

Video Games Do Indeed Influence Children and Adolescents' Aggression, Prosocial Behavior, and Academic Performance: A Clearer Reading of Ferguson (2015)

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Abstract

Psychological scientists have long sought to determine the relative impact of environmental influences over development and behavior in comparison with the impact of personal, dispositional, or genetic influences. This has included significant interest in the role played by media in children's development with a good deal of emphasis on how violent media spark and shape aggressive behavior in children and adolescents. Despite a variety of methodological weaknesses in his meta-analysis, Ferguson (2015, this issue) presents evidence to support the positive association between violent media consumption and a number of poor developmental outcomes. In this Commentary we discuss this meta-analytic work and how it fits into a broader understanding of human development.

Keywords

child development, video games, media effects, meta-analysis

A fundamental theme in the study of child and adolescent development is the relative influence of the environment, as compared with the influence of genetics or related factors located within individuals. The tension created by concerted efforts to understand the myriad factors that shape development has been generative and provocative. For example, based on early findings from behavioral-genetic research, Scarr (1992) put forth the tantalizing proposal that parents need only create a “good enough” environment for their children, given the destiny of genetic heritability and the more or less unidirectional impact of individuals on determining their own environments. Reaction was quick and decisive, with Baumrind (1993) noting that parents absolutely could optimize their children's development through active, purposeful efforts. This sort of discourse most certainly led to the current state of affairs in popular culture, in which parenting is cast as the opportunity to maximize children's positive outcomes through careful and consistent management of their experiences at home, in schools, and in the broader community.

Possibly more than any other environmental factor in a child's social ecosystem, parents and other caregivers

can exert considerable influence over children's access to and consumption of media—especially younger children. Starting at very young ages and continuing through adolescence, children in contemporary society spend substantial amounts of time with media in many forms. The mass media have been with us, for better or for worse, for decades, and psychologists have consistently answered the call to investigate and attempt to understand the many ways in which children's exchanges with various forms of media might affect their well-being. Since the 1960s, when Leonard Eron first reported his serendipitous observation that children who preferred television programs characterized by violence were likely to behave more aggressively than their peers (Eron, 1963), there has been significant interest in the effects of violent media in particular on child development. By now, of course, interest in the impact of media on

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children has expanded considerably to include all types of media and all types of content.

It certainly is the case, like just about every other source of environmental influence that has been studied, that media influence children. Perhaps unique among social influences, media permeate every layer of Bronfenbrenner's (1979) well-known ecological model of human development given that children now can access media at home, in school, in the community, and just about everywhere else with smartphone technology. Thus we can ask a simple common-sense sort of question: Why wouldn't something that is literally everywhere impact children in some way? From the research, we know that children learn from educational television shows and computer games; we know that video games can enhance children's hand-eye coordination; we know that news reports of violent and traumatic real-life events can increase children's stress and anxiety; and we know that violent video games, television shows, and films increase children's aggressive behavior. We know this from numerous original studies that have controlled for a variety of potential confounds and that still find these effects. These conclusions also have found support among meta-analytic reviews summarizing the research findings. The effects that have been reported across media types and across child outcomes have been coherent from study to study and consistent with contemporary theorizing.

But now, at least with respect to video games, it would appear that according to Ferguson (2015, this issue), perhaps we actually do not know those things. Ferguson has essentially concluded that video games do not affect children in any negative fashion, despite affirming the positive effects of video games in an earlier piece (Ferguson, 2010). Ferguson reports that video games do not significantly increase children's aggression, do not reduce their prosocial behavior, do not affect their academic performance, do not relate to their depressive symptoms, and do not increase their attention deficit symptoms.

These are striking claims! But they are not claims that can be taken seriously, because they do not emanate from an appropriately conducted meta-analytic investigation. Aside from considerable problems with the collection of studies, coding of effects, and presentation of appropriate information about those studies and effects, Ferguson's reliance on controlled (partial) effect sizes is simply unacceptable. This is because it has been established in previous meta-analytic work that "partial correlations are not used in meta-analyses because the statistical theory underlying meta-analytic procedures assumes that one is working with raw (zero-order) correlations" (Anderson et al., 2010, p. 159). It is important to note that the Anderson et al. (2010) meta-analysis included some partial effects analysis in order to demonstrate explicitly that

even with overly conservative procedures—that is, methodological procedures that overcorrect for potential confounds (see Prot & Anderson, 2013)—the effects of violent video games on a host of aggression-related outcomes do not disappear.

Still, Ferguson reports the unreliable and invalid estimates from his analysis of partial effect sizes. Conveniently, the partial effect sizes support an otherwise unfounded claim that Ferguson and others have made numerous times previously—that violent media have no untoward impact on children. Not only does this contradict decades of sound research regarding violent media effects, but these partial effect size estimates cannot be taken at face value because they represent the result of incorrectly applied statistical techniques. In fact, as a whole, Ferguson's meta-analysis falls far short of the standards for meta-analysis set by recognized authorities on the subject (e.g., the American Psychological Association's Meta-Analysis Reporting Standards [MARS]; American Psychological Association, 2010; Cooper, 2010). To make matters worse, the statistical controls applied to Ferguson's effect sizes are inappropriate. Among the known effects of violent media use, as shown in longitudinal studies, is the development of habitually aggressive behavior or aggressive personality tendencies. By controlling for a measure of trait aggression in cross-sectional studies, one is essentially partialling out the effect of one dependent variable from the target dependent variable! The only exception to this problem is if the controlled measure of trait aggression is not susceptible to change (e.g., the presence of a genetic marker linked to trait aggression).

Errors such as these are so plentiful in Ferguson's meta-analysis that the space limitations preclude us from addressing them all. But let us assume for the moment that Ferguson's meta-analysis was otherwise conducted in good faith and accurately. Let us consider instead what Ferguson reported in terms of the more generally acceptable bivariate effect sizes.

When considering the appropriate bivariate correlations, Ferguson's findings are remarkably similar to those reported in previous meta-analyses on the subject. In 2001, Sherry reported an effect size of $r = .15$ among 25 studies of the violent video game effect on aggression. The same year, Anderson and Bushman (2001) found the average effect size to be $r = .19$ ($K = 33$), followed by an updated effect size of $r = .20$ reported by Anderson in 2004 ($K = 32$, after dropping some studies that did not meet newly applied best practices criteria) and $r = .22$ by Anderson et al. (2004; $K = 38$). In two previous meta-analyses conducted by Ferguson himself, effect sizes of $r = .22$ ($K = 13$; Ferguson, 2007b) and $r = .14$ ($K = 17$, Ferguson, 2007a) were reported, though this second figure included unreliable and invalid estimates from partial correlations when they were available. In the largest

meta-analysis on the subject to date, Anderson et al. (2010) observed an effect of violent video game use on aggressive behavior of $r = .24$. More recently, Greitemeyer and Mügge (2014) observed an effect of $r = .19$.

Remarkably, Ferguson manages to discuss his findings in a manner that blithely ignores the decidedly similar size of these effects in comparison with his own analysis. If we assume that Ferguson's meta-analytic procedures were correct save for the use of partial effect sizes (though they were not), we might conclude from his Table 4 that violent video games do indeed impact aggression ($r = .17$, $K = 48$), prosocial behavior ($r = -.15$, $K = 16$), and academic performance ($r = -.11$, $K = 7$). General video game exposure (not limited to violent games) showed similar effects. These effects are, of course, modest, but they are certainly in line with what has been reported by other studies.

So where do we go from here? Certainly Ferguson's present study, along with other recent meta-analytic summaries, support the basic role of media as one of many sources of environmental risk in the broader risk matrix to which children may be exposed (see Boxer, Huesmann, Bushman, O'Brien, & Mocerri, 2009). Media influences are increasingly acknowledged as relevant to theorizing about the multiplicity of environmental risk factors that impact children's development. Thus, per the Institute of Medicine's (1994) general approach to prevention research, media as a source of risk can and should be on the agenda for interventions geared toward promoting positive development and reducing children's risk exposure. What comes next for psychologists in this context should be understanding at a finer degree of detail precisely how transactions with media become problematic for children—not just the what (e.g., violent games) and how much (e.g., frequency), but also the when, where, and with whom.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

References

- American Psychological Association. (2010). *Publication manual of the American Psychological Association* (6th ed.). Washington, DC: Author.
- Anderson, C. A. (2004). An update on the effects of playing violent video games. *Journal of Adolescence*, 27, 113–122.
- Anderson, C. A., & Bushman, B. J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. *Psychological Science*, 12, 353–359.
- Anderson, C. A., Carnagey, N. L., Flanagan, M., Benjamin, A. J., Eubanks, J., & Valentine, J. C. (2004). Violent video games: Specific effects of violent content on aggressive thoughts and behavior. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 36, pp. 199–248). Bradford, United Kingdom: Emerald.
- Anderson, C. A., Shibuya, A., Ihori, N., Swing, E. L., Bushman, B. J., Sakamoto, A., . . . Saleem, M. (2010). Violent video game effects on aggression, empathy, and prosocial behavior in Eastern and Western countries: A meta-analytic review. *Psychological Bulletin*, 136, 151–173.
- Baumrind, D. (1993). The average expectable environment is not good enough: A response to Scarr. *Child Development*, 64, 1299–1317.
- Boxer, P., Huesmann, L. R., Bushman, B. J., O'Brien, M., & Mocerri, D. (2009). The role of violent media preference in cumulative developmental risk for violence and general aggression. *Journal of Youth & Adolescence*, 38, 417–428.
- Bronfenbrenner, U. (1979). Contexts of child rearing: Problems and prospects. *The American Psychologist*, 34, 844–850.
- Cooper, H. (2010). *Applied Social Research Methods Series, Vol. 2: Research synthesis and meta-analysis: A step-by-step approach* (4th ed.). Thousand Oaks, CA: SAGE.
- Eron, L. D. (1963). Relationship of TV viewing habits and aggressive behavior in children. *The Journal of Abnormal and Social Psychology*, 67, 193–196.
- Ferguson, C. J. (2007a). Evidence for publication bias in video game violence effects literature: A meta-analytic review. *Aggression and Violent Behavior*, 12, 470–482.
- Ferguson, C. J. (2007b). The good, the bad and the ugly: A meta-analytic review of the positive and negative effects of violent video games. *Psychiatric Quarterly*, 78, 309–316.
- Ferguson, C. J. (2010). Blazing Angels or Resident Evil? Can violent video games be a force for good? *Review of General Psychology*, 14, 68–81.
- Ferguson, C. J. (2015). Do Angry Birds make for angry children? A meta-analysis of video game influences on children's and adolescents' aggression, mental health, prosocial behavior, and academic performance. *Perspectives on Psychological Science*, 10, 646–666.
- Greitemeyer, T., & Mügge, D. O. (2014). Video games do affect social outcomes: A meta-analytic review of the effects of violent and prosocial video game play. *Personality and Social Psychology Bulletin*, 40, 578–589.
- Institute of Medicine. (1994). *Reducing risks for mental disorders: Frontiers for preventive intervention research*. Washington, DC: National Academies Press.
- Prot, S., & Anderson, C. A. (2013). Research methods, design, and statistics in media psychology. In K. Dill (Ed.), *Oxford handbook of media psychology* (pp. 109–136). New York, NY: Oxford University Press.
- Scarr, S. (1992). Developmental theories for the 1990s: Development and individual differences. *Child Development*, 63, 1–19.
- Sherry, J. L. (2001). The effects of violent video games on aggression. *Human Communication Research*, 27, 409–431.