). Some hypothesize that violent games could be more influential than savage television content, by increasing identification with aggressors through active participation, and rewarding the repetition of violent behavioral sequences (Gentile & Anderson, 2003).

A number of states have introduced laws that would block sales of M-rated electronic games (or games containing variously defined heinous or inappropriate violence) to children under 18; similarly, the proposed federal Family Entertainment Protection Act (S.2126) would prohibit sales and rentals of Mature games to children under 17 (Child-Responsible Media Campaign,

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2007). Since 2005 alone, U.S. District Court judges have blocked or overturned laws passed in California, Illinois, Louisiana, Michigan, Minnesota, and Oklahoma. Most rulings specified that the research evidence presented (primarily experimental studies) was inadequate to show harm to children from violent game content (Bangeman, 2006). The state of California recently asked the 9th U.S. Circuit Court of Appeals to review the lower court's ruling. The case may eventually go to the U.S. Supreme Court (Young, 2008).

Utility of Video Game Violence Research for Youth Policy

Given these inconsistent results, the body of violent game research (experimental and correlational studies) merits a closer look. Since 2001, a series of research reviews and meta-analyses have appeared in peer-reviewed journals and academic books (e.g., Bensley & van Eenwyk, 2001; Anderson, 2004; Sherry, 2006). Some reported clear evidence that exposure to violent games increases aggression in terms of behavior, cognition, and affect, including serious real-world aggression and violence. Others found support only for small, short-term increases in aggression, or equivocal findings, and insufficient evidence to support a link between violent games and real-life violence. A new meta-analysis by Ferguson (2007a) examined the possibility of a "file drawer effect" in video game research, where nonsignificant or negative results go unreported. When publication bias was factored in, results did not support an effect of violent game play on aggressive behavior, though there was some support for an effect on aggressive thoughts.

From a public policy perspective, the utility of existing experimental data is limited by small, non-representative samples—typically of young adults, especially college students—and by a focus on short-term effects from brief exposures to a violent game chosen by researchers. Such findings are difficult to generalize to children or adolescents who play self-selected games, with varying motivations and goals, for longer periods of time, often in social groups, over months or years. One meta-analysis (Sherry, 2001) found that longer play sessions with a violent game (75 minutes with *Mortal Kombat* instead of only 10) had a far smaller effect on aggression, raising the possibility that brief-play studies may be measuring an initial arousal effect.

Correlational studies of children and adolescents also have limitations. These include small, non-representative samples, outdated settings or technology (e.g., studies from the 1980s that focus on arcade play), and inadequate attention to other known influences on aggression (Olson, 2004). A particularly salient limitation of existing correlational studies is their assessment of violent content exposure. There are no "gold

standard" measures of exposure in television or video game research, which makes study findings difficult to compare or combine. Many studies use time spent with media as a proxy for content exposure (Jordan, 2006).

Comparatively few studies of violent games and aggression have attempted to quantify exposure to violent content. The various methods include asking children about their preference for violent content, and/or the level of violence in their three favorite games, assessed via a Likert scale, a set of researcher-defined categories, or whether the game required killing humans to advance (Gentile, Lynch, Linder, & Walsh, 2004; Funk et al., 2002; Lemmens & Bushman, 2006). Other researchers asked children how frequently they played "video games that include killing, (i.e., *Mortal Kombat*)" using a five-point scale from *always* to *never* (Graber, Nichols, Lynne, Brooks-Gunn, & Botvin, 2006), or how often the games they played contained violence, defined as "killing, fighting, attacks, kicking," on a four-point scale from *not at all* to *very often* (Wallenius, Punamäki, & Rimpelä, 2007). These creative efforts advance the field, but are hobbled by dependence on children's personal and inconsistent definitions and assessments of violence (as well as time-related concepts such as "often") and/or the use of idiosyncratic categories. Evidence is also needed to support the assumption that children's "favorite" games are ones they play currently and frequently.

Violent Electronic Game Content and Aggression

Inconsistent or vague definitions of aggression are another major impediment to using video game research to support policy initiatives. This problem afflicts both experimental and correlational studies. Aggressive thoughts, feelings, and behaviors have sometimes been presented as equivalent in nature or importance (Anderson, 2004), and playful, developmentally appropriate aggression or verbal arguing are not always distinguished from aggressive acts intended to cause harm (Pellegrini, 2003).

Aggression is a complex concept. In popular usage, the term may refer to anything from self-assertion, to social manipulation, to physical attack on a person or thing. A combination of laboratory studies, clinical observations, and cluster and factor analyses of data from a variety of samples support the existence of multiple subtypes of aggression, including some that may be specific to children (Vitiello & Stoff, 1997). Various instruments used to measure aggression in clinical and research settings appear to tap different constructs (Collett, Ohan, & Myers, 2003). For studies to be useful for policy, aggression must be clearly defined and validly measured with a focus on practical (not just statistical) significance.

There is disagreement about the construct and external validity of aggression measures used in laboratory studies of game violence. Some argue that violent crime and

laboratory measures are comparable, because they “share the conceptual features of delivering a noxious stimulus to a victim with the intent and expectation of harming the victim” (Anderson & Bushman, 1997). Others note the lack of validity and reliability data on tests commonly used as measures of aggression (e.g., a modified Taylor Competitive Reaction Time test that involves “punishing” an unseen opponent with a brief loud noise) (Ferguson, 2007b).

Violent Game Content and Criminal/Delinquent Behavior

It is especially important to understand how playing violent games affects aggression as compared to real-world violence or criminality (Levesque, 2007). For example, violent video games have been linked repeatedly in popular and research publications to school shootings (e.g., Anderson, 2004). Reports by the FBI (O’Toole, 2000) and U.S. Secret Service (Vossekuil, Fein, Reddy, Borum, & Modzeleski, 2002) did not find that violent games played a significant role in any of these tragedies. Most recently, a report to the governor of Virginia on issues raised by the college mass murders in April, 2007 (Virginia Tech Review Panel, 2007) found no evidence that the perpetrator had played violent games. (He had, however, played E-rated games such as *Sonic the Hedgehog* in elementary school.) Indeed, his roommate reportedly found it “strange” that, unlike most students, Seung Hui Cho *did not* play video games (p. 51).

Government data from the past two decades do not show an increase in homicides or other serious violence at school (Dinkes, Kemp, Baum, & Snyder, 2009, pp. 8, 24). However, there is ample evidence that news coverage of such crimes has gone up dramatically, fueling unwarranted fears of victimization (Lawrence & Mueller, 2003).

As yet, there are no studies linking violent video games to real-world crime. In Savage’s 2004 review of studies on television and movie violence and criminal aggression, the researcher found that evidence for such a link was “practically nonexistent.” There is also no indication that juvenile crime increased during the past decade, as games with increasingly realistic violence became more widely available in homes. Using data supplied to the Federal Bureau of Investigation by local law enforcement agencies, the U.S. Office of Juvenile Justice and Delinquency Prevention reports that the rate of juvenile arrests increased in the late 1980s and peaked in 1994 (Snyder & Sickmund, 2006). At the time, this looked like an alarming trend. Media reports were filled with speculation about a new breed of “super-predator” juvenile delinquents (Muschert, 2007). In the mid-1990s, violent titles such as *Mortal Kombat* migrated from arcades to home game consoles (Gonzales, 2004). It seemed natural to connect the video game violence and the real-life violence (Grossman & DeGaetano, 1999).

Instead, juvenile arrests declined in each of the next seven years. Between 1994 and 2001, arrests for murder, forcible rape, robbery, and aggravated assaults fell 44%, resulting in the lowest juvenile arrest rate for violent crimes since 1983. Juvenile murder arrests reached a high of 3,790 in 1993. By 2004, arrests were down 71%, to 1,110 (Snyder, 2006). According to the latest available data, juvenile violent crime arrests were up slightly in 2005 and 2006, although the number of 2006 arrests was still lower than any year in the 1990s. Arrests for property crimes have continued to decline (Snyder, 2008).

Potential Effects of Violent Games on Fighting, Delinquency, and School Problems

However, the pattern is different for less visible aggressive acts. For reasons not yet understood, arrests for simple assault (actual or attempted attack, without a weapon) increased by 106% for boys and 290% for girls between 1980 and 2004 (Snyder, 2006).

A related concern, bullying, creates misery for a substantial proportion of American youths. In the 2005 School Crime Supplement to the National Crime Victimization Survey, about 28% of students aged 12 to 18 said they had been bullied at school (from being made fun of or excluded, to being pushed, tripped or spat on) at least once in the past six months. About 9 percent of students had been physically bullied in some way; a quarter of that group sustained cuts or bruises, chipped teeth, or worse. Young teens were most likely to be victimized (Dinkes, Cataldi, Lin-Kelly, & Snyder, 2007).

The focus on school shootings had diverted attention from these everyday and much more common problems young people face. Studies conducted in 25 countries found broad variation in rates of bullying and, surprisingly, similar problems associated with it. Young teens who are bullies or victims are at greater risk for a range of issues involving emotional adjustment, peer relationships, physical health, and academic performance (Nansel et al., 2004; Ma, Phelps, & Lerner, 2009). Bullies and, to a lesser extent, victims are also more likely to carry weapons, engage in fights, and be injured while fighting (Nansel, Overpeck, Haynie, Ruan, & Scheidt, 2003). Children who are both bullies and victims are at particularly high risk. Nansel and colleagues noted that bullying, while a problem in itself, also serves as a marker for these even more concerning behaviors.

Factors That May Mediate the Relationship Between Video Games and Behavior

In recent years, researchers have begun to look at traits that might mediate any relationship between violent video games and aggressive feelings or behaviors. Some

studies found greater effects of violent content in video games among subjects high in trait hostility, while others did not (Kirsh, 2003). An Australian study of 107 adolescents that tried to reconcile these differences found that a subject's level of state anger before starting to play a violent game (*Quake II*) influenced how he or she felt afterwards. Subjects with an aggressive/labile temperament were more likely to experience an increase or decrease from their initial low or high anger state (Unsworth, Devilly, & Ward, 2007). Giumetti & Markey (2007) gave college undergraduates a written test of trait anger, and then randomly assigned them to play one of several violent or nonviolent Xbox games. After play, subjects were asked to expand on written "story stems" that involved negative outcomes such as a car accident; their responses were coded as aggressive (e.g., "punch them in the face") or nonaggressive ("ask for their insurance information"). Violent game play was linked to a higher number of aggressive responses for high anger and (to a lesser extent) moderate anger subjects, but did not significantly affect low anger subjects. As is typical for laboratory studies, both of these experiments looked at short-term effects of brief play sessions (15 to 20 minutes).

Goals and Hypotheses

The goal of the present study is to fill a gap in the literature and inform public policy by looking for evidence of a link between children's violent video game exposure and everyday aggressive or delinquent behaviors. Taking note of previous studies' limitations, we developed a more specific and policy-relevant measure of exposure to violent media. Given the concerns of policymakers noted previously, we chose to focus on young adolescents' use of Mature-rated (age 17+) games. Early adolescence is also a time when adult oversight decreases, and bullying behavior peaks. To increase the generalizability of our findings, we sought a larger, more diverse sample, and a higher survey response rate.

Based on research cited previously, we hypothesized that children who frequently played violent (Mature-rated) games were more likely to be involved in fights, and more likely to be bullies as well as victims of bullies. Because Mature-rated games often feature socially undesirable or criminal activities, we expected to find some association between heavy use of such games and delinquent behavior. We also hypothesized that these relationships might be reduced or eliminated when controlling for trait anger, aggressive temperament, and school performance. Finally, we expected that aggressive children might be more likely to seek out violent media, and thus be heavier users of M-rated games (Lancet, 2008).

METHOD

Sample and Procedures

In the fall of 2004, 1,254 7th and 8th grade students completed self-administered surveys during English/Language Arts class periods at two middle schools in Pennsylvania and South Carolina. At the suburban Pennsylvania school, the student population was 90% white, 4% black, 4% Asian, and 1% Hispanic; median household income in that county for 2003 was \$60,700. At the urban South Carolina school, the student body was 50% white, 43% black, 5% Hispanic, and 2% Asian; 2003 median household income in that city was \$40,600.

All students in attendance on the day of the survey were asked to participate, with the exception of classrooms of students who had limited English skills or physical, emotional, or intellectual limitations that prevented them from completing surveys (as determined by school administrators). More detail on survey methodology can be found in Olson et al. (2007).

Measures

The instrument created for this study included questions on amount of time typically spent playing electronic games, game preferences, and context of and motivations for game use. We defined electronic games as "computer games, video games (Xbox, PlayStation, GameCube, etc.) and handheld games (Game Boy, etc.)." Other questions addressed non-media activities, including attitudes, beliefs and experiences related to aggression and conflict, and school performance. To facilitate comparison with other studies, some questions or subscales not directly related to media use were drawn from existing validated instruments, including the Olweus Bully/Victim Questionnaire (Solbert & Olweus, 2003). Questions on delinquent behaviors (damaging property for fun, stealing from a store, skipping school, or getting in trouble with the police) and physical aggression (hitting or beating up someone, or getting in physical fights) were adapted from the Profiles of Student Life: Attitudes and Behaviors survey (Leffert et al., 1998) and the Youth Risk Behavior Survey (Brener et al., 2002).

We used the Attitude Toward Conflict scale as a measure of aggressive personality (Dahlberg, Toal, & Behrens, 1998). The scale was designed to measure attitudes toward the use of violence in response to disagreements or conflicts. It was tested on middle-school students, with internal consistency of .66 to .72 (Lam, 1989). Scale items are similar to those used in adult measures of aggressive personality, such as the widely-used Buss-Perry aggression questionnaire (Buss & Perry,

1992). To assess trait anger, we created a new three-item measure to briefly capture key aspects of this trait, i.e., greater frequency of angry feelings and outward expression of anger (Deffenbacher et al., 1996) and an attentional bias for angry faces (van Honk, Tuiten & de Haan, 2001). Children were asked, “How often do you feel angry?” “How often do other people say you seem angry?” and “How often do other people seem angry at you?” with response options offered on a five-point scale from “never” to “always.” A principal components analysis confirmed that these items form a single factor, with loadings of .82, .80, and .73, respectively.

To estimate exposure to various types of game content, we asked children to list five games they had “played a lot in the past six months.” This allowed us to focus on the types of content children had been exposed to most recently and frequently, and to reliably and independently assess the level of violence in those games (rather than relying on children’s definitions and estimates). We also asked children to estimate the number of days each week they usually played any electronic games, choosing from six response options (none, 1, 2, 3, 4–5, and 6–7 days).

The Partners HealthCare System human research committee approved all study procedures and materials, including “opt-out” parental consent for children’s participation. To preserve student privacy, surveys were distributed and collected by a member of the study team, with no teacher involvement.

Statistical Analyses

All statistical analyses were conducted using the SPSS Statistical Package, Version 13.0. Associations between continuous variables were assessed by Pearson correlation coefficients, while those between categorical variables were assessed by contingency table analysis test by chi-square. Odds ratios and B-weights for control and test variables were computed via simultaneous logistic regression for binary outcome variables, and via simultaneous multiple linear regression for continuous outcome variables.

RESULTS

Study Population

A total of 1,254 students completed the survey; participation was considered evidence of assent. Virtually all eligible students in attendance on the day of the survey (including 78 children in special-needs classrooms) took part; 88% of enrolled students in Pennsylvania and 79% of enrolled students in South Carolina completed surveys. One parent directly requested that his child be excluded; several other children who reported parent

concerns about the study or had just enrolled in the school were not surveyed.

Exposure to M-Rated Electronic Games

Eighty children had not played any games in the previous six months; 1,126 children wrote down at least one game. The 5,030 titles identified as commercially available games or game series were entered into a database, and matched with age-based ratings assigned by the ESRB (2006). Other listings (e.g., “driving game”) were treated as missing data. In cases where a game title’s rating varied across play platforms (e.g., handheld vs. console version), or only a series title was listed, we assigned a rating based on the least violent version available during the previous two years. Collapsing titles from series with similar content and mode of play into single categories resulted in a list of roughly 500 unique titles of games or game series.

Among children who were current game players, 48.8% had at least one M-rated game on their “five most played” list (67.9% of boys, and 29.2% of girls), with no apparent pattern by age. By far the most popular M-rated game series was *Grand Theft Auto* (played by 44% of boys and 20% of girls). To ensure adequate exposure to game content, the analyses below were limited to children who typically played electronic games at least one day per week, as shown in Table 1 (N = 1,069).

M-Rated Games and Aggressive/Delinquent Behaviors

We computed children’s approximate “dose” of violent content exposure by multiplying days played per week

TABLE 1
Characteristics of Study Sample of 1069 Videogame Players

	Category	Frequency
Gender	Female	520 (49.2%)
	Male	536 (50.8%)
School location	Pennsylvania	567 (53.0%)
	South Carolina	502 (47.0%)
Grade level of classroom (English/Language Arts)	7th Grade	541/1055 (51.3%)
	8th Grade	514/1055 (48.1%)
Special education classroom?	Yes	60 (5.6%)
	No	1009 (94.4%)
Age	11	5 (0.5%)
	12	335 (31.4%)
	13	527 (49.3%)
	14	188 (17.6%)
	15	10 (0.9%)
	16	3 (0.3%)
Frequently plays M-rated games	Female	148/482 (30.7%)
	Male	357/520 (68.7%)

Note: Some denominators were less than 1069 due to missing data for particular responses.

TABLE 2

Simultaneous Logistic and Linear Multiple Regression Analysis Results to Test Effect of Exposure to M-Rated Games While Controlling for Relevant Covariates: All Subjects (N = 966)

		Outcome Variable			
		Bullying Behavior	Bully Victim	Delinquent Behaviors	Physical Aggression
Control Variables	Gender	OR = 0.86	OR = 0.72	B = -.24	B = -.46**
	School attended	OR = 1.11	OR = 1.28	B = .28*	B = .37**
	Grade of classroom	OR = 0.86	OR = 0.37***	B = .11	B = .20
	Students' grades	OR = 1.22*	OR = 1.11	B = .26***	B = .22***
	Trait anger	OR = 1.26***	OR = 1.39***	B = .11***	B = .23***
	Aggressive personality	OR = 1.00	OR = 1.00	B = .00	B = .00
	Dose of exposure to non-violent games	OR = 1.39**	OR = 1.07	B = .02	B = .15**
Test Variable	Dose of exposure to violent games	OR = 1.45**	OR = 1.03	B = .05	B = .24***

Notes: *p < .05, **p < .01, ***p < .001 (note: dichotomous outcomes tested by logistic regression and odds ratio given; continuous outcome measures tested by linear regression and unstandardized B weights given).

by the percentage of their five most-played games that were rated Mature. Dose of exposure to nonviolent/less violent video games (i.e., those rated Teen or younger) was computed as days per week played multiplied by the percentage of nonviolent/less violent video games played. We statistically controlled for these potential confounding variables: 1) gender; 2) school attended; 3) grade level (7th or 8th grade); 4) school grades earned (self-reported on an eight-point scale from "mostly A's" to "mostly D's, F's and Incompletes"); 5) trait anger; 6) aggressive personality; and 7) dose of exposure to nonviolent/less violent games. (Subjects with missing data on any of the variables were excluded from the analyses.)

Problem behaviors were analyzed based on five response categories, from "never" to "5+times" during the past 12 months, with the exception of bullying. In line with previous research (Solbert & Olweus, 2003), children were classified as bullies or victims if they reported involvement in these behaviors on a regular basis (at least two or three times a month).

As shown in Table 2, even after controlling for a variety of possible confounding variables, exposure to M-rated games remained a strongly significant predictor of engaging in bullying and physical aggression. Further, this relationship was dose-related: each additional day-per-week category of exposure to M-rated games increased the probability of bullying behavior

TABLE 3

Simultaneous Logistic and Linear Multiple Regression Analysis Results to Test Effect of Exposure to M-Rated Games While Controlling for Relevant Covariates: By Gender

		Bullying Behavior	Bully Victim	Delinquent Behaviors	Physical Aggression
Outcome Variable: BOYS (N = 462)					
Control Variables	School attended	OR = 0.87	OR = 1.40	B = .54*	B = .44*
	Grade of classroom	OR = 0.83	OR = 0.52	B = .14	B = .24
	Students' grades	OR = 1.07	OR = 1.01	B = .44***	B = .28***
	Trait anger	OR = 1.21*	OR = 1.50***	B = .06	B = .20***
	Aggressive personality	OR = 0.87***	OR = 1.00	B = .00	B = .00
	Dose of exposure to non-violent games	OR = 1.33	OR = 1.34	B = .11	B = .15
Test Variable	Dose of exposure to violent games	OR = 1.20	OR = 1.05	B = .09	B = .19*
Outcome Variable: GIRLS (N = 507)					
Control Variables	School attended	OR = 1.23	OR = 1.28	B = .15	B = .30
	Grade of classroom	OR = 0.88	OR = 0.30**	B = .08	B = .16
	Students' grades	OR = 1.32*	OR = 1.26	B = .10*	B = .15*
	Trait anger	OR = 1.36**	OR = 1.32**	B = .13***	B = .27***
	Aggressive personality	OR = 1.00	OR = 1.002*	B = .00	B = .00
	Dose of exposure to non-violent games	OR = 1.28	OR = 0.87	B = .00	B = .14*
Test Variable	Dose of exposure to violent games	OR = 2.22**	OR = 1.17	B = -.06	B = .42**

Notes: *p < .05, **p < .01, ***p < .001 (note: dichotomous outcomes tested by logistic regression and odds ratio given; continuous outcome measures tested by linear regression and unstandardized B weights given).

by 45%. Similarly, each additional day per week of exposure to M-rated games was related to an increase of 24% in the physical aggression score. However, we found no significant relationship between playing M-rated games and being a victim of bullies, or engaging in delinquent behaviors. (The only predictors of being a bully victim were enrollment in an earlier school grade and higher trait anger. For delinquent behaviors, poorer grades, higher trait anger, school attended, and being male were significant predictors.)

As the table indicates, dose of exposure to games with lesser amounts of violence (rated Everyone to Teen) had the same pattern of relations to the four outcome measures as did dose of exposure to M-rated games. (Exposure to both types of games was highly correlated; however, even after removing their shared effects, each had independent significant predictive value.) Trait anger was highly predictive of all four outcome measures, while aggressive personality was not significantly predictive of any of the four. Contrary to expectations, preference for M-rated games was significantly predicted neither by trait anger (OR = 1.07) nor aggressive personality (OR = 1.00).

Finally, given that boys and girls differ significantly in use of M-rated games, time spent with games overall, and self-reported motivations for game play (Olson et al., 2007), we re-ran our analyses by gender. Results are presented in Table 3. For boys, M-rated game play no longer predicted bullying; instead, aggressive personality emerged as the strongest predictor. Violent games still predicted greater risk of physical fights, although E- and T-rated game "dose" did not.

When girls were analyzed separately, frequent M-rated game use became an even stronger predictor of bullying and fighting. Amount of time spent on younger-rated games was a weak significant predictor for physical aggression only.

DISCUSSION

As hypothesized, this study found significant relationships between M-rated electronic game play and routine engagement in bullying behaviors and physical aggression in a diverse sample of young adolescent game players. The odds of engaging in these behaviors increased with the relative "dose" of M-rated game exposure (i.e., the percentage of M-rated games on children's lists of "five games played a lot in the past six months"). No relationship was found between violent game play and delinquency or victimization.

For the total sample, dose of exposure to M-rated games was only slightly more predictive of problems than was dose of exposure to younger-rated games. In the case of girls, however, heavy use of M-rated games

in particular was linked to a higher risk of bullying and fighting. Parents of young adolescent girls should be mindful of this increased risk and limit or monitor M-game use.

When boys were analyzed separately, dose of M-rated game exposure ceased to be a significant predictor of bullying, and aggressive personality (as measured by the Attitude Toward Conflict scale) became a strong predictor. (Note, the odds ratio was less than one on this control variable, so this may be a spurious result; it should not be taken out of context.) M-rated game play was still a significant, though weaker, predictor of fighting for boys, whereas use of younger-rated games was not. Overall, our hypothesis that heavy play of Mature-rated, violent games would predict a greater risk for common problem behaviors, even when controlling for potential confounders suggested by previous research, was partially supported.

In our survey sample, Mature-rated game play was normative for boys, but not for girls; boys were also much more likely to play electronic games almost every day. It is possible that a larger, national survey would find greater differences between boys who are heavy M-game users and boys who play for less time or who favor E or T games. Interestingly, trait anger was a significant predictor of greater risk for all four categories of problems, in both genders (aside from delinquent behavior in boys). This deserves further study.

Limitations

It is important to note that most young adolescents who play M-rated games are neither bullies nor victims, and that not all children who engage in bullying or aggressive behaviors are frequent players of M-rated games. Involvement in problem behaviors is common among adolescents; for example, over half of boys and one-third of girls in our sample had hit or beaten up someone at least once during the previous year.

This study used a conservative estimate of Mature-rated game exposure: asking children to list five games they had "played a lot" in the past six months, not *all* games they had recently played. This should therefore be considered a minimum estimate of exposure.

We were not able to independently verify the accuracy of their responses. In the Kaiser Family Foundation survey (Roberts et al., 2005) over three quarters of boys in grades 7 to 12 reported playing an M-rated *Grand Theft Auto* game at least once; this suggests that our results are consistent with previous self-report data. However, "played a lot" likely encompasses a range of actual time spent playing across children. We also cannot determine how much total play time was spent on any particular game. This would be virtually impossible

to accurately assess solely through children's self-reports.

This study had a larger, more diverse sample and higher response rate than previous correlational studies. However, as with all cross-sectional studies, it cannot demonstrate causality. We cannot say that M-rated game play causes bullying or physical aggression. It is likely that any influence of violent games is mediated by a child's individual characteristics, experiences, and environment, including discipline, supervision and affection from parents; affiliation with antisocial peers; and family or community violence (Mercy, Butchart, Farrington, & Cerdá, 2002; Pettit, 2004; Ferguson et al., 2008). Although, in our sample, children with high trait anger and aggressive personality were not more likely to play M-rated games; other research suggests that such children are drawn to violent activities, whether contact sports such as football or wrestling, or more aggressive schoolyard play (Steinberg, 2000). For some, playing football or a violent video game might reinforce and worsen their aggressive behavior; for others, these activities might be socially acceptable ways to work through and get rid of hostile feelings (Sherry, 2006). Findings are mixed on whether violent media content could harmlessly purge aggressive impulses; the potential for catharsis may vary based on individuals' cognitive abilities, personality traits, and beliefs (Gunter, 2008; Bushman, Baumeister, & Phillips, 2001). Future studies of representative national samples might examine the use of violent video games by youth in relation to a variety of known risk and protective factors for aggressive or violent behavior.

This paper did not address potential positive aspects of video game use. Some research suggests that video game play is compatible with, and perhaps supportive of, school engagement, family closeness, improved cognitive abilities, and other positive aspects of adolescent development (Durkin & Barber, 2002; Feng, Spence, & Pratt, 2007). One meta-analysis found stronger evidence for a relationship of violent video games to higher visual-spatial cognition than to aggression (Ferguson, 2007b). As with most research on adolescents (Steinberg & Morris, 2001), studies of media effects have focused much more on potential harms than on potential benefits. We must also consider adolescents' strengths and how electronic games might support them (Levesque, 2007).

Policy Implications

Although we found that frequent use of M-rated games statistically predicts a greater risk of some problem behaviors, especially for girls, policymakers must pay careful attention to the limits on interpreting this type of study, especially with respect to causality. Given that nearly all children play electronic games, and nearly half of

those regularly play at least one M-rated title (Olson et al., 2007), a limited amount of M-rated game use is not automatic cause for concern. A Mature rating cannot encompass all of the factors that might make violent content harmful to youth. The research on the effects of television violence shows that the context of violence is critical to its effects on children in terms of learned aggression, increased fear, and desensitization (Federman, 1998). For example, whether violence is rewarded, and whether the consequences of violence (including pain and suffering) are shown, may influence the likelihood of imitation. Ironically, games with Teen ratings are often less likely to show the consequences of violence: dead bodies disappear in moments and little blood is shown.

Television studies also suggest that realistic violence employing conventional and accessible weapons (including fists) may be more likely to promote aggressive behavior. Depictions of realistic violent situations may be more worrisome than copious blood and gore (which are a major factor in current game ratings). Further research is needed to understand these associations, as well as to identify the specific characteristics of video game content that may be harmful to particular at-risk subgroups of children and adolescents. For example, given that aggression against people or property is of greatest social concern, studies comparing the electronic game play patterns of juvenile offenders to those of other youth may be enlightening (Lancet, 2008).

Another complication for researchers is the variety of content accessible in today's technically sophisticated games. In our study, by far the most frequently played Mature-rated game series was *Grand Theft Auto*. This "sandbox" game allows players to engage in a variety of violent acts (though not against children or animals, which are not part of the game world). On the other hand, players may spend time delivering pizzas, driving an ambulance, listening to satirical radio programs, or trying on clothing at a shopping mall. It is nearly impossible to assess the amount and nature of the violence any one player is exposed to over time. (We did confirm, however, that the most popular M-rated games among our sample all contained "violence" or "intense violence," according to ESRB [2006] criteria.)

The California law currently under appeal (Civil Code Section 1746-1746.5) seeks to ban children's access to the most violent video games, where serious injury is inflicted on human-like characters through violence that is "especially heinous, cruel or depraved in that it involves torture or serious physical abuse to the victim." It is unclear who would determine whether a game fits these criteria.

Because of these complexities, it is unlikely that a narrow category of games could be clearly identified and supported by research as broadly harmful to young people. Some researchers have expressed concern that

media violence draws the political spotlight from known risk factors for violence, such as child abuse, poverty, and inequitable distribution of resources (Savage, 2008; Anderson, 2008).

In the meantime, parent education merits attention. Parents should assume that their child has been or will be exposed to violent games. Studies by the Federal Trade Commission suggest that mature-content games are frequently sold to young adolescents. Despite notable improvement in retailer practices since the initial FTC "mystery shopper" survey in 2000, 42% of unaccompanied children ages 13 to 16 were able to purchase an M-rated game in 2006 (FTC, 2007).

The FTC has praised the ESRB game rating system (2006) as more detailed and broadly disseminated than the ratings for movies or music (FTC, 2002). More education on the meaning of, and the criteria for assigning, game ratings and content descriptors would be helpful to parents. However, ratings should not be the sole basis for deciding which games are appropriate for a particular child. Both T- and M-rated games may include substantial violent content (Thompson, Tepichin, & Haninger, 2006), and not all content of concern to parents is highlighted. For example, current content descriptors do not tell parents whether a game's protagonists have prosocial goals, such as rescuing hostages and minimizing bloodshed, or whether antisocial violence (including violence targeting women or minorities) is required to win. Qualitative research suggests that these factors are important to parents (Kutner, Olson, Warner, & Hertzog, 2008). To address such concerns, the ESRB began supplementing its ratings in November, 2008 with online summaries of game content and relevant context. More study is needed regarding what kinds of information parents most want, and where and how they prefer to access it.

Perhaps the best advice to parents is to play video games with their child, or at least observe the play by keeping the game console or computer in a common area of the home. This gives parents an opportunity to understand the types of games that appeal to their child, why their child is attracted to them, and the positive or negative effects those games may have for that child (Villani, Olson, & Jellinek, 2005). Studies on television violence suggest that asking questions is more effective in mediating preteens' and teens' perceptions of media content; judgmental statements may backfire and increase the appeal of game violence (Nathanson & Yang, 2003).

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