

ORIGINAL ARTICLE

**Violent Movies and Severe Acts of Violence:
Sensationalism Versus Science**Patrick M. Markey¹, Juliana E. French¹, & Charlotte N. Markey²

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Violent media has often been blamed for severe violent acts. Following recent findings that violence in movies has increased substantially over the last few decades, this research examined whether such increases were related to trends in severe acts of violence. Annual rates of movie violence and gun violence in movies were compared to homicide and aggravated assault rates between the years of 1960 and 2012. Time series analyses found that violent films were negatively, although nonsignificantly, related to homicides and aggravated assaults. These nonsignificant negative relations remained present even after controlling for various extraneous variables. Results suggest that caution is warranted when generalizing violent media research, conducted primarily in laboratories and via questionnaires, to societal trends in violent behavior.

Keywords: Violent Media, Homicide, Film, Violence, Assault.

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... an estimated 10% to 30% of violence in society can be attributed to the impact of media violence.

—Strasburger (2007), commentary in *Pediatrics*.

... high exposure to media violence is a major contributing cause of the high rate of violence in modern U.S. society.

—Craig Anderson (2000), testimony before the U.S. Senate Commerce Committee on the impact of interactive violence on children.

A recent analysis published in the journal *Pediatrics* found that violence in the top grossing movies has increased substantially over the past 50 years. Perhaps even more troubling is that gun violence in films is now as prevalent in PG-13 movies as it is in R-rated movies (Bushman, Jamieson, Weitz, & Romer, 2013). The authors of this study argued that such violent portrayals in cinema provide individuals with “scripts for using guns,” even noting that during many real-world shooting sprees the perpetrators seem to dress as if “following a script from a movie”

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(Bushman et al., 2013, p. 1015). Consistent with this concern, these authors suggest that the apparent rise in school and other public shootings coincides with the increase in violent films (France-Presse, 2013), even arguing that violent films might cause “a lot of kids” who lack parental guidance to act in a manner similar as the Aurora, Colorado shooter, James Holmes¹ (Romer, 2013). Although such claims are troubling, whether these observed trends in violent films and gun violence in PG-13 films are actually related to trends in severe acts of violence is unclear.

The research by Bushman et al. (2013) did not examine any potential negative outcomes related to the trends they found in violent films; instead, their conclusions linking violent films to trends in violent behavior were based on previous research examining other forms of violent media. For example, bivariate meta-analyses have tended to find that the average effect sizes (i.e., Pearson r) yielded from studies linking violent video games to concurrent assessments of aggressive behaviors range between $r = .14$ and $.21$ (Anderson & Bushman, 2001; Anderson et al., 2010; Ferguson, 2007; Sherry, 2001). When examined longitudinally, this effect decreases ($r = .07$), but still remains significant (Anderson et al., 2010). Some scientists have noted that a number of studies have failed to find a link between violent media and aggression (cf., Adachi & Willoughby, 2011; Ballard, Visser, & Jocoey, 2012; Ferguson et al., 2008; Przybylski, Deci, Rigby, & Ryan, 2013; Tear & Nielsen, 2013) and the effect sizes yielded by meta-analyses are extremely small (Ferguson, 2007). However, other researchers have argued that such effect sizes are substantial, even contending that the negative effect of violent media on public health is analogous to the causal relationship between smoking and lung cancer (Bushman & Anderson, 2001).

Researchers who believe that the small effects observed between violent media and aggression are substantial and have reasoned that society should be extremely concerned even if violent media only adversely affects a small proportion of the population. For example, Bushman and Anderson (2001) noted that, “It takes only one or two affected students to wreak murderous havoc in a school as demonstrated in recent years. . . .” These researchers further point out that if 10 million people were exposed to violent media, and if only 1% were negatively impacted, there would be 100,000 additional aggressive and violent acts. Using this logic, the selling of over 40 million tickets for the 2012 violent film *Marvel’s The Avengers* might have resulted in over 400,000 additional violent acts. If such a number is even remotely accurate, the fact that the top five violent films in 2012 sold over 250 million tickets should be of grave concern.

Consistent with this reasoning, some scholars have generalized the results of laboratory and questionnaire studies to specific horrific acts of violence, such as school shootings, or to general trends in violence (cf. Anderson, 2000; Huesmann & Taylor, 2006; Strasburger, 2007). This link is nowhere more apparent than the first two sentences of the American Academy of Pediatrics, 2009 policy statement on media violence:

Although shootings in schools around the world periodically prompt politicians and the general public to focus their attention on the influence of media violence, the medical community has been concerned with this issue since the

1950s. The evidence is now clear and convincing: Media violence is one of the causal factors of real-life violence. . . (American Academy of Pediatrics, 2009)

In what would be one of the most important public health findings in the past 50 years, some have argued that the public health risks associated with the exposure to violent media is as substantial as the health risks posed by smoking cigarettes and is an even a greater threat than the effect of calcium deficiency on bone mass, asbestos inhalation on related cancers, lack of condom use on HIV infection, and exposure to lead and IQ scores in children (cf., Anderson & Warburton, 2012; Bushman & Huesmann, 2001).

Not surprisingly, researchers who share this belief often suggest that controlling or limiting access to violent media will make our society safer (cf., Anderson et al., 2003; Bushman, 2013a, 2013b). Even in peer reviewed empirical research articles, authors often reference real world violence to substantiate the rationale of their research. Among the research articles cited in a recent meta-analysis examining the effects of violent media (Anderson et al., 2010), 28% of the studies discussed severe forms of violence, most often within the introduction or abstract of the article.² Of these studies, 42% presented their research in the context of the Columbine High School shooting with the remaining discussing other school shootings (e.g., the Heath High School shooting, Westside Middle School shooting, etc.), homicide rates, and terrorism, including the September 11th attacks on the World Trade Center and the Pentagon.

Various psychological theories and models have been proposed to understand how violent media might encourage violent acts (e.g., social learning theory, arousal theory, etc.). However, one model, has garnered considerable attention: the General Aggression Model (Bushman & Anderson, 2002). The General Aggression Model proposes that the link between exposure to violent media and violent behavior is mediated by one's cognition. At its most basic level, the General Aggression Model is an extension of social modeling theory and Berkowitz's (1990) cognitive-neoassociation model of aggression. The General Aggression Model suggests that exposure to situational cues (e.g., a gun in a violent PG-13 movie) activates ideas with similar meanings to the cue (e.g., shooting, bullets, etc.), which in turn activates associated ideas (e.g., murder, kill, etc.) and violent acts. According to this model, when an individual is exposed to violent films he or she will become more prone to violent behavior with repeated exposure fundamentally "change[ing] the individual's personality" (Anderson & Dill, 2000, p. 774).

One limitation of studies examining violent media is that very little research has actually examined severe forms of violent behavior, but instead utilized questionnaire and laboratory-based designs that assess proxy measures of violence. As noted by Huesmann and Taylor (2006) most research in this area has examined either hostile thoughts or aggressive behaviors, which include both physical and nonphysical acts ranging from insulting to pushing or shoving others. Little research has actually examined severe violent behaviors, which are acts that pose a *significant* risk of serious injury to victims.

For example, researchers have found that individuals who were exposed to violent media were more likely to subject others to unpleasant noise “blasts” (i.e., a loud and irritating sound; Anderson & Dill, 2000), reported feeling more hostile on a questionnaire (Markey & Scherer, 2009), endorse aggressive thoughts on a questionnaire (Anderson & Dill, 2000), and gave hot sauce to hypothetical individuals who did not like spicy food (Barlett, Branch, Rodenheffer, & Harris, 2009). Research has also found that preschool children and teens who are exposed to violent television are more likely to express interpersonal aggression on the playground and around their friends (Joy, Kimball, & Zabrack, 1986; Lefkowitz, Eron, Walder, & Huesmann, 1972; Singer & Singer, 1981; Steuer, Applefield, & Smith, 1971). Although such research suggests a link between violent media and relatively minor forms of aggression, whether these results generalize to severe forms of violent behaviors, such as homicides and aggravated assault, is unclear.

To examine severe forms of violent behavior, media researchers and others have stressed the importance of examining criminal data (Anderson, 1987; Anderson, Bushman, & Groom, 1997; Curran & Scarpitti, 1991; Garmaise & Moskowitz, 2006; Markey, Markey, & French, 2014; Raphael & Winter-Ebmer, 2001). The use of such data is often imperative for researchers who want to examine predictors of homicide or aggravated assault as it is practically impossible to investigate such outcomes in a laboratory setting.

For example, in an earlier research article, Brad Bushman, the primary author of the *Pediatrics* (2013) paper, also investigated criminal data to identify predictors of severe acts of violence. In this study Anderson, Bushman, and Groom (1997) found that trends in temperature were related to trends in violent crime (e.g., homicide and aggravated assault) between the years of 1950 and 1995. What is perhaps most impressive about this study is, although violent behavior has a multitude of causes, the effect of heat was strong enough to express itself in real forms of violent behavior. By linking temperature to the changes in violent behavior across time the authors of this study concluded that the “heat effect is real and significant when applied to large populations.” (Anderson et al., 1997, p. 1222). Unfortunately, similar analyses were not reported to establish whether violent films and gun violence in PG-13 films have a “real and significant” relation with trends in violent criminal behavior.

Current study

The current study sought to fill this research void by examining the relations among violence and gun use trends in films and gun-related homicides, homicides, and aggravated assaults. Specifically, three sets of analyses were conducted to provide the best possibility of detecting links between violent films and severe forms of violent behavior. In the first analyses, simple correlations were computed between annual ratings of violence in films and annual reports of homicide and

aggravated assault rates in the United States. These analyses supply information concerning the overall amount of covariation between violent films and violent crime.

One potential issue with examining simple correlations between time series data is that the raw data often contain trends and considerable amounts of autocorrelation, indicating that an observation for a given time period is correlated with past time periods (Sadler, Ethier, Gunn, Duong, & Woody, 2009; Warner, 1998). This is problematic because autocorrelations within a time series often lead to spurious correlations between two time series (Warner, 1998). Therefore, in the second set of analyses, trends and autocorrelations were removed from each time series using the Box–Jenkins approach to fit time series data to an autoregressive integrated moving average (ARIMA) statistical model (a process called prewhitening; Box, Jenkins, & Reinsel, 2008). Residuals from the resulting ARIMA models were correlated in order to examine the relation between violent films and violent crime after autocorrelations and trends had been removed from each time series.

The final set of analyses controlled for the effects of five extraneous variables that have previously been related to violent crime: age shifts, poverty, education, incarceration rates, and economic inequality (see LaFree, 1999 for a review). Age shifts refers to the proportion of young individuals in a population (e.g., ages 15–24; Moffitt, 1993) and have been associated with violent crimes (Anderson et al., 1997). Poverty is linked to a weakening of social bonds and an increase in psychological strain, violent subcultures, and criminal motivation (Flango & Sherbenou, 1976). Education is thought to discourage crime by reducing criminal motivation and increasing social control (Elliott & Voss, 1974; LaFree, 1999). The incarceration of criminals serves as a deterrence and incapacitation of individuals likely to commit future criminal acts, and has been linked to a reduction in violent crime (Cantor & Land, 1985). Finally, economic inequality, the unequal distribution of income and resources across residents, has been found to predict violent crime (LaFree & Drass, 1996). In the final analyses, the relation between violence in films, homicide, and aggravated assault were examined while controlling for autocorrelations, trends, and these five extraneous variables.

On the basis of predictions derived from the General Aggression Model, previous meta-analyses examining primarily minor forms of aggression (e.g., Anderson & Bushman, 2001; Anderson et al., 2010; Ferguson, 2007; Sherry, 2001), and speculation from media researchers, we hypothesized that the previously described analyses would yield positive correlations indicating that the years when films were more violent would also exhibit higher rates of violent crime. Additionally, given the dramatic rise Bushman et al. (2013) found in gun violence depicted in PG-13 movies, and the ensuing discussion about the provision of scripts for gun use in these movies, we also hypothesized that changes in gun-related homicides would be positively related to changes in films depicting gun violence.

Method

Data and sources

Overall movie violence and PG-13 gun violence. Bushman et al. (2013) sampled 945 top-grossing films between the years 1950 and 2012. Using trained coders, they were able to achieve a high rate of agreement (Krippendorff's Alpha = .80) as to the occurrence of violence in these films. Using these ratings, the authors computed the annual rate of violent sequences per hour in films (for additional information see Bushman et al., 2013). This methodology provides an assessment of the amount of violence in the most popular movies, not the amount of violence in a random sample of movies during this time period. In addition to overall movie violence, Bushman and colleagues also coded the occurrence of gun usage during violent sequences in films released after 1985, the year the MPAA began employing the PG-13 film rating. As before, raters were able to achieve a high amount of agreement concerning the use of guns in films (Krippendorff's Alpha = .91). Overall movie violence and gun-violence ratings were extracted from figures presented in the original article by Bushman and colleagues using the software WebPlotDigitizer v2.4 (Rohatgi, 2011). This software has been utilized by various researchers (cf., Hauser, Christensen, Heimes, & Kiær, 2013; Oduyayo & Hladunewich, 2012) as an efficient and accurate method for extracting data from figures.

Violent crime rates. The Federal Bureau of Investigation's annual Uniform Crime Reports (UCRs) were used to compute annual homicide and aggravated assault rates. The UCRs contain crime-related statistics from most law enforcement agencies located in the United States, and consist of over 17,000 city, county, state, and federal law enforcement agencies who voluntarily submit data concerning various crimes brought to their attention. For the current analysis the violent crime rates between 1960 and 2012 were obtained from the UCR database. This database, created by both the FBI and the Bureau of Justice Statistics, provides UCR violent crime statistics collected since 1960 (the database can be accessed online via <http://www.ucrdatatool.gov/>). Additionally, to examine whether changes observed in gun violence in PG-13 movies were related to actual gun violence, firearm homicide rates between 1985 and 2011³ were also obtained from the UCR database.

Extraneous variables. The U.S. Census Bureau provided data concerning age shifts, poverty, education, and economic inequality for the years 1960–2012. Age shifts were the annual percentages of residents in the United States between 15 and 24 years of age. Annual poverty rates were represented by the percentage of residents who lived in poverty for a given year. Education was defined as the percentage of residents aged 25 and over who completed high school or college. Economic inequality was assessed via annual calculations of the Gini coefficient (a standard economic measurement of income inequality, Choe, 2008). Finally, annual incarceration rates were obtained from the Bureau of Justice Statistics, which reflected the rate (per 100,000 residents) of sentenced prisoners under jurisdiction of State and Federal correlational authorities.

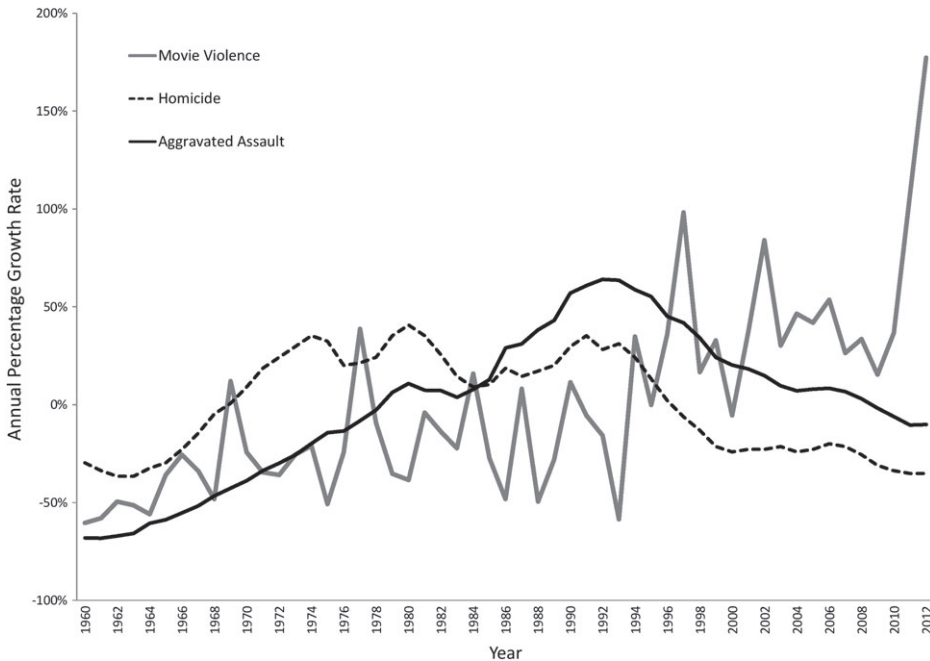


Figure 1 Annual changes in overall movie violence, homicides, and aggravated assaults between 1960 and 2012.

Results

Overall movie violence and violent crime: 1960–2012

Figure 1 displays the annual percentage growth rates (using the mean value for each time series as the base) for violent movies and violent crime. These growth rates are linear transformations of the original time series data and are presented in order to allow all findings to be displayed in a single figure (all of the analyses were conducted using the original time series data). As can be seen in this figure, movies have tended to become more violent over time, and in 2012 were 177% more violent than the mean. In contrast, homicide (–35%) and aggravated assault (–10%) rates were lower than the mean during this same time period. As seen in Figure 2, simple correlations of the raw data revealed that violence in movies was negatively related to homicide rates and positively related to aggravated assault.

However, as stated earlier, these results need to be interpreted with extreme caution as time series data often contain a considerable amount of autocorrelation (Sadler et al., 2009; Warner, 1998). Autocorrelations were removed from each time series using the Box–Jenkins approach to fit time series data to an ARIMA statistical model (Box et al., 2008) by identifying autocorrelations and trends in the data. These models were then used to estimate the parameters for a given time series. By applying resulting ARIMA models to each time series, a set of residuals for each series

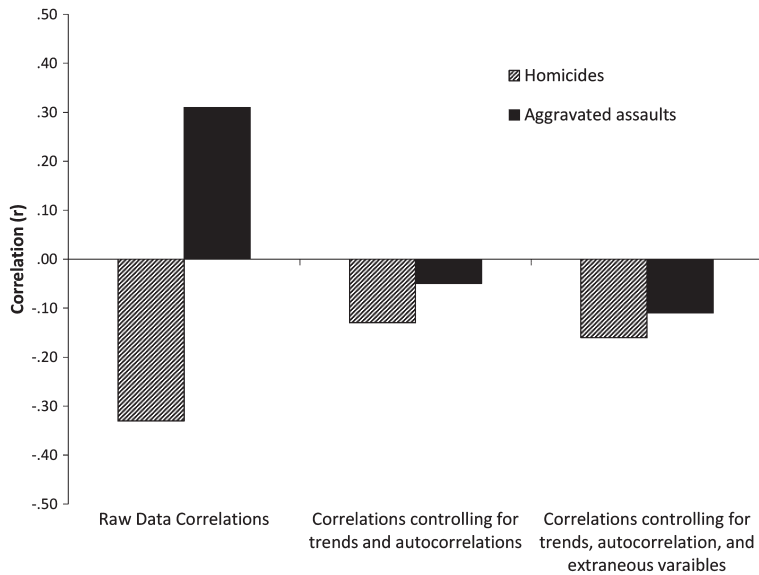


Figure 2 Relations between overall movie violence, homicides, and aggravated assaults.

can be generated, which are free of trends and autocorrelations (a process called prewhitening; West & Hepworth, 1991; for additional information about ARIMA models see Box et al., 2008). Ljung–Box Q tests for white noise residuals revealed that when these models were applied to violent films (Ljung–Box Q at lag 5 = 2.75, $p = .74$), homicides (Ljung–Box Q at lag 5 = 1.20, $p = .95$), and aggravated assault (Ljung–Box Q at lag 5 = .88, $p = .97$) there were nonsignificant autocorrelations among the residuals.

The removal of trends in a time series is especially important, otherwise a spurious relationship may be found between two time series simply because they share similar (or opposite) trends. Stronger evidence of the link between violent films and violent crimes would be provided if deviations from these trends were related to each other. To examine this possibility, the residuals from each of the time series were correlated with each other (see Warner, 1998 and West & Hepworth, 1991, for additional information). As seen in Figure 2, there tended to be *negative*, non-significant, relations between violence in films, homicides, and aggravated assaults.

Finally, the relations between violent films, homicides, and aggravated assaults were examined while controlling for age shifts, poverty, education, incarceration rates, and economic inequality. ARIMA models were created for each control variable by identifying autocorrelations and trends in the data. As before, the resulting ARIMA models were applied to each time series in order to generate a set of residuals which are free of trends and autocorrelations. Ljung–Box Q tests for these prewhitened data revealed that age shifts (Ljung–Box Q at lag 5 = 3.17, $p = .67$), poverty (Ljung–Box Q at lag 5 = 1.37, $p = .93$), education (Ljung–Box Q at lag

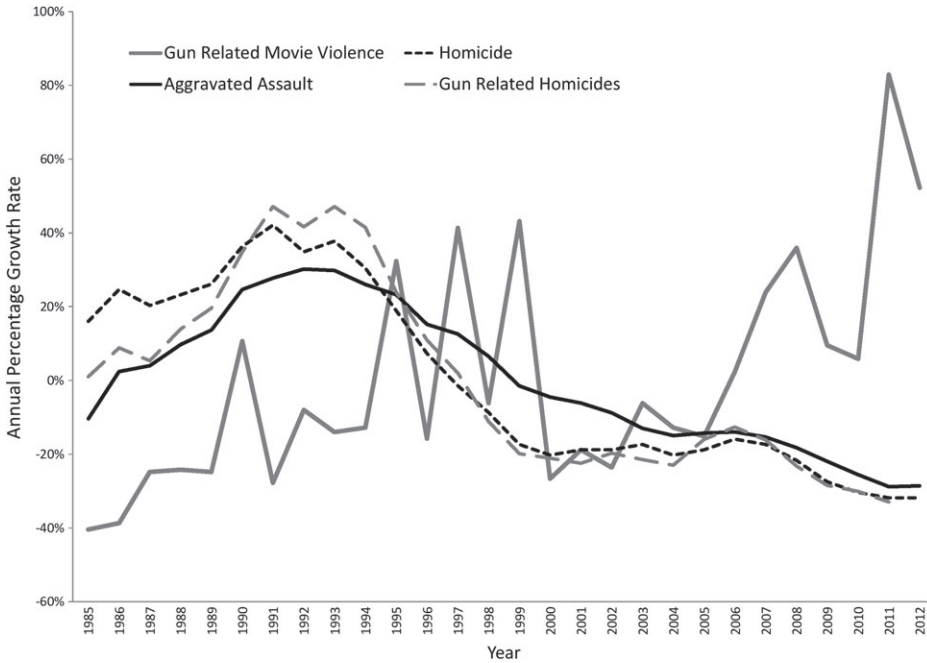


Figure 3 Annual changes in PG-13 gun violence, gun-related homicides, homicides, and aggravated assaults between 1985 and 2012.

5 = 2.31, $p = .81$), incarceration rates (Ljung-Box Q at lag 5 = .21, $p = .98$), and economic inequality (Ljung-Box Q at lag 5 = 4.36, $p = .50$) contained nonsignificant autocorrelations. Partial correlations between the prewhitened assessments of violent films, homicide, and aggravated assault were then computed while controlling for age shifts, poverty, education, incarceration rates, and economic inequality. As seen in Figure 2, both homicide rates and aggravated assault remained *negatively*, but not significantly, related to overall movie violence.

PG-13 gun violence and violent crime: 1985–2012

Figure 3 displays the annual percentage growth rates (using the mean value for each time series as the base) for gun-violent PG-13 movies and the assessments of violent crime. As can be seen in this figure, gun violence in PG-13 movies has dramatically increased over time, peaking in 2011 when films displayed 83% more gun violence than the mean during this time period. In contrast, in 2011, gun-related homicides (–33%), homicide (–31%), and aggravated assault (–29%) rates were lower than the mean during this time period.

As seen in Figure 4, correlations of the raw data revealed that gun violence in movies was negatively related to gun-related homicides, homicides, and aggravated assaults. However, as before, due to the trends and dependency contained within these time series, these findings need to be interpreted with caution. Ljung-Box Q

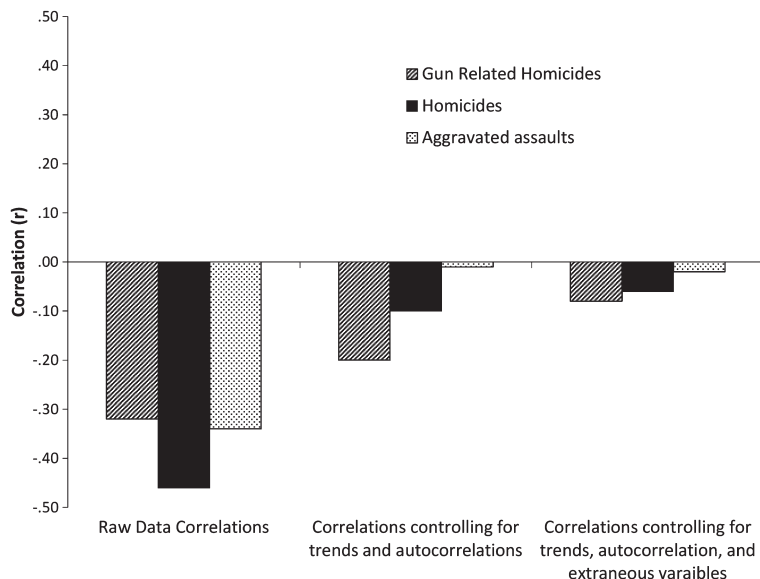


Figure 4 Relations between PG-13 gun violence, gun-related homicides, homicides, and aggravated assault.

tests for white noise residuals revealed that when ARIMA models were applied to gun violence in films (Ljung-Box Q at lag 5 = 1.51, $p = .91$), homicides involving guns (Ljung-Box Q at lag 5 = 2.43, $p = .77$), homicides (Ljung-Box Q at lag 5 = 1.66, $p = .89$), and aggravated assault (Ljung-Box Q at lag 5 = 3.05, $p = .69$) they produced nonsignificant autocorrelations among the residuals. Residuals from each of the time series were then correlated with each other (see Warner, 1998 and West & Hepworth, 1991, for additional information). As seen in Figure 2, after the removal of trends and autocorrelations, there still tended to be *negative*, although not significant, relationships between gun violence in movies, gun-related homicides, homicides, and aggravated assaults.

The relations between gun violence in movies, gun-related homicides, homicides, and aggravated assault were next examined while controlling for age shifts, poverty, education, incarceration rates, and economic inequality. ARIMA models for each of the extraneous variables were able to eliminate significant autocorrelations in age shifts (Ljung-Box Q at lag 5 = 3.57, $p = .62$), poverty (Ljung-Box Q at lag 5 = 3.17, $p = .67$), education (Ljung-Box Q at lag 5 = 3.72, $p = .59$), incarceration rates (Ljung-Box Q at lag 5 = 2.06, $p = .84$), and economic inequality (Ljung-Box Q at lag 5 = .24, $p = .98$). Partial correlations between the prewhitened assessments of gun violence in movies, gun-related homicides, homicides, and aggravated assault were then computed while controlling for age shifts, poverty, education, incarceration rates, and economic inequality. As can be seen in Figure 4, after controlling for autocorrelations, trends, and the extraneous variables there were still *negative*,

nonsignificant, relationships between gun violence in movies, gun-related homicides, homicides, and aggravated assaults.

Discussion

Violence in films has increased substantially over the past 50 years and gun violence in PG-13 movies has more than tripled in the last 27 years. These trends in violent films might be particularly concerning given previous research linking violent media to increases in minor forms of aggression (e.g., subjecting another person to an unpleasant noise), self-reports of aggressive feelings (cf., Anderson & Bushman, 2001; Anderson et al., 2010; Ferguson, 2007; Sherry, 2001), and the observed aggressive behaviors of children (cf., Joy et al., 1986; Lefkowitz et al., 1972; Singer & Singer, 1981; Steuer et al., 1971). On the basis of such research, some scholars have suggested that violent media might even be a contributing factor to severe forms of violent behavior (e.g., school shootings, the Aurora movie theater shooting, etc.), and that exposure to gun violence in the media may make it more likely that individuals will utilize firearms when committing crimes (cf., Bushman et al., 2013). This study sought to examine whether trends in violent films and gun violence in PG-13 films were related to trends in serious violent behavior (e.g., gun-related homicides, homicides, and aggravated assaults). Crime data provided by the FBI for the past 52 years along with the violent content ratings of popular movies released during this time period were examined using time series data analytic techniques.

Contrary to the notion that trends in violent films are linked to violent behavior, no evidence was found to suggest this medium was a major (or minor) contributing cause of violence in the United States. Annual trends in violent films for the past 52 years were unrelated to violent crime. Annual trends in gun violence in PG-13 movies were also unrelated to violent crime and to homicides involving firearms. Caution is always warranted in the interpretation of nonsignificant results as these findings could occur due to problems with the measurement of the research variables or the statistical power of the study (Cozby & Bates, 2011; see Ferguson & Heene, 2012 for a discussion on the importance of null results). However, the methodology used to operationalize either violence in films (reliable judge ratings of films over the past 50 years previously reported in *Pediatrics*) or severe acts of violence (crime statistics provided by the FBI, which have been used in numerous previous studies) seem unlikely to be problematic. Additionally, power was not likely a contributing cause for the inability to find a significant *positive* relationship between violence in films and severe acts of violence as the majority of analyses found *negative* relations between these variables (see Figures 2 and 4).

Although such negative and nonsignificant relations between violent media and violent crime is contrary to most laboratory research examining minor forms of aggression (cf., Anderson & Dill, 2000; Barlett et al., 2009), it is consistent with previous research examining severe forms of violence. One recent meta-analysis of 26 independent samples failed to find a link between violent media and violent

criminal behavior (Savage & Yancey, 2008). Additionally, the popularity of violent television programs has been found to be *negatively* related to rates of severe violence (Messner, 1986).

In the days following the release of popular violent movies, violent crime rates *decrease*. For example, during the opening weekend of the extremely violent film *Hannibal* assaults decreased by 1,056 (a 5.2% decrease; Dahl & DellaVigna, 2009). In a similar manner, homicides have been found to *decrease* in the months following the release of popular violent video games (Markey et al., 2014). The reason for such a link is unclear, but violent media might possibly reduce severe acts of violence because they effectively remove violent individuals from other social venues where they might have otherwise committed a violent act (Felson & Cohen, 1980). In other words, violent individuals might attend a movie, watch television, or play a video game instead of engaging in other activities (e.g., going to a bar, socializing on the streets, etc.) that are more likely to result in a violent altercation.

The interpretation of the results from this study should be considered within the context of the methodological limitations of this study. The sample sizes used in the current study were small—especially concerning the analyses examining gun violence in PG-13 movies. However, as discussed previously, power was not likely an issue for failing to find a significant *positive* relation between violent films and violent behavior. Additionally, the sample used in the current study was the same sample used by others to make conclusions about trends in violent media as well as to generalize these trends to severe acts of violence. We hope that as more movies are released, future researchers will revisit this analysis with a larger sample.

This research is also limited because it only examined several risk factors for violent behavior. Media researchers have often adopted a risk factor approach when discussing the negative effects of violent media and have noted that this approach is similar to the model linking smoking to lung cancer. This model acknowledges there are many risk factors for violent crime, as there are many risk factors for developing lung cancer. Each factor may elevate the risk for a negative outcome, and with enough risk factors it becomes likely a person will act violently or develop lung cancer (Anderson, Gentile, & Buckley, 2007). In other words, although not everyone who smokes will get lung cancer and not everyone who watches a violent movie will become violent, both smoking and violent media are important risk factors. This logic has led media researchers to conclude that violent media has a similar negative effect on public health as does smoking (cf., Bushman & Anderson, 2001).⁴ However, risk factors like smoking are strong enough that as more people have stopped smoking there has been a dramatic decrease in lung cancer rates (Centers for Disease Control and Prevention, 2013). Even the risk factor of temperature has been found to be strong enough that when it becomes just a couple of degrees warmer there is a significant increase in homicides and aggravated assaults (Anderson et al., 1997). Such a pattern does not appear to exist for violent films; as more people have been exposed to violent films and gun-related violence in PG-13 movies, indicators of violent behavior have not increased. Seemingly, a minor temperature change (e.g., going from 57° to 59°) has

a bigger effect on homicides and aggravated assaults than the over 200% increase in violent films which has occurred during the past 50 years. In short, any adverse effects violent films have on violent behavior are either nonexistent or they are dwarfed by the effects of other factors, which make the effects of violent films appear nonexistent.

One final limitation of this study is that it does not allow for the examination of a small minority of the population with preexisting dispositions who might be more adversely affected by violent media. If personality dispositions moderate the negative effects of violent media this could explain why the effect of violent media has been small in laboratory studies (r values = .14 to .21; Anderson & Bushman, 2001; Anderson et al., 2010; Ferguson, 2007; Sherry, 2001), longitudinal studies ($r = .07$; Anderson et al., 2010), and studies examining aggravated assault ($r = -.11$) and homicide trends ($r = -.16$). Although some have rejected the notion that only certain individuals are adversely affected by violent media, arguing that “no one is exempt from the deleterious effects of media violence.” (Anderson et al., 2003; p. 104), there is a growing body of psychological research suggesting that, due to preexisting dispositions, not all individuals are affected by violent media in a similar manner (cf., Arriaga, Esteves, Carneiro, & Monteiro, 2006; Barnes, Malamuth, & Check, 1984; Giumetti & Markey, 2007; Lynn, Hampson, & Agahi, 1989; Markey & Markey, 2010; Markey & Scherer, 2009; Zilman & Weaver, 1997). However, such conclusions are still tentative as none of these studies examined severe acts of violence like aggravated assault and homicide.

The ecological fallacy

The ecological fallacy is the notion that the relations among variables at the societal level (e.g., the correlation between annual trends in violent films and violent crime in the United States) do not always hold at the person level (e.g., the correlation between 100 participants' exposed to violent films and their subsequent aggressive behavior). Numerous studies have used societal data (e.g., Anderson, 1987; Anderson et al., 1997; Clark et al., 2014; Cohen, 1998; Curran & Scarpitti, 1991; Garmaise & Moskowitz, 2006; Markey et al., 2014; Raphael & Winter-Ebmer, 2001; Siegel, Ross, & King, 2013) and have shown that such data can be extremely useful for several reasons. First, there is no fallacy if generalizations about these data are made at the societal level. It is perfectly accurate to predict that, based on the findings reported in this report, if violence in movies decreases (either through legislation or voluntary action) it is unlikely that homicides or assaults would also decrease. In fact, others have argued (cf., Lubinski & Humphreys, 1996) that societal level data often provide more valuable information for public policy decisions than data collected at the person level.⁵

Second, ecological studies are extremely useful for generating hypotheses. For example, future researchers might wish to study if violent media's potential ability to remove violent individuals from the environments in which they are likely to commit violent offense is more powerful than the small effects found linking violent media to aggressive thoughts and actions. Third, ecological studies can be used to estimate person-level correlations (cf., Slatin, 1969). Fourth, as stated by numerous media researchers (cf., Huesmann & Taylor, 2006), researchers simply cannot study severe

forms of violence in a laboratory due to obvious ethical constraints. Therefore, ecological studies provide a method to assess outcomes with more external validity (e.g., homicides, aggravated assaults, etc.) than traditional research methods (e.g., exposing others to unpleasant noise “blasts,” endorsing aggressive thoughts on a questionnaire, giving hot sauce to a hypothetical person who does not like spicy food, etc.).

Finally, prominent media researchers have noted that theories framed at the person level can translate into concrete empirical predictions at the societal level (Anderson et al., 1997). Consistent with this notion, we predicted that the years when films were more violent and displayed high levels of gun violence would coincide with high rates of violent crime and gun-related homicides. Such empirical predictions are falsifiable, constituting “a legitimate test of the theory despite its cross-level nature” (Anderson et al., 1997, p. 1221).

Although many are familiar with the ecological fallacy, researchers often forget that the limitations surrounding this fallacy go in both directions. Just as results from the societal level do not always apply to the person level, findings from the person level do not always translate to the societal level; this is often called that “atomistic fallacy” or the “reverse ecological fallacy” (cf., Diez, 2002). In other words, researchers need to use caution when generalizing results from laboratories and questionnaires to the societal level constructs (e.g., homicide rates, violent crime rates, trends in school shootings, etc.). In a similar manner, restraint is warranted when research collected at the person level in university laboratories is used to explain the idiosyncratic behavior of a specific individual (e.g., the Aurora, Colorado shooter, James Holmes). Given that the public, media, and lawmakers tend to be concerned about trends in violent behavior and specific acts of violence, the reason some researchers might be tempted to make such claims based only on laboratory and questionnaire research is understandable. However, researchers must be aware of the tentative nature of such claims and consistently acknowledge these limitations.

Conclusion

The sensationalistic language used by some in generalizing the findings of research conducted primarily in laboratories, with questionnaires, or by examining minor forms of aggression in relation to violent crime appears to be unfounded. This study found no evidence that “10% to 30% of violence in society can be attributed to the impact of media violence” (Strasburger, 2007, p. 1398) or that “media violence is a major contributing cause of the high rate of violence in modern U.S. society” (Anderson, 2000, p. 39). Consistent with these findings, in 2013 approximately 230 media scholars, psychologists, and criminologists signed a statement to the American Psychological Association expressing their concern about the generalization of “. . . laboratory measures of aggression to public health issues and violent crime” (Consortium of Scholars, 2013). However, we would note that just because violent media does not appear to contribute to trends in violent crime, this does not imply that previous research examining violent media is unimportant. There is ample

evidence that violent media can increase aggressive cognitions, aggressive affect, and some minor aggressive behaviors. Although watching a violent film does not seem to be related to shifts in homicide or aggravated assault rates, such exposure may affect other types of less severe aggressive behaviors such as bullying, spreading gossip, minor fights at school, pushing and shoving, or hurling insults.

The current research also does not discredit Bushman et al.'s (2013) main findings and conclusions that films are becoming more violent. Indeed, there seems to be little doubt that films are displaying more blood, violence, guns, and gore than ever before. As with all media, violent films are not inherently "good" or "bad." Some violent films have artistic value (e.g., *The Hurt Locker*, *The Pianist*, etc.) whereas others are morally depraved (e.g., *Saw*, *Hostel*, etc.). Parents might want to shield their children from such violence for various reasons, including preventing nightmares, to avoid negative affect, and to make them feel safe. Adults themselves may even decide not to view such violent films for similar reasons. However, based on the data reported here, the viewing of these films does not appear to increase severe forms of violence (e.g., homicides, aggravated assault) at the societal level, nor do they seem to provide shooters with "scripts for using guns." Additionally, no evidence suggests that children who lack parental guidance and view such films will commit mass shootings. In short, the science is not consistent with such conclusions.

Notes

- 1 Contrary to the authors' claims, data from the FBI's Supplementary Homicide Reports indicates there has not been a rise in mass shootings since 1976 (Fox & DeLateur, 2014). Additionally, James Holmes was not a "kid" but a 24-year-old graduate student who is believed to have suffered from severe schizophrenia when he committed his crimes (Levin, 2012).
- 2 The first author of the current research article was also an author of one of the "best practices" studies which discussed violent video games in the context of school shootings.
- 3 Data concerning firearm homicides for 2012 had not yet been released during the writing of this article.
- 4 A recent report from the Australian Attorney General's Office (2010) states that it is misleading to contrast the effects of violent media to smoking and lung cancer and some researchers (cf., Ferguson, 2009) have questioned the statistical methods used to make such comparisons.
- 5 Consistent with this notion, Anderson et al. (1997) and Bushman (2013a, 2013b) have used the findings from their ecological study on the "heat effect" to illustrate the dangers of global warming.

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