

# Gun Violence Trends in Movies



**WHAT'S KNOWN ON THIS SUBJECT:** Previous research has shown the following: the mere presence of weapons can increase aggression, dubbed the “weapons effect”; violence in films has increased over time; and violent films can increase aggression.



**WHAT THIS STUDY ADDS:** This study examines a potential source of the “weapons effect”: the presence of guns in films. In just 20 years, gun violence in PG-13 films (age 13+) has increased from the level in films rated G/PG to the point where it exceeds the level in R films.

## abstract

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**BACKGROUND:** Many scientific studies have shown that the mere presence of guns can increase aggression, an effect dubbed the “weapons effect.” The current research examines a potential source of the weapons effect: guns depicted in top-selling films.

**METHODS:** Trained coders identified the presence of violence in each 5-minute film segment for one-half of the top 30 films since 1950 and the presence of guns in violent segments since 1985, the first full year the PG-13 rating (age 13+) was used. PG-13–rated films are among the top-selling films and are especially attractive to youth.

**RESULTS:** Results found that violence in films has more than doubled since 1950, and gun violence in PG-13–rated films has more than tripled since 1985. When the PG-13 rating was introduced, these films contained about as much gun violence as G (general audiences) and PG (parental guidance suggested for young children) films. Since 2009, PG-13–rated films have contained as much or more violence as R-rated films (age 17+) films.

**CONCLUSIONS:** Even if youth do not use guns, these findings suggest that they are exposed to increasing gun violence in top-selling films. By including guns in violent scenes, film producers may be strengthening the weapons effect and providing youth with scripts for using guns. These findings are concerning because many scientific studies have shown that violent films can increase aggression. Violent films are also now easily accessible to youth (eg, on the Internet and cable). This research suggests that the presence of weapons in films might amplify the effects of violent films on aggression. *Pediatrics* 2013;132:1014–1018

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### KEY WORDS

guns, violent films, violent movies, weapons effect

### ABBREVIATION

CI—confidence interval

Drs Bushman and Romer conceptualized the study; Dr Jamieson directed the coding and analyzed data; and Ms Weitz analyzed the data. All authors wrote portions of the manuscript.

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In many shooting sprees, the perpetrator puts on a uniform (eg, hockey mask, trench coat, movie costume, military uniform), as if following a script from a movie. For example, on July 20, 2012, James Holmes bought a ticket to see the new *Batman* movie in Aurora, Colorado. Approximately 20 minutes after the show started, Holmes left the theater and returned dressed in full tactical gear, carrying several guns and a huge amount of ammunition. He launched 2 canisters that emitted smoke or gas and then began firing into the crowd, killing 12 and wounding 70 others. Holmes identified himself to the police as “The Joker.”<sup>1</sup>

It is useful to consider a youth’s life as filled with a succession of social problems that must be solved. Youth learn how to solve problems by observing how others solve similar problems.<sup>2</sup> By observing others, youth accumulate a set of programs, called scripts, for solving social problems.<sup>3</sup> In theater, scripts tell actors what to do and say. In memory, scripts define situations and guide behavior; the person first selects a script for the situation, assumes a role in that script, and then behaves according to it. A script may be learned through direct experience or by observing others, such as violent characters in the mass media.<sup>4</sup> The media provide scripts for gun use. Gun violence in films might also encourage an association between guns and violence. In the wake of recent shooting sprees, legislators and the lay public are discussing possible ways to reduce youth violence. What is conspicuously absent from these discussions, however, is the fact that just seeing a weapon can increase aggression, an effect dubbed the “weapons effect.”

Guns not only permit violence, they can stimulate it as well. The finger pulls the trigger, but the trigger may also be pulling the finger.

Leonard Berkowitz, Psychology Professor<sup>5</sup>

In 1967, Leonard Berkowitz and Anthony LePage conducted a study to determine whether the mere presence of weapons could increase aggression.<sup>6</sup> Angered participants were seated at a table that had a shotgun and a revolver on it or badminton racquets and shuttlecocks in the control condition. The items on the table were described as part of another experiment that the researcher had supposedly forgotten to put away. There was also a second control condition with no items on the table. The participant decided what level of electric shock to deliver to an accomplice of the experimenter, ostensibly to evaluate his or her performance on a task. In reality, the shock was used to measure aggressive behavior. The experimenter told participants to ignore the items on the table, but apparently they could not. Participants who saw the guns were more aggressive than participants who saw the sports items or no items at all. More than 50 other studies have replicated the weapons effect, both inside and outside the laboratory in both angered and nonangered individuals.<sup>7</sup> Weapons can even make people aggressive when they cannot “see” them. In one study,<sup>8</sup> for example, participants who were exposed to words describing weapons (eg, gun) for only 0.17 second were more aggressive afterward than participants exposed to nonaggressive words (eg, water). These findings suggest that there is a strong link between weapons and aggression in memory.

For decades, researchers have studied the effects of exposure to violent media on aggression in children and youth. The evidence from these studies has been reviewed numerous times, and nearly all researchers have reached the same conclusion: exposure to media violence can increase aggression.<sup>9–12</sup> After reviewing the available evidence, 6 public health organizations (the American Academy of Child and Adolescent Psychiatry, the American Academy of

Pediatrics, the American Academy of Family Physicians, the American Medical Association, the American Psychiatric Association, and the American Psychological Association) endorsed a joint statement that concluded: “The conclusion of the public health community, based on over 30 years of research, is that viewing entertainment violence can lead to increases in aggressive attitudes, values and behavior, particularly in children.”<sup>13</sup> Research organizations, such as the International Society for Research on Aggression, have issued similar statements.<sup>14</sup> Many government organizations also have issued statements, including the US Surgeon General, the National Science Foundation, the National Institute of Mental Health, and the Centers for Disease Control and Prevention. In summary, virtually all scientific and health organizations have concluded that media violence can increase aggression.

The current study tested a potential source of the weapons effect: the presence of guns in top-selling films. Given that the sight of weapons can increase aggression, and violent media can increase aggression, gun violence in films might be a “double whammy.” Seeing guns in films might also provide youth with scripts for using guns. In particular, we were interested in the presence of guns in violent scenes depicted in PG-13–rated films (ie, for viewers age 13+). The proportion of PG-13–rated films in the top 30 grossing films has increased greatly since the rating was introduced in 1985.<sup>15</sup> Previous research has shown that violence is a common theme in top-selling films and that the amount of violence has increased over time,<sup>16,17</sup> even in G (general audiences)-rated films considered appropriate for viewers of all ages.<sup>18</sup> Research also shows that youth frequently watch extremely violent films.<sup>19,20</sup> Moreover, such films are more accessible today to viewers of all ages than ever before, such as on the Internet and cable. However, previous

research has not examined the extent to which gun violence is portrayed in films and whether the use of guns has increased over time, especially in PG-13-rated films that adolescents are most likely to watch. We predicted that the presence of guns in violent scenes has increased in films with PG-13 ratings.

## METHODS

We used the Coding of Health and Media Project's<sup>21</sup> database of 945 films that were sampled from the 30 top-grossing films (based on annual box office sales as ranked by *Variety* magazine) for each of the years from 1950 to 2012. Trained coders identified violent sequences in those films, by using a definition adapted from previous research<sup>19</sup>: "Physical acts where the aggressor makes or attempts to make some physical contact with the intention of causing injury or death," excluding natural disasters, accidents, objects not attributed to a character, and expected physical acts in sports that are not intended to seriously injure (eg, tackling in football). Coders achieved a high level of reliability (0.80) for these sequences, using Krippendorff's  $\alpha$  reliability formula, which controls for chance agreement between multiple coders.

Violent sequences performed by each character were coded for each 5-minute segment of each film. A "sequence" of violence is uninterrupted if the character uses 1 weapon or action continuously, regardless of the number of victims. There were 17 695 violent sequences in the 945 films we coded from 1950 to 2012. Violent sequences performed by each character were summed to get a segment's total, and the rate of violent sequences per hour in each film was computed. Due to skewness in these scores, we computed the annual mean of these rates using a log transform.

Our violence coding indicated that 396 (94%) of the 420 films since 1985 had 1 or more 5-minute segments containing

violence. Those segments with violence were subsequently coded for the use of guns. A gun was defined as a weapon that can be carried with 1 or both hands that fires a bullet or energy beam with the intention of harming or killing a living target. Weapons such as cannons and artillery were excluded because they cannot be carried with 1 or both hands. Rocket-propelled grenades, bullets on their own, and holsters without guns were also excluded. Gun violence was defined as shooting a gun and hitting a living target. Guns fired at shooting-range targets, skeets, or animals while hunting (eg, game birds, deer) were excluded.

Five independent raters coded films. Raters were trained by using 27 films not included in the database. Coders were blinded to each film's publication year and Motion Picture Association of America rating, and they achieved a high level of reliability (Krippendorff  $\alpha = 0.91$ ) for identification of gun violence.

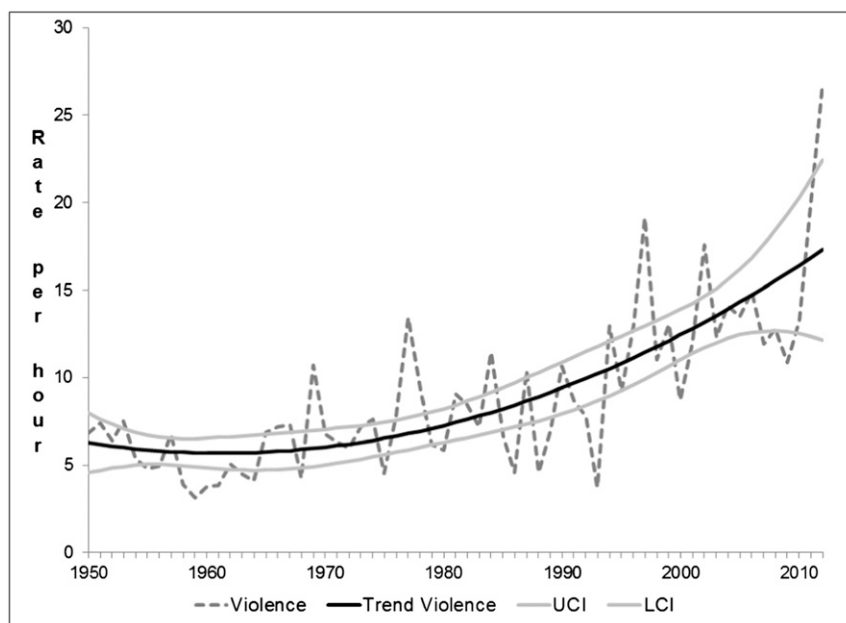
We identified 783 segments with gun violence in the 396 films with violence. The rate of gun violence per hour was

obtained for each film, transformed via a log transformation, and then averaged over films for each year. We examined the rate of gun violence by film rating. Because there were few G-rated films ( $n = 21$ ), they were combined with PG (parental guidance suggested for young children) films ( $n = 108$ ); there were also 166 PG-13-rated films, and 119 R-rated (restricted to viewers age 17+) films from 1985 to 2012.

## RESULTS

### Overall Violence Trend Analyses

Best-fitting trends were identified for linear, quadratic, and cubic trends. Robust SEs were used for all trend analyses to protect against violations of regression analysis assumptions (ie, normality, homoscedasticity, independence). The best-fitting trend for annual violent sequences from 1950 to 2012 was quadratic ( $b = .005$  [95% confidence interval (CI): .0015–.0076]  $P = .004$ ,  $R^2 = .52$ ). As shown in Fig 1, the trend in the rate of violent sequences more than doubled from 1950 to 2012.



**FIGURE 1**

Rate of violent sequences per 5-minute segment for the top 30 ranked films, 1950 to 2012, along with linear trend and 95% upper CIs (UCI) and lower 95% CIs (LCI).

## Gun Violence Trend Analyses

There was an overall annual increase in gun violence in the films from 1985 to 2012 ( $b = .0003$ , [95% CI = .00005 – .00050],  $P = .021$ ,  $R^2 = .17$ ). However, trends differed by movie rating. Among G/PG films, gun violence decreased linearly ( $b = -.014$  [95% CI:  $-.026 - .003$ ],  $P = .015$ ,  $R^2 = .16$ ), while among PG-13 films the rate increased with linear ( $b = .267$  [95% CI:  $.118 - .416$ ],  $P < .001$ , quadratic ( $b = -.021$ , [95% CI:  $-.033 - .009$ ],  $P = .002$ , and cubic trends ( $b = .0005$  [95% CI:  $.0002 - .0008$ ],  $P < .001$ ;  $R^2 = .53$ ). There was no trend in gun violence for R-rated films during this period. As shown in Fig 2, the annual mean rate of gun violence in R-rated films was 2.15 segments per hour and was 1.26 in G/PG-rated film segments per hour. The rate for films in the PG-13 category started at 0 in 1985 to 1986 and rose over time. Although the PG-13 trend was within the 95% CI for G/PG-rated films for many years, since 2009 it has been as high or higher than R-rated films. In 2012, the level of gun violence in PG-13 films exceeded the mean in R-rated films.

## DISCUSSION

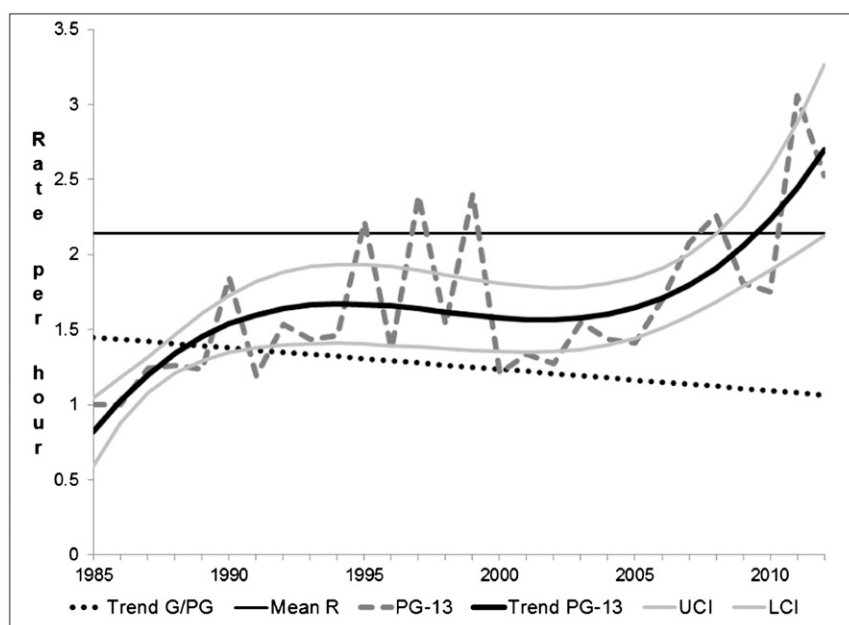
Consistent with other analyses,<sup>15–20</sup> we found that violence in top-grossing films has increased linearly since 1950. Since 1985, scripts containing the use of guns in violent segments have declined slightly in G/PG films but not changed overall in R-rated films. However, gun violence in PG-13 films has grown considerably since 1985, even exceeding the rate in R-rated films in recent years. Films with a PG-13 rating are popular, accounting for more than one-half of top-grossing film revenue,<sup>5</sup> but unfortunately they are not restricted at movie theaters to youth. Film producers may therefore be strengthening the weapons effect by increasingly including guns in scripts that involve violence in the films youth are most likely to see. The presence of guns in films also provides youth with scripts on how to use guns. In addition, children no longer need to go to movie theaters to see films; films are readily available on the Internet or cable. Thus, children much younger than 13 years can easily view films that contain ample gun violence.

One limitation of the current study is that we did not code for guns in non-violent segments. However, these uses are likely to be rare. In addition, movies less popular than the top 30 were not coded, although the top 30 has represented  $>50\%$  of the box office sales in recent years.<sup>5</sup> We also did not distinguish between the use of guns for self-defense versus violence initiation, although this distinction was not relevant to testing our hypothesis that the presence of guns has increased in PG-13-rated films since 1985.

The findings from the current research are troubling given the large body of research evidence showing that violent media can have harmful effects on children and youth. Future research should test whether violence with guns is more likely to increase aggression in youth than violence without guns. Future research should also investigate whether films containing gun violence provide viewers with scripts on how to use guns. Previous research has shown that when exposed to movie characters who smoke, many youth are more likely to start smoking themselves<sup>22</sup>; the same effect is true for characters who drink.<sup>23</sup> Similarly, we predict that youth will be more interested in acquiring and using guns after exposure to gun violence in films.

## CONCLUSIONS

Our research found that violence in films has more than doubled since 1950, and that gun violence in PG-13 films has increased to the point where it recently exceeded the rate in R-rated films. The effects of exposure to gun violence in films should not be trivialized. Even if youth do not use guns, the current research suggests that because of the increasing popularity of PG-13-rated films, youth are exposed to considerable gun violence in movie scripts. The mere presence of guns in these films may increase the aggressive behavior of youth.



**FIGURE 2**

Rate of 5-minute film segments with gun violence for the top 30 ranked films rated G/PG, PG-13, and R, 1985 to 2012, along with best-fitting trend and 95% CIs for PG-13-rated films.

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