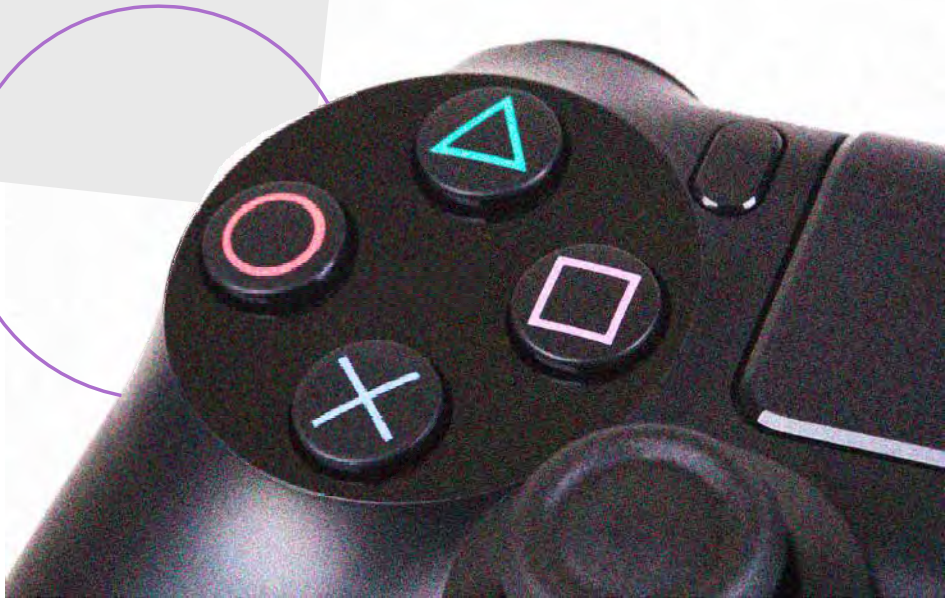
APA TASK FORCE
ON VIOLENT MEDIA

TECHNICAL REPORT on the REVIEW OF THE VIOLENT VIDEO GAME LITERATURE



American Psychological Association

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PREFACE

In keeping with the American Psychological Association's (APA) mission to advance the development, communication, and application of psychological knowledge to benefit society, the Task Force on Violent Media was formed to review the 2005 APA Resolution on Violence in Video Games and Interactive Media and the related literature. The goal of the task force was to ensure that APA's resolution on the topic continues to be informed by the best science currently available and that it accurately represents the research findings directly related to the topic.

After consulting with the most frequently published researchers in the field, as well as prominent methodologists, theoreticians, and practitioners in behavioral science, pediatrics, communications, and public health, APA created a task force of seven senior scientists with exemplary methodological and scientific expertise to undertake a rigorous review of the literature. The task force members bring expertise in meta-analyses, child development, learning, digital media, multicultural psychology, violence, and aggression to this effort. Task force members were Mark Appelbaum, PhD; Sandra Calvert, PhD; Kenneth Dodge, PhD; Sandra Graham, PhD; Gordon Nagayama Hall, PhD; Sherry Hamby, PhD; and Lawewnce Hedges, PhD.

APA adopted a multifaceted approach to the review of the science. Prominent scientists with broad expertise in related fields oversaw an independent evidentiary review and meta-analysis and review of the 2005 resolution, augmented by input as needed from topical specialists representing the range of viewpoints on the topic. The intent of this approach was to provide the most comprehensive, rigorous, and balanced review of the evidence base possible.

At the first meeting of the task force, the members spent significant time disclosing and discussing potential conflicts of interest. This process was modeled after the procedure used by the National Academies of Sciences to eliminate potential bias in the group's work. Specifically, task force members were asked to disclose and discuss any financial, scientific, or other interest that might conflict with their service on the task force if the interest could either significantly impair the individual's objectivity or create an unfair advantage for any person or organization. Task force members were also asked to disclose any research or publication activity or commitment to a fixed position through public statement or publication or through other personal or professional activity related to the current task.

INTRODUCTION

Video game use has become pervasive in the American child's life: More than 90% of U.S. children play some kind of video game; that figure rises to 97% when focusing on adolescents ages 12–17 (Lenhart et al., 2008; NPD Group, 2011). Although high levels of video game use are often popularly associated with adolescence, children younger than age 8 who play video games spend a daily average of 69 minutes on hand-held console games, 57 minutes on computer games, and 45 minutes on mobile games, including tablets (Rideout, 2013). Considering the vast number of children and youth who use video games and that more than 85% of video games on the market contain some form of violence, the public has understandably been concerned about the effects of violent video game use on individuals, especially children and adolescents.

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News commentators often turn to violent video game use as a potential causal contributor to acts of mass homicide. The media point to perpetrators' gaming habits as either a reason they have chosen to commit their crimes or as a method of training. This practice extends at least as far back as the Columbine massacre (1999) and has more recently figured prominently in the investigation into and reporting on the Aurora, CO, theater shootings (2012), Sandy Hook massacre (2012), and Washington Navy Yard massacre (2013). This coverage has contributed to significant public discussion of the impacts of violent video game use. As a consequence of this popular perception, several efforts have been made to limit children's consumption of violent video games, to better educate parents about the effects of the content to which their children are being exposed, or both. Several jurisdictions have attempted to enact laws limiting the sale of violent video games to minors, and in 2011, the U.S. Supreme Court considered the issue in Brown v. Entertainment Merchants Association, concluding that the First Amendment fully protects violent speech, even for minors.

In keeping with the American Psychological Association's (APA) mission to advance the development, communication, and application of psychological knowledge to benefit society, the Task Force on Violent Media was formed to review the APA Resolution on Violence in Video Games and Interactive Media, adopted in 2005, and the related literature to ensure that APA's resolution on the topic continues to be informed by the best science currently available and accurately represents the research findings directly related to the topic. The task force was asked to consider whether a new meta-analysis was needed or whether an alternate approach to reviewing the relevant research might be better suited to achieving this goal. The review of the scientific literature related to violent video game use is particularly important given both the amount of new research that has been conducted since 2005 and the significant changes in gaming technologies, which continue to yield more realistic and engaging games and platforms. Finally, the task force was asked to make recommendations based on its synthesis of the literature.

The task force engaged in a three-step process for its work: (a) Identify the relevant literature, (b) review the literature's findings systematically, and (c) synthesize the findings into coherent conclusions and recommendations.

LITERATURE REVIEW PROCESS

To undertake the literature review, we adopted a two-pronged approach to identifying the literature to be included. First, we conducted a comprehensive search of PsycINFO, Medline, ScienceDirect, Social Science Research Network, ERIC, Google Scholar, ProQuest, Wilson Social Science Index, and miscellaneous journals and references discovered through the search process. We used the following keywords: violent video games, violence, violen*, aggressive behavior, aggression, aggress*, prosocial*, prosocial behavior, computer games, video*, game*, and video games and media. We restricted the literature to be considered to research focused on violent video game use separate from other forms of violent media to facilitate the review of the resolution, which focuses on violent video games.

Second, on the basis of an initial PsycINFO search, we contacted approximately 130 of the most frequently published researchers in the topic area to request nominations of the 10 strongest empirically based articles addressing violent video game use published between 2000 and 2013. This process yielded four[1] meta-analyses conducted since the 2005 resolution and directly relevant to the task force's charge to evaluate the literature related to violence in video games and interactive media (Anderson et al., 2010; Ferguson 2007a, 2007b; Ferguson & Kilburn, 2009). Given the number of meta-analyses already completed, we decided to carefully review these existing meta-analyses to determine what they addressed and how they converged or differed.

The four meta-analytic reviews that we identified examined the impact of violent video game use on a variety of negative outcomes (Anderson et al., 2010; Ferguson 2007a, 2007b; Ferguson & Kilburn, 2009). The meta-analyses reviewed more than 150 research reports, including more than 400 effect sizes. Although the outcomes considered differed somewhat across meta-analyses, aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, prosocial behavior, reduced empathy and desensitization, and criminal violence were included in at least one meta-analysis. Given the breadth and publication dates of these studies, we determined that they sufficiently covered the existing literature through 2009.

Although the four meta-analyses included some different articles and were conducted by investigators who held different perspectives on the impact of violent video game use, our review of the meta-analyses revealed similar significant effect sizes. All four meta-analyses reported an adverse effect of violent video game use on aggressive outcomes, with an effect size greater than zero and a narrow range of unadjusted effect sizes (.14–.29). However, the authors' interpretations of these results varied considerably.

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QUESTIONS EMERGING FROM THE META-ANALYSES REVIEW

During the review of the meta-analyses, we identified six important issues that were not adequately addressed.

Is this research applicable to children?

The earliest research in this area focused primarily on young adults 18 years of age and older and, more specifically, on college students. Young adults are a group of considerable interest because they have a high exposure both to violent video games and to other risk factors for violence. Similar concerns have been voiced about the impact of violent video games on children and adolescents. Implications of this research are often applied to children, yet relatively few of the studies used in the meta-analyses reviewed included children or adolescents younger than age 16 as participants in the research.

[1]The search process yielded a fifth meta-analysis conducted since the 2005 policy statement (Savage & Yancey, 2008). However, we did not consider this meta-analysis to be directly relevant to our charge because it did not examine effects of violent video games separately from other forms of violent media.

Does this research address the developmental trajectory of potential effects or the possible course of vulnerability to potential negative effects?

Questions have been raised about whether children and adolescents are particularly vulnerable to effects of violent video game use. Prospective longitudinal studies can provide information about the effect of violent video game use on children over time, as they age into adulthood. The value of these studies would be to elucidate how violent video game use affects the lives of participants in ecologically important ways. These studies would also provide estimates of the time period of effects and the trajectory of impact as the effects grow or decline across long periods. Finally, these studies can inform theory because they can be used to test hypotheses about mediators of impact (i.e., the processes through which effects occur) and moderators (i.e., individual or setting characteristics that alter the impact). However, the meta-analyses we reviewed included very few longitudinal studies, and none of those that were included considered enough time points to examine the developmental trajectory of violent video game use and associated outcomes.

Do outcomes for males and females differ?

Video game use is often stereotypically associated with males; however, nearly all teenagers—99% of boys and 94% of girls ages 12–17—are exposed to video games (Lenhart et al., 2008). Although it is true that boys have historically spent more time playing video games throughout childhood than have girls, it appears that this gap may be narrowing (Lenhart et al., 2008; Rideout, 2013; Rideout, Foehr, & Roberts, 2010). However, a considerable difference still remains with regard to daily game users; this group is 65% male. Further, males are at higher risk of perpetrating physical violence (Federal Bureau of Investigation [FBI], 2013; Hamby, Finkelhor, & Turner, 2013). Including females in participant samples without analyzing potential gender effects may distort group findings. The meta-analyses reviewed did not consider gender differences in outcomes or collapsed across gender after an initial analysis of baseline differences.

Does the degree of exposure matter?

Some questions of policy importance focus on the issue of dose. The first is the basic question of whether individuals with greater exposure to violent video game use are more likely to show increased aggressive outcomes. A second is whether there is some level or threshold of exposure that marks a point of potential concern. In many of the experimental studies, a single dose of exposure is administered to every participant. In studies of violent video game habits, by contrast, it is more likely that exposure is indexed as a continuous measure on the basis of the reported frequency of exposure to violence and magnitude of violence in video games. The meta-analyses did not address questions related to degree of exposure.

What is the role of other known risk factors for aggression in moderating or mediating the effects of violent video game use?

Research has identified a number of risk factors for the development of aggression, including factors at the level of the individual (e.g., aggressive traits, neurobiological factors, academic achievement), family (e.g., low socioeconomic status [SES], harsh discipline practices), peers (e.g., bullying, peer rejection), school (e.g., exclusionary disciplinary practices), and neighborhood or community (e.g., poor urban settings) (e.g., see Bushman, 2013). Children who experience multiple risk factors are more likely to engage in aggression (Dodge, Coie, & Lynam, 2006; Herrenkohl et al., 2000). Most of these factors were not tested in the meta-analyses we reviewed because an insufficient number of studies had included these other aggression risk factors. Other moderation factors were included in at least one meta-analysis, such as duration of game use, and Eastern versus Western cultures (Anderson et al., 2010).

What is the role of other game characteristics?

In addition to the violent content in video games that may be related to aggressive behavior by game users, questions have arisen about other qualities of the experience that may influence aggressive outcomes. Some of these factors involve the properties of the video game, how the game is played, and the user needs that game use fulfills.

Properties of the game include factors such as the presence or absence of a plot and the production features used to present aggressive content. Television programs and movies are often based on stories with plots that have moral themes in which the hero acts aggressively to save others and overcomes a desire for revenge and retribution (Calvert, 2015; Calvert, Murray, & Conger, 2004). The moral decisions of heroes in response to the aggression of others, particularly in regard to their own feelings of revenge, provide a potentially redeeming quality to these experiences, as all humans grapple with the impulse to "get even" with those who have "wronged them" at various points in their lives (Kotler & Calvert, 2003). Comprehension of complex archetypal plots has implications for how youths perceive heroic characters.

Although early violent video games typically reduced the plot to a minimum (Calvert, 1999), changes over time have led to an increased use of complex plots, which require players to grapple more with their feelings and decisions about vengeance. For example, player actions in Assassin's Creed II can lead players to feel guilty, and they are able to decide how much revenge they will pursue as well as how they assassinate other players (S. P. Calvert, personal communication, October 2014). Other violent video games explicitly involve taking on antisocial roles (e.g., Grand Theft Auto).

How the game is played involves the user interface (e.g., joystick, Wii remote, or player movements per se), the player's perspective, and the use of competition and cooperation as ways to engage players in the game. Game interfaces have changed considerably over time; user activity was much more cumbersome in the past than at present (Przybylski, Rigby, & Ryan, 2010). Players also have a symbolic perspective during game play through their characters. First-person perspectives have been thought to impact players the most, as their perspective is that of the avatar, which may increase players' identification with their character; by contrast, third-person perspectives treat players as more distal agents with control over their avatar (O'Keefe & Zehnder, 2004). Additionally, some researchers have suggested that competitive features of games produce the aggressive effects (Adachi & Willoughby, 2011).

User needs, or motivations for using violent video games, can include the satisfaction of three basic human needs: competence, autonomy, and relatedness (Przybylski et al., 2010). Based on the identity of the users, specific games may have differential effects on users. Additionally, perceptually salient production features and engaging plots can also influence how the game is played, leading to immersion in a video game program, which may enhance player enjoyment. To the extent that enjoyment increases, players may experience what is described as "flow," which can facilitate sustained exposure to the violent video game over time. As exposure increases, deleterious effects of exposure, such as desensitization, may increase (Calvert, 1999). The role of these characteristics in the relationship between violent video game use and aggressive outcomes was mostly unexplored in the early literature.

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NEW LITERATURE

After fully reviewing the existing meta-analyses and identifying the issues detailed previously, we turned to the more recently published literature. Our review of this literature was designed to address two questions. First, does the more recent literature provide further evidence of the effects of violent video game use? Second, does the more recent research address the questions enumerated previously? To answer these questions, we used two techniques: a systematic evidence review and an effect size review (meta-analysis) of the studies identified through the systematic evidence review as having sufficient utility to address our objectives.

SYSTEMATIC EVIDENCE REVIEW OF THE LITERATURE SINCE 2009

We conducted a systematic evidence review of the literature published since the most recent meta-analysis to determine whether this more recent research sufficiently addressed the questions raised earlier in this report to support conclusions about the effects of violence in video games. A systematic evidence review synthesizes all empirical evidence that meets prespecified criteria to answer specific research questions. This approach uses systematic methods selected to minimize bias in order to produce more reliable findings (Oxman, 1993).

The Institute of Medicine and others have adopted systematic evidence reviews as a standard approach to summarizing bodies of literature to draw conclusions from a field of research (e.g., McGinnis, Gootman, & Kraak, 2006). A systematic evidence review includes the following: a clear set of objectives with predefined eligibility criteria used to include studies in the review; explicit methodology; a systematic search that attempts to identify all studies that meet the criteria; an assessment of the findings in the studies identified; a systematic presentation of the characteristics and findings in the included studies; and conclusions based on the evidence review (Zief & Agodini, 2012).

To conduct the systematic evidence review, we repeated the literature search process described earlier to capture all relevant articles publicly available between January 1, 2009, and August 12, 2013. We identified 170 research reports, including gray literature (see Appendix A). Those reports were screened according to the following inclusion criteria we developed:

- Does the report include at least one empirical analysis addressing video game violence separately from other media violence?
- Does the analysis include complete statistics?
- Does the report include at least one of the outcome variables considered in the earlier meta-analyses: aggressive behavior, aggressive cognitions, aggressive affect, physiological measures, prosocial behavior, reduced empathy or desensitization, delinquency, or violence?
- Does the report include some measurement of violent video game exposure?
- Does the report include some description or assessment to determine that the violent video game is, in fact, violent?
- Was the study published in a peer-reviewed academic journal?

In establishing these criteria, we sought to create a body of evidence that would be extensive and directly relevant to our goal of identifying relationships between violent video game use and aggressive behaviors and associated outcomes and that would address whether those relationships are causal. Although we initially included gray literature in our screening, in part to answer concerns about the potential for publication bias in evidence, we ultimately decided that peer review would be an inclusion criterion. The rationale was as follows. First, peer review provides a basic, independent indication of quality. Second, by selecting peer-reviewed journal articles as our source of information, we also tried to standardize our unit of inquiry. Whereas the same information may be found in multiple conference proceedings, for example, it is less likely that the same study would be published in multiple locations. We examined these articles for all possible effects of violent video game use related to the outcome variables identified through the earlier meta-analytic review, including long-term, short-term, negative, positive, and null effects.

Of the 170 articles examined, 68 met all six screening criteria. These articles reported the results of 78 studies that were then each coded for study characteristics. Coded characteristics included research design and methodology, sample characteristics, violent video game exposure characteristics, aggression risk factors, and outcome variables (see Appendix B).

To assess the utility of the evidence provided by the studies, we rated each study on five dimensions for fulfilling the task force's charge: possibility for causal inference, ecological validity, sampling validity, and measurement of independent and dependent variables. Each of the studies was randomly assigned to two members of the task force for rating, except those studies with neurological outcomes, which were all assigned to two members with topic-matter expertise. Task force members rated each study's contribution to the evidence base pertaining to the research questions identified in the earlier review of meta-analyses.

The studies were then divided into two groups: studies perceived as having sufficient utility and those perceived as having insufficient utility for informing the decisions and recommendations the task force was charged with making. Studies were assigned to the sufficient utility group if they were rated by at least one rater as having sufficient ecological validity, sampling validity, or possibility for causal inference to address the task force's charge and no more than one of these variables was rated as having insufficient utility by the second rater. In addition, to be included in the sufficient utility group, the study had to have at least one dependent and one independent variable rated as having sufficient measurement validity.

We used three primary criteria for evaluating the measures in a study: validity, reliability, and precision. Studies that ranked high on at least one of these factors and low on none of the factors were rated as having sufficient utility. Studies that did not meet these criteria were assigned to the insufficient utility group. Interrater reliability was high, and any initial differences of more than one unit were resolved by having both raters rescore the article. Study inclusion in the sufficient or insufficient utility group reflected the task force's determination of the potential relevance of the study for answering the specific research questions considered in this review. This rating process yielded 31 studies published since 2009 with sufficient utility to be included in the synthesis of findings.

Next, we considered the evidence available for each research question, using the following four inquiries:

- Was there enough research to draw conclusions?
- What does the evidence suggest about a relationship between violent video game use and measured outcomes for children and adolescents?
- What is the utility of the research support?
- What are the limitations of the data set?

The results of this synthesis are summarized below, organized by outcome variable.

SYNTHESIS OF THE EVIDENCE BY OUTCOME

Aggressive behavior

The link between violent video game exposure and aggressive behavior is one of the most studied and well established. Of the 31 studies reviewed, 14 investigated the relation between violent video game use and aggressive behaviors. Aggressive behavior measures included experimental proxy paradigms, such as the administration of hot sauce or a noise blast to a confederate, self-report questionnaires, peer nomination, and teacher rating of aggressiveness. A positive association between violent video game use and increased aggressive behavior was found in most (12 of 14 studies) but not all studies published after the earlier meta-analyses. This continues to be a reliable finding and shows good multimethod consistency across various representations of both violent video game exposure and aggressive behavior. The findings were also seen in a range of samples, including those with participants who were older children, adolescents, and young adults. They also showed consistency over time, in that the new findings were similar in effect size to those of past meta-analyses (see Effect Size Analyses section below).

Several longitudinal studies, using both experimental and naturalistic approaches, have helped establish that the effects of violent video game exposure last beyond immediate effects in the laboratory.

Since the earlier meta-analyses, the literature has broadened in some directions. For example, there are more longitudinal and multiexposure studies. The literature has also broadened in terms of populations studied, including a limited number of studies of children, high-risk populations, and non-U.S. samples, although more similar research is needed. Several longitudinal studies, using both experimental and naturalistic approaches, have helped establish that the effects of violent video game exposure last beyond immediate effects in the laboratory.

Aggressive cognitions

Numerous laboratory and longitudinal studies have assessed the impact of violent video game use on aggressive cognitions, which includes both self-reports and direct measures of cognitive processes. Aggressive cognition measures included hostile attributions and expectations, word completion, Implicit Association Test responses, aggressive intentions, aggressive cognitions about the world being a hostile place, dehumanization, and pro-violence attitudes. These measures are important because they inform an understanding of the psychological processes through which violent video game use might have an impact on behavior.

Of the 31 studies reviewed, 13 included aggressive cognitions as an outcome. All of these studies showed an effect of violent video game use on increased aggressive cognitions, replicating the finding in the pre-2009 research. In general, this research utilized improved designs (e.g., exposure via timed computer presentation and better measurement of dependent variables such as computer-recorded response times and implicit associations) and longer term follow-up with participants.

Aggressive affect

Thirteen of the 31 studies included aggressive affect as an outcome; all were experimental studies with adults. Aggressive affect measures included self-report questionnaires, picture-rating tasks, and experimental proxy. Twelve of the 13 experimental studies that examined the effects of violent video games on affect indicated negative outcomes for adults. The most common negative outcome was increased hostility or aggressive affect. There is also evidence of less emotional reactivity (increased emotional desensitization) as a negative outcome, which is often seen as a result of previous experience with violent video games. There were no nonexperimental, naturalistic studies of the affective outcomes of violent video use on adults. Also, there were no studies of the effects of violent video games on children's affect.

Prosocial behavior, empathy, and desensitization

In addition to increases in aggressive outcomes, nine studies examined decreases in socially desirable behaviors following exposure to violent video games. In particular, prosocial behavior, empathy for the distress of others, and sensitivity to aggression were diminished after exposure to violent video game play (seven of the nine studies). Eight of these studies were experimental, and all but two of the studies included adult participants only.

Physiological and neurological outcomes

None of the 31 studies we reviewed used physiological measures as their primary outcomes; however, eight did include physiological measures, and two reported neurological outcomes. Of the eight studies that did include physiological measures such as heart rate changes, skin conductance, and blood pressure changes along with other measures, five found an effect of violent video game exposure, and three showed no effect.

Two studies we reviewed examined neurological outcomes as a function of violent video game exposure. Although both found effects, there were too few studies to derive a finding related to neurological outcomes.

Taken together, the evidence in the recent literature for a relationship between violent video game use and physiological or neurological outcomes is insufficient to support a conclusion.

Delinquency and violence

Although the media and the public often ask about the association between violent video game use and delinquency or violence, only one of the 31 studies we reviewed included delinquency or violence as an outcome. Thus, too little research has addressed these outcomes to reach a conclusion.

SYNTHESIS OF EVIDENCE FOR OTHER RESEARCH QUESTIONS

Age and developmental trajectory

The new literature added 10 studies with children and adolescents 17 years old and younger. There also continued to be substantial data on young adults 18 years old and older (21 studies). As mentioned previously, there were two key questions regarding age. First, is there any evidence that violent video game use is associated with aggressive outcomes for children and adolescents? The studies including children between the ages of 11 and 17 varied in outcome but supported overall the premise that the findings are similar for adolescents and young adults. There remains a dearth of studies on children younger than age 10.

Second, are effects of violent video game use stronger at particular ages or developmental stages? This question cannot be answered from studies included in our review, which rarely examined the variation in patterns across age groups. When studies did examine multiple age groups, they did not offer enough variance in participant age to paint a meaningful picture of differential developmental impacts of violent video game use.

Gender

Of the 31 studies included in the evidentiary review results, seven included male participants only; nine did not analyze gender, though they had male and female participants; two analyzed gender and found no effects, leading the researchers to collapse gender in subsequent analyses; six used gender

as a covariate; and only seven analyzed gender fully as a variable of interest. In short, more than half of the studies did not examine potential gender differences for outcomes related to violent video game use.

This approach is somewhat surprising. In particular, although many researchers either assumed no difference between genders or assumed that men will experience greater effects than women, few actually analyzed gender as a variable, or they used gender as a covariate in the analyses. When analyzed, the negative effects of violent video game use did appear for both genders. Nevertheless, another limitation of the current literature is that potentially different outcomes of violent video game use for male and female participants were typically not considered. Thus, no conclusions are possible regarding gender effects in this domain because a proper examination of this variable was lacking.

Another limitation of the current literature is that potentially different outcomes of violent video game use for male and female participants were typically not considered.

Degree of exposure

The largest body of evidence on the question of whether the degree of exposure has an impact on the effects of violent video game use comes from the nonexperimental studies that assessed violent video game habits among participants (seven studies). Many naturalistic studies used a continuous measure of violent video game use (frequency of violent video game use, degree of violence in frequently played games, or both) and tested the linear association with violence. Five of the seven studies supported the model that more violent video game use is associated with higher levels of aggressive outcomes. Only a few studies examined a dose–response relation or heightened effects among heavy users of violent video games. Therefore, the current evidence base cannot yet specify a particular amount of exposure that clearly marks a problematic level of exposure.

Other known risk factors

Five of the 31 studies we reviewed included consideration of other known risk factors for aggression. These analyses examined a variety of risk factors, including antisocial personality traits, delinquency, academic achievement level, parental conflict, child and parent depression, and exposure to deviant peers. The predominant strategy in these studies was to use risk factors as covariates in analyses of the effect of violent video game exposure on aggressive outcomes. The overarching question was, once all of these known risk factors for aggression are accounted for, does violent video game use independently predict aggression? Three of the five studies tested for moderation whereby the interaction between violent video game use and one or more risk factors was examined.

The effects of violent video game use were fairly robust even with the inclusion of third variables known to be risk factors for aggression. Four of the five studies supported this finding. Only one study reported that violent video game play was not associated with aggression once other risk factors were accounted for. Of three studies that tested for an interaction between a risk factor and violent video game use, only one documented a marginal effect of education level. Therefore, the research we reviewed offered little evidence that risk factors moderated the effect of violent video game use on aggressive outcomes. As in previous meta-analyses, researchers who conducted the studies in our review have been concerned with risk factors that may exacerbate the effects of violent video games or protective factors that may buffer those effects. However, at this point we do not yet know with any certainty what those risk and protective factors might be.

Other game characteristics

As in the earlier meta-analyses, other violent video game characteristics that might influence aggressive outcomes such as plot, action, pacing, user interfaces, perspective, and motivations for use remain understudied. Our review included insufficient studies to derive findings about these or any other game features. Given the literature documenting the effects of such features with other media, research examining the role of these characteristics in violent video game use effects might increase our understanding of the critical aspects of the games that contribute to negative effects.

EFFECT SIZE ANALYSES

In addition to the syntheses discussed previously, we also conducted effect size analyses of the 31 studies identified in our review as being of sufficient utility to compare the earlier meta-analytic reviews with the review of the more recent literature.

Although we attempted to extract effect sizes from all of the studies in the sufficient utility group, we were only able to compute effect size estimates from 18 of them. The major reason that effect sizes could not be computed for some studies was that they did not report the relevant results in sufficient detail. This is not necessarily a deficiency of the study—some studies were

primarily focused on questions other than the impact of violent video games (e.g., they might have focused on the mechanism by which game use affects outcomes rather than the simple magnitude of the effect).

We computed the effect sizes as the difference between the mean outcome among the treated group (e.g., exposed to violent video games) versus the control group (e.g., exposed to nonviolent video games), expressed in (within-treatment group) standard deviation units, sometimes called Cohen's d. Note that different studies used somewhat different outcome measures, and the effect size measure is designed to put all of the mean differences (treatment effects) on the same scale. We chose to use the metric of Cohen's d because many of the studies were experimental, and it is the most common metric for use with experimental studies.

In addition to coding effect size estimates, we also coded the variances of the effect size estimates that were used for meta-analysis. There are two statistical models for meta-analysis, known as the fixed-effects and random-effects models. They differ in whether they treat the variation between studies as random error and may lead to slightly different combined results. The results we obtained from fixed- and random-effects methods were not substantially different, so we report here the results of the random-effects analyses because they tend to be more conservative.

We conducted meta-analyses using both fixed- and random-effects methods for all of the studies and separately for studies with each of four outcomes (aggressive behavior, aggressive cognitions, aggressive affect, and physiological arousal). These outcomes were the only ones that were measured in at least three studies for which we could code effect sizes.

Some of the earlier authors of the meta-analyses expressed concern about the potential for publication bias and used methods to adjust for its potential effects. Consequently, we computed several adjustments for publication bias, including trim and fill (Duval & Tweedie, 2000) and nonparametric weight functions (Hedges, 1992). Because results were similar, we report here only the results for the trim-and-fill method because this was the method used in previous meta-analyses.

Note that the earlier meta-analyses used the r (correlation coefficient) metric, while the current meta-analysis used the d metric. Consequently, we converted the results of the previous meta-analyses into the d metric (and converted our results into the r metric for reference using a standard method; see Hedges & Olkin, 1984). In all of the tables that follow, we present the standard error of the combined effect size in the current meta-analysis as a measure of the statistical uncertainty of the combined effect size. In comparing the results of the several previous meta-analyses with these new analyses, we did not use a strict statistical significance test but rather looked at general qualitative agreement. However, we note that if significance tests were carried out and Bonferroni methods were used to adjust for multiple testing, none of the differences would be statistically significant at the .05 level.

Table 1 reports the results of our meta-analysis of all studies examining the effects of violent video games, combining across outcomes. In this analysis, we used a single effect size estimate per publication. If a study had more than one outcome, we took the average and used this as the (synthetic) effect size for that study. Table 1 also reports the average effect size estimate from one of the previous meta-analyses that corrected for publication bias. Note that a 95% confidence interval would range from approximately 2 standard errors below the average effect size estimate to 2 standard errors above it, or from about 0.21 to about 0.42. Because the results of each of the previous meta-analyses also have statistical uncertainty, we regard the average effect size of 0.31 and its confidence interval of 0.21–0.42 as consistent with previous estimates.

Table 1. Results of Meta-Analyses Combining Across Outcomes

Meta-analysis	k	r	d	SE
Ferguson & Kilburn (2009)[a]	27	.080	0.161	
New studies[a]	18	.154	0.312	0.053

[a]Denotes meta-analyses with corrections for publication bias.

Table 2 reports the results of our meta-analysis of all studies examining the effects of violent video games on aggressive behavior. Table 2 also reports the average effect size estimate from three previous meta-analyses, with corrections for publication bias if they were available. Note that a 95% confidence interval would range from approximately 2 standard errors below the average effect size estimate to 2 standard errors above it, or from about 0.19 to about 0.56. Because the results of each of the previous meta-analyses also have statistical uncertainty, we regard the average effect size of 0.37 and its confidence interval of 0.19–0.56 as consistent with previous estimates.

Table 2. Results of Meta-Analyses for Aggressive Behavior

Meta-analysis	k	r	d	SE
Anderson et al. (2010)[a]	140	.192	0.391	
Ferguson (2007b)[a]	17	.040	0.080	
Ferguson (2007a)[a]	5	.150	0.303	
New studies[a]	7	.184	0.374	0.092

[a]Denotes meta-analyses with corrections for publication bias.

Table 3 reports the results of our meta-analysis of all studies examining the effects of violent video games on aggressive cognitions. Table 3 also reports the average effect size estimate from three previous meta-analyses, with corrections for publication bias if they were available. Note that a 95% confidence interval would range from approximately 2 standard errors below the average effect size estimate to 2 standard errors above it, or from about 0.11 to about 0.46. Because the results of each of the previous meta-analyses also have statistical uncertainty, we regard the average effect size of 0.34 and its confidence interval of 0.11–0.46 as qualitatively consistent with the previous estimate of Anderson et al. (2010), but perhaps not with Ferguson's (2007a, 2007b) two estimates, which were somewhat larger.

Table 3. Results of Meta-Analyses for Aggressive Cognitions

Meta-analysis	k	r	d	SE
Anderson et al. (2010)[a]	95	.170	0.345	
Ferguson (2007b)[a]	7	.360	0.772	
Ferguson (2007a)	12	.250	0.516	
New studies[a]	8	.166	0.336	0.064

[a]Denotes meta-analyses with corrections for publication bias.

Table 4 reports the results of our meta-analysis of studies examining the effects of violent video games on aggressive affect and empathy or desensitization. Table 4 also reports the average effect size estimate from a previous meta-analysis that looked at these two outcomes separately. All analyses corrected for publication bias. Note that a 95% confidence interval would range from approximately 2 standard errors below the average effect size estimate to 2 standard errors above it, or from about 0.04 to about 0.34. Because the results of each of the previous meta-analyses also have statistical uncertainty, we regard the average effect size of 0.19 and its confidence interval of 0.04–0.33 as consistent with previous estimates.

Table 4. Results of Meta-Analyses for Aggressive Affect and Reduced Empathy or Desensitization

Meta-analysis	k	r	d	SE
Anderson et al. (2010)				
Aggressive affect	62	.100	0.201	
Empathy or desensitization	32	.179	0.364	
New studies[a]	9	.093	0.187	0.074

[a]Denotes meta-analyses with corrections for publication bias.

Table 5 reports the results of our meta-analysis of all studies examining the effects of violent video games on physiological arousal. Table 5 also reports the average effect size estimate from three previous meta-analyses, with corrections for publication bias if they were available. Note that a 95% confidence interval would range from approximately 2 standard errors below the average effect size estimate to 2 standard errors above it, or from about 0.15 to about 0.91. Because the results of each of the previous meta-analyses also have statistical uncertainty, we regard the average effect size of 0.38 and its confidence interval of 0.15–0.91 as consistent with previous estimates.

Table 5. Results of Meta-Analyses for Physiological Arousal

Meta-analysis	k	r	d	SE
Anderson et al. (2010)[a]	29	.135	0.272	
Ferguson (2007a)[a]	4	.270	0.561	
New studies	3	.189	0.384	0.265

[a]Denotes meta-analyses with corrections for publication bias.

WHAT DOES THE RESEARCH SAY?

Taken as a whole, the research included from the systematic evidence review of the newer literature and the previously conducted meta-analyses was of sufficient utility, variety, and scope to support certain findings about violent video game use. Notably, the findings are comparable across all of these meta-analyses, including the one conducted by this task force. To draw conclusions, we had to consider plausible alternative explanations for effects found and plausible explanations when no effects were found. This was simpler when multiple research designs—experimental, observational, or longitudinal—were used to study the same relationship between variables within one age group. Research that included methodological and statistical controls for alternative explanations was also useful. However, for outcome variables for which the research did not include multiple well-controlled experimental studies as well as correlational methods, it was difficult to reach conclusions about the relation between violent video game use and those outcomes.

In interpreting the results, we kept in mind that aggression is a complex behavior with multiple risk and contributing factors. There was no expectation that violent video game use might be the only influence on aggressive outcomes or that it would necessarily be a stronger or larger influence than other known risk factors. We examined the research to determine whether violent video game use is a possible unique contributing factor among other known influences on aggression.

We considered many factors in developing our conclusions, including the quantity, variety, and utility of the research from which they came. Several different studies from different researchers using different research populations, designs, and measures needed to be available for a conclusion to be developed. Also, any consistent differences in research outcomes supporting and not supporting the finding had to be considered. The research we reviewed ranged widely in methods, samples, country of inquiry, discipline of author, and number of unique authors.

To develop our conclusions, we considered the review of earlier meta-analyses and the results of our systematic evidence review and effect size analyses of the more recent literature. All pointed to the same conclusions, providing confidence in the findings. As with most areas of science, the picture presented by this research is more complex than is usually depicted in news coverage and other information prepared for the general public.

CONCLUSIONS

- The research demonstrates a consistent relation between violent video game use and increases in aggressive behavior, aggressive cognitions, and aggressive affect and decreases in prosocial behavior, empathy, and sensitivity to aggression.

The research demonstrates a consistent relation between violent video game use and increases in aggressive behavior, aggressive cognitions, and aggressive affect and decreases in prosocial behavior, empathy, and sensitivity to aggression.

- The research converges across multiple methods and multiple samples, with multiple types of measurements demonstrating these relations.
- The recent research demonstrated that these effects hold over at least some time spans. This body of research includes laboratory experiments examining effects over short time spans immediately following experimental manipulations and observational longitudinal studies.

- Laboratory experiments have generally found a significant impact of exposure to violent video game use on aggressive outcomes. The experimental method increases confidence in the causal impact of violent video game use, but the controlled environment of most experiments reduces their ecological validity.
- The relation between violent video game use and heightened aggressive outcomes remains when other known risk factors for aggression are included as covariates in analyses. However, this body of research is small, with a limited number of studies addressing a limited number of risk factors.
- Although the number of studies directly examining the relation between the amount of violent video game use and the degree of change in adverse outcomes is still limited, existing research suggests that higher amounts of exposure are associated with higher levels of aggression and other adverse outcomes.
- This research has been conducted primarily with young adults, with adolescents making up the second largest age group studied. The amount of research focusing on participants younger than 14 decreased sharply as participant age decreased, with extremely little research including participants younger than 10. Thus, caution is called for in applying these findings to preadolescent and younger age groups.
- The field of research has not adequately examined potential gender differences in the relations between violent video game use and aggressive outcomes.
- This research has also not adequately included samples representative of the current population demographics, nor has it sufficiently examined the potential differences in effects when participant samples have been diverse; no conclusions about differences in effects related to ethnicity, SES, or culture can be drawn from the currently available research.

UNDERSTANDING THE LITERATURE

What do effect sizes mean?

A substantial component of the recent debate on the existence and importance of the effects of violent video game use has rested on an argument over effect sizes and their meaning. The two major viewpoints in the field (simply put, that effects are well established and substantial vs. that such effects have not been demonstrated to be large enough to take seriously) seem to rest substantially on the interpretation of the effect sizes established in two different but overlapping meta-analyses (Anderson et al., 2010; Ferguson, 2007a). Although these two previous meta-analyses have produced effect size estimates that are remarkably similar (*r*s = .19 and .15, respectively)—and were replicated in the meta-analysis on the newer literature conducted for this review—the interpretations of the importance of effect sizes of this order of magnitude vary enormously.

The estimation of effect sizes has become increasingly common in reporting the outcome of behavioral studies (usually reported in combination with some confidence interval) and for special and important purposes in applications such as meta-analysis. Despite the growing use of effect size estimates, the interpretation of effect sizes in absolute terms is not well established for two reasons. First, most effect size metrics are standardized indices, which permits them to be comparable even though they might be computed from vastly different outcome variables—which is the case in the meta-analysis of the effects of violent video games. However, the standardization makes their interpretation difficult because the effect sizes are not expressed in natural units.

Second, effect sizes express the magnitude of the relationship between variables. However, the effect size itself tells nothing about the value of change in the dependent variable to be achieved by manipulating the independent variable. Whether an association, and therefore the effect size, is judged to be meaningful depends on how easy it is to vary the independent variable and how important the dependent variable might be. A small effect of an independent variable that is easy to change (e.g., taking a baby aspirin every day) on an important outcome (e.g., death) might be judged quite important, but a large effect on a less important dependent variable might be judged less important.

The interpretation of effect sizes depends on the cost associated with producing the magnitude of change to the independent variable represented by the effect size weighed against the benefit received from the corresponding change in the dependent variable. At a minimum, then, the relevant question is, does the benefit from the amount of change represented by effect size x outweigh the cost for a change of that magnitude? Applied to violent video game use, the interpretation of the effect size might be determined, for example, by asking whether the (effect size x) reduction in the likelihood of increased aggression outweighs the cost in lost access to violent video games necessary to bring about the reduction. Because this analysis requires a subjective judgment, the interpretation of effect sizes will remain subjective, dependent on the value placed on these considerations and the context in which the change to the independent variable would occur. Debate about their meaning will always be possible.

The guidelines offered by Cohen (1988, 1992) as values for small, medium, and large are sometimes cited as standards for interpreting effect sizes. These guidelines, however, were developed for a totally different purpose—for attempting to power a study (i.e., to determine the number of participants that might be needed to detect effects of certain sizes) when no other pertinent information was available. The guidelines should not be applied to determine value of an effect size; it is not their purpose.

One also needs to remember that the effect size estimates computed for meta-analysis are exactly that—estimates. They are statistics with sampling distributions and standard errors. Because they are not population values,

the estimates should always be interpreted in light of their statistical uncertainty (e.g., by confidence intervals) and not discussed as though they are known values.

Definitions of aggression and violence as outcomes

The violent video game literature uses a variety of concepts, terms, and definitions in considering aggression and aggressive outcomes, sometimes using violence and aggression interchangeably or using aggression to represent the full range of aggressive outcomes studied. This lack of precision has contributed to some debate about the effects of violent video game use. In part, the numerous ways to consider violence and aggression stem from the multidisciplinary nature of the field. Epidemiologists, criminologists, physicians, and others approach the phenomena of aggression and violence differently than psychologists and emphasize different definitions of the phenomena accordingly. Some disciplines are interested only in violence and not the other dimensions of aggression. In psychological research, aggression is usually conceptualized as behavior that is intended to harm another (see Baron & Richardson, 1994; Coie & Dodge, 1998; Huesmann & Taylor, 2006; VandenBos, 2007). Violence can be defined as an extreme form of physical aggression (see Anderson, 2000) or as the intentional use of physical force or power that either results in, or has a high likelihood of resulting in, harm (Krug, Dahlberg, Mercy, Zwi, & Lozano, 2002).

Thus, all violence is aggression, but not all aggression is violence. This distinction is important for understanding this research literature, for considering the implications of the research, and for interpreting popular press accounts of the research and its applicability to societal events.

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Definitions of violence in video games

In reviewing this literature, we found that video game violence was not well specified or controlled. Most of the studies relied on either the rating system devised by the Entertainment Software Rating Board (ESRB) or a personal judgment by participants or the experimenters to determine whether a game was violent. The ESRB is an industry-wide self-regulatory body.

Because virtually all games that children play have ratings, the ESRB might appear to be a natural way by which to evaluate or compare them; however, reliance on the ESRB ratings is problematic. These ratings are not based solely on the violence in the game and do not include definitions or descriptions of what is considered to be violence. Ratings are based on considerations such as crude humor; profanity; alcohol, tobacco, and drug use; sexual content or nudity; and gambling. Moreover, the ESRB system uses the term violence, not aggression, and does not differentiate the two. In addition, not all types of violence are handled in the same manner. The ESRB system makes distinctions among violence, cartoon violence, and fantasy violence, based largely on the qualities of the characters involved as well as the outcome of the violence. However, there appears to be no empirical basis for these distinctions.

The ESRB's categorization of violence in this manner coupled with the use of the ESRB ratings in the research create the possibility for masking of effects. Comparisons of games rated as E (no age restriction recommended), which may contain cartoon or fantasy violence, with games rated as M (recommended for those age 17 and older because of mature content), which likely contain graphic violence, may yield different results than would comparisons of M-rated games with games matched on other characteristics (such as high levels of action and rapid rates of pacing) with no violence.

The issues with using the ESRB ratings as an indicator of violent content speak to the larger issues surrounding the definition and distinction of violent acts in video games. Those studies that do not use only the ESRB rating rely on a personal judgment—of the participant, the pilot participants, or the experimenter—to describe the perceived level of violence in the stimulus games. Game violence itself is not well defined in these paradigms: Although it appears that violence requires the target to be animate, studies have inconsistently defined actions taken during the course of a sport's game play (tackling, kicking, boxing) or those "clearly" outside the realm of reality as violent actions. Furthermore, levels and kinds of violence are not well differentiated and are not innately or quantitatively hierarchical (stabbing is not inherently worse than shooting, etc.).

This definitional problem has undoubtedly colored the research findings of this field. Game violence should be better and more uniformly operationalized

in order to increase our understanding of the impact of violent video game use. This is an empirical concern that can be addressed through research.

The research would also benefit from contextualization of the findings on the basis of the level and qualities of violence in a game within the broader framework of the violent game market. That is, we would benefit from knowing how the games that are used in the research compare with the most popularly played games.

Despite these concerns, given the widespread acceptance of ESRB ratings within the field, we determined that the ratings offer an acceptable approximation of game violence for the purpose of reviewing the existing literature. Although ESRB ratings are not entirely objective or focused on violence, they are independent of the experimenter's judgment. They do not separate out other content markers, nor do they adequately differentiate between different levels and types of violence; however, violence appears to be the most prevalent factor in a game's rating.

Causality and ethical conduct of research

Although valid methodology for establishing causality, and, indeed, even the definition of causality, are not firmly settled issues (see, e.g., Pearl, 2009), the randomized clinical trial is generally taken to be the ideal standard in many areas of empirical research with human and animal participants. This design is characterized by the random assignment of participants to various experimental conditions and optimally features large samples and controls for various third factors that might have an impact on the causal influence of the target variable. Well-executed and well-replicated randomized clinical trials are generally taken as the only research design from which causality can be unconditionally inferred. APA's "Reporting Standards for Research in Psychology: Why Do We Need Them? What Might They Be?" provides a comprehensive review of this type of experimental paradigm (APA Publications & Communications Board Working Group on Journal Article Reporting Standards, 2008).

However, ethical constraints in exposing participants, especially children and teens, to harmful stimuli, difficulty in controlling exposure due to the widespread nature of modern media, difficulty offering meaningful levels of exposure in laboratory settings, and the ever-present challenge of obtaining large samples limit the feasibility of randomized clinical trials in this domain.

Given the ethical and pragmatic realities, it is unlikely that it will be possible to conduct definitive studies that can establish causality. This is similar to the limitations on other research addressing violence and abuse as well as other harmful behaviors such as smoking tobacco. Moreover, randomly controlled trials may suffer from limitations such as selection bias. We must therefore ask what we might expect and find useful for inferring causality. Convergence of results across multiple methods, multiple samples, and multiple researchers, creating a collective body of scientific inquiry yielding similar results, is an accepted method for inferring causality in behavioral science.

How strong is the evidence for causality?

The most common empirical finding of a bivariate cross-sectional correlation between violent video game use and aggressive behavior can be misleading about any causal relation, due to possible common association with a third variable or backward causation. Three methods were found across studies to constrain these alternate possibilities. First, some of the studies included covariates that might account for a spurious correlation, such as gender, age, and prior level of aggressiveness. We found that although inclusion of these covariates in general lowered the remaining effect size, they did not fully account for the relation between violent video game use and aggressive behavior. We noted that although this empirical strategy is appropriate, it is never conclusive because the possibility always looms of an unmeasured third variable that causes both violent video game use and aggressive behavior, rendering the correlation spurious.

The second method used was a laboratory experiment in which individuals are randomly assigned to exposure to violent video game use (or not) for a period of time or sessions and then observed for impact on aggressive outcomes. This method provides uniform evidence of a causal impact on the aggressive outcomes measured at a magnitude similar to the overall effect size reported previously. Although this method provides the strongest evidence in all of science for the impact of a factor on an outcome, in the current context conclusions from the experimental literature are tempered by the limited ecological validity of the independent and dependent variables. Specifically, because the independent variable is typically a directive by an authoritative adult to engage in violent video game use in a university laboratory (which differs from self-selected violent video game use in one's natural environment), the participant might be induced to demonstrate the impact that the participant infers the researcher desires (the so-called demand characteristic effect on compliance). However, the small dose received in the laboratory is likely to have a smaller impact than the actual dose received by individuals across their lifetime.

Regarding the dependent variable, the measures typically used in laboratory experiments are self-reports or directly observed measures of aggression in a simulated or game context (such as delivering hot sauce to an opponent) that have limited generalizability to outcomes of real-world interest. We concluded that the laboratory experiments are an important but not conclusive component of the array of empirical evidence.

The third method used was longitudinal inquiry across years of time, in which causal interpretations are constrained by temporal precedence, covariates are measured, the independent variable of violent video game use is measured contemporaneously, and ecologically valid dependent variables are measured over time. This method was used in several more recent studies that found similar effect sizes, as noted previously. The limit of this method is that unmeasured third variables could account for any empirical relation.

No single method or study is conclusive in this field. One method's limits are offset by another method's strengths. The conclusions we reached are based on the combination of methods used across studies performed in multiple countries by multiple disciplines and multiple unique researchers. We note that our strategy of inference based on a combination of studies using complementary methods has been well documented in many fields of public health science. On the basis of the body of empirical evidence, we concluded that the impact of exposure to violent video game use on aggressive outcomes is robust.

Applicability to U.S. population

The U.S. population is becoming more racially and ethnically diverse with each passing decade. Census 2000 (U.S. Census Bureau, 2013) and Census 2010 (U.S. Census Bureau, n.d.) attested to that fact. In a national sample, Hispanic and African American youths ages 8–18 were also reported to spend significantly more time playing video games on a typical day than their Caucasian counterparts (1:35, 1:35, and 0:56 hours:minutes per day, respectively; Rideout et al., 2010).

Not surprisingly, then, we were struck by how few of the research studies with children, adolescents, or adults included ethnically diverse samples, even with the review of more recent studies. One exception (Ferguson, Garza, Jerabeck, Ramos, & Galindo, 2013) included an adolescent Latino sample from the Southwest. Most of the studies failed to report race/ethnicity of participants or, if they did, it was not a factor in the analyses. Also missing from the literature was any analysis of the effects of SES on the association of violent video game use with aggressive outcome. Given the sparse attention to race/ethnicity or its interactions with social class differences, we have to question the representativeness of the study samples to the U.S. population as we currently know it. Because racial/ethnic minority status combined with poverty can be a risk factor for aggression, future studies of violent video game use, especially with children and adolescents, should make concerted efforts to recruit more diverse samples. From a public health perspective, it is critically important to know whether any negative effects of exposure to violent video games are magnified in youths who are vulnerable because of their racial/ethnic background, SES, or both.

Treatment of gender

The potential differential influence of violent video game use on males and females remains a question in the current literature. All-male samples or statistical controls for gender were used in more than half of the recent studies in our sample, potentially obscuring differences in how males and females might react after exposure to violent video games. Because males typically engage in more physical aggression than females (FBI, 2013; Hamby et al., 2013), it is important to examine the impact of video game violence for both genders separately, particularly in relation to different kinds of aggression-related dependent variables (i.e., heightened aggressive behavior, aggressive cognition, arousal, and reduced prosocial behavior and empathy). Future research is needed in this area.

Other factors

Researchers have begun to explore game characteristics other than violence as an explanation of the link between violent video game use and aggression. Competition, in particular, has been put forth as an alternative reason for aggression (see Adachi & Willoughby, 2011). When gamers compete with one another, an element of that competition can involve aggressive conduct toward another player for the goal of winning. Such behaviors should be less likely to occur when cooperative game play occurs, even when the aggressive content is part of the game, because teamwork requires people to work with one another to win the game. Competition, then, may provide an independent influence on aggressive outcomes after playing aggressive video games. The literature on competition as the underlying causal component of the apparent link between violent game use and aggression is still nascent and is not currently substantial enough to influence, on its own, an objective assessment of the broader violent video game research.

The impact of exposure to violent video game use on aggressive outcomes is robust.

Other game characteristics, such as plots with morals and the use of salient formal production features to convey content, have rarely been considered in this literature. Although violent video game research has sometimes examined what is called program pacing, the term pacing is used differently in this research than it had been in the earlier research, which defined it as the rate of scene and character change (Wright et al., 1984). In the violent video game literature, pacing is used for what has traditionally been defined as action (i.e., the level of physical movement on the screen). Terms need to be used consistently across different kinds of media literature to avoid confusion. Because earlier research addressing video content demonstrated that these characteristics influence player engagement, exploring the role of game characteristics in determining the impact of violent video game use on aggressive outcomes would be an important direction for future research.

SUMMARY

On the basis of our review of the literature directly addressing violent video game use, we concluded that violent video game use has an effect on aggression. This effect is manifested both as an increase in negative outcomes such as aggressive behavior, cognitions, and affect and as a decrease in positive outcomes such as prosocial behavior, empathy, and sensitivity to aggression. Although additional outcomes such as criminal violence, delinquency, and physiological and neurological changes appear in this literature, we did not find enough evidence of sufficient utility to evaluate whether these outcomes are affected by violent video game use. To the extent that other known risk factors of aggression are examined as covariates in this literature, these factors do not account for all of the variance in the link between violent video game use and aggressive outcomes.

We have determined that the evidence is sufficient to indicate that these effects appear in older children, adolescents, and young adults; however, there is a dearth of studies that have examined these effects in children younger than age 10 or that have attempted to examine the developmental course of the effects. In addition, we are concerned that the samples examined in these research studies are not representative of contemporary U.S. demographics. Because many studies do not even report—much less analyze—sample characteristics such as ethnicity, SES, or, to a lesser extent, gender, potentially vulnerable populations have not been examined.

No single risk factor consistently leads a person to act aggressively or violently. Rather, it is the accumulation of risk factors that tends to lead to aggressive or violent behavior (Berkowitz, 1993; Eron, Huesmann, Lefkowitz, & Walder, 1974; Ferguson et al., 2013). Each risk factor increases the likelihood of such negative behavior (Sameroff, Bartko, Baldwin, Baldwin, & Seifer, 1988). The research reviewed here demonstrates that violent video game use is one such risk factor.

Interpretation of the finding of an effect of violent video game use on aggression must be embedded in a context that asks: What cost is necessary to produce (or prevent) the effect? Costs to eliminate the effect might be measured in the creation of more informative ratings, media literacy education, or dollars. Reasonable people can disagree about the value placed on these costs weighed against the benefit of preventing the effect, within the constraints of law and public health. Our society regularly takes action to limit harms before legal sanctions are applied and in public health before action is taken. The findings reported here should be regarded as scientifically sound. The next step is for stakeholders (e.g., legal system, public health and other professional practitioners, the video game industry, parents) to decide what actions should be taken in light of the effect and the costs and benefits of each option. One course of action for APA that this task force unanimously endorses is to provide public education about the results of scientific inquiry in this field so that various stakeholders can make informed choices.

We concluded that violent video game use has an effect on aggression. This effect is manifested both as an increase in negative outcomes such as aggressive behavior, cognitions, and affect and as a decrease in positive outcomes such as prosocial behavior, empathy, and sensitivity to aggression.

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APPENDIX A
Publications for Systematic Evidence Review[A1]

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[A1]Asterisks (*) denote articles coded for study characteristics. Daggers (†) denote articles included in the systematic evidence review.

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APPENDIX B
Characteristics Coded in the Systematic Evidence Review

The studies included in the systematic evidence review were coded for the following characteristics:

Age
Grade
Gender
Number of participants
Country of origin of study
Ethnicity, race, or origin of participants
Socioeconomic status
Research design
- Experimental or observational study
- Cross-sectional or longitudinal

Delay between exposure and testing
- Present or not
- Analyzed or not

Analytic approach
- Group means comparison, correlational, modeling, other

Summary statistics available
Amount of exposure to violent video games
- Time of play
- Number of play incidents

Measure of intensity of violence in violent video game
- Entertainment Software Rating Board rating available
- Participant report
- Rater report

Measure of intensity of violence in comparison game
- Is there a comparison game?
- Entertainment Software Rating Board rating available
- Participant report
- Rater report

Outcomes
- Aggressive behaviors
  - Experimental proxy
  - Physical aggression
  - Verbal aggression
  - Relational aggression
  - General or composite aggression
- Aggressive cognitions
- Aggressive affect
- Physiological measures
- Neurological measures
- Prosocial behaviors
- Reduced empathy or desensitization
- Delinquency
- Criminal violence
- Clinical symptomatology
- Other

Other game characteristics
- Interactivity
- Perspective (first person or third person)
- Cooperation or collaboration
- Competition
- Realism

Environmental risk factors for aggression
- Family violence or abuse
- Peer violence
- Social reputation (peer or teacher nomination)
- Neighborhood violence
- Learning disability
- IQ
- Low academic achievement
- Foster care
- Drug use
- Teen parent
- Parental divorce
- Low parental involvement or monitoring

Deception detection
Participant source
Participant payment
Note/other