

The Weapons Effect

Arlin James Benjamin, Jr.
University of Arkansas—Fort Smith, USA

Abstract

This review examines the current state of research on the weapons effect, a phenomenon in which the mere presence of weapons is presumed to cause people to behave more aggressively. The General Aggression Model (GAM) is often used to explain how and why the weapons effect occurs. Hence research on the extent to which weapons prime cognitive and appraisal processes is considered, based on findings from recent meta-analytic research. Findings from classic and contemporary studies offer mixed support for the weapons effect. Implications for theory and future research will be discussed.

Introduction

Berkowitz and LePage (1967) coined the term “the weapons effect” in their classic article that first demonstrated that the mere presence of weapons could increase aggressive behavior. In that experiment, male college students were paired with a partner (actually a confederate) in what was ostensibly an essay rating task. Participants were led to believe that the “ratings” were the number of electric shocks given to their partner, with more electric shocks equating a more negative evaluation. First, the partner evaluated the participants’ essays with either one electric shock (low provocation condition) or seven electric shocks (high provocation condition). When it was the participants’ turn to evaluate their partner, they were led into a control room that contained either rifles or badminton racquets that were presumably left behind by mistake from a previous experiment. There was also a true control condition in which no objects were present in the control room. Berkowitz and LePage (1967) found that highly provoked participants who were also exposed to weapons gave the most electric shocks, showing more aggression than participants in any of the other conditions.

Aggressive Behavior

Since that initial experiment, numerous attempts to replicate the weapons effect have been reported with participants of various ages, including samples of adults (e.g., Caprara, Renzi, Amolini, D’Imperio, & Travaglio, 1984; Leyens & Parke, 1975), adolescents (Frodi, 1975), and children (Turner & Goldsmith, 1976). Although Berkowitz and LePage used electric shock to measure aggressive behavior, other laboratory experiments have found similar results using other aggression measures, such as blasts of unpleasant noise delivered through headphones (Lindsay & Anderson, 2000), and the amount of spicy hot sauce delivered to a victim who hated spicy foods (Klinesmith, Kasser, & McAndrews, 2006).

There was some initial skepticism regarding the weapons effect, largely based on the hypothesis that the positive results obtained by Berkowitz and LePage (1967) were due to participants’ suspicion or evaluation apprehension (Page & Scheidt, 1971). However, a series of experiments appeared to debunk that particular explanation, showing that the weapons effect occurred when participants were naïve and lacking evaluation apprehension and did not occur when they were suspicious or apprehensive (Simons & Turner, 1976; Turner & Simons, 1974). In other words, the mere presence of weapons appeared to influence aggressive behavior as long as participants were unaware of the hypothesis or believed that they were being watched and judged by others. That said, there have been a number of noteworthy failures to replicate the weapons effect in the lab (e.g., Buss, Booker, & Buss, 1972; Fraczek & MacAuley, 1971) and in the field (Halderman & Jackson, 1979; Turner, Simons, & Layton, 1975, Exp. 3). Turner et al.

(1975, Exp. 3) is especially noteworthy for showing evidence of mere exposure to a weapon suppressing aggression.

In spite of these mixed findings, a meta-analysis of the available published research (Carlson, Marcus-Newhall, & Miller, 1990) appeared to support the reliability of the weapons effect under highly provoking conditions, but not under neutral conditions, in line with the findings initially published by Berkowitz & LePage (1967). After Carlson et al. (1990) published their meta-analysis, research on the influence of weapons on aggressive behavioral outcomes largely ceased, with exceptions duly noted (e.g., Bushman, Kerwin, Whitlock, & Weisenberger, 2017; Guo, Egan, & Zhang, 2016; Klimesmith et al., 2006; and Lindsay & Anderson, 2000). A more recent meta-analysis including all known available published and unpublished research on the weapons effect suggests that the influence of weapons on aggressive behavior is inconclusive for now (Benjamin, Kepes, & Bushman, 2018). Although the weapons effect appears to be statistically reliable on the surface, once publication bias and outlier effects are taken into consideration, it is not entirely clear what the “true” mean effect size for the influence of weapons on aggressive behavior actually is. The mean effect size may be small but reliable if a random effects trim-and-fill analysis is used to estimate publication bias, but other techniques to estimate publication bias show an average effect size close to zero. As a result, Benjamin et al. (2018) suggest caution in interpreting research on the influence of weapons on aggressive behavioral outcomes.

Aggressive Cognition

Assuming there is sufficient evidence for a weapons effect, why might it occur? According to the General Aggression Model (GAM; Anderson & Bushman, 2002), weapons have the potential to prime aggressive thoughts, which in turn influence hostile primary and secondary appraisal processes. Depending on the outcome of these appraisal processes, an aggressive behavioral response may result.

Although some research showing a link between the mere exposure to weapons and an increase in aggression-related thoughts was conducted as early as the 1970s (e.g., Frodi, 1975; Mendoza, 1972), research on what would be called the weapons priming effect did not begin in earnest until the 1990s. An initial article established the weapons priming effect from the results of two experiments (Anderson, Benjamin, & Bartholow, 1998). In the first experiment, participants viewed stimulus words (either weapons or animals) paired with target words containing aggressive or nonaggressive content. After viewing each stimulus word, participants read each target word aloud into a microphone, which is called a pronunciation task. Anderson et al. (1998) found that reaction times for aggressive target words were significantly faster when they were paired with weapon-related words than when they were paired with animal-related words. A second experiment, in which participants viewed pictures of weapons or neutral objects paired with the same aggressive and nonaggressive target words used in the first experiment successfully replicated the results of the first experiment. These findings were subsequently replicated by Lindsay and Anderson (2000) and Bartholow, Anderson, Carnagey, & Benjamin (2005).

More recent experiments examining cognitive priming effects of weapons use a lexical decision task procedure in which participants have to decide as quickly as possible whether or not a string of letters is a real word (Bartholow & Heinz, 2006; Subra, Muller, Bègue, Bushman, & Delmas, 2010). As with the pronunciation task, faster reaction times to aggressive words indicate greater accessibility of aggressive thoughts in memory. The findings of these experiments indicate that individuals tend to respond more quickly to aggressive words when primed with weapons than when primed with neutral objects. At least one other published set of experiments replicated the weapons priming effect by using a word completion task, in which participants were instructed to complete word fragments to form words (Bushman, 2017). For example, the fragment KI__ can be completed to form an aggressive word (e.g., KILL, KICK) or a non-aggressive word (e.g., KISS, KIND). Participants exposed to weapons tended to complete more aggressive words.

A recent meta-analysis suggests that weapons reliably prime aggressive thoughts (Benjamin et al., 2018). The initial mean effect size was small-to-moderate. A battery of sensitivity analyses was run to test for publication bias and outlier effects. These analyses found no evidence of outlier effects. Furthermore, although analyses from the battery of sensitivity analyses showed publication bias reduced the magnitude

of the average effect somewhat, the effect was still reliable (with mean d estimates between .21 and .25 reported).

Aggressive Appraisal

As noted earlier, the GAM predicts that how we interpret a given situation determines whether or not we will respond aggressively in that situation. Although most research on appraisal outcomes is relatively recent, some published research was conducted as early as the 1980s (da Gloria, Duda, Pahlavan, & Bonnet, 1989), and unpublished research exists as far back as the 1970s (e.g., Klosterman, 1973). Early research examined primary appraisal based on how rapidly participants clenched their fists when exposed to weapons versus neutral objects (da Gloria et al., 1989). Clenching one's fists is a potential fight response to a perceived threat. More recent research on primary appraisal examines how rapidly individuals respond to perceived threats. In particular, this line of research examines if individuals respond to weapons such as guns and knives similarly to stimuli we are biologically prepared to recognize as threats such as spiders and snakes. This research consistently shows that adults respond more rapidly to both types of threatening items compared to non-threatening items (e.g., Blanchette, 2006; De Oca & Black, 2013; Fox, Griggs, & Mouchlianitis, 2007; Sulikowski & Burke, 2014). There may be gender differences in primary appraisal to weapons (Sulikowski & Burke, 2014), with males responding with more hostile appraisals than females to threatening items. Finally, recent research examining secondary appraisal shows that similar effects are obtained with objects that are typically not weapons, but could be used as weapons, such as garden shears (Holbrook, Galperin, Fessler, Johnson, Bryant, & Haselton, 2014).

When examining the influence of weapons on aggressive appraisals, Benjamin et al. (2018) found that the average effect size was approximately moderate. Once primed, individuals appear biased to make initial appraisals of threat and secondary appraisals of hostility. Sensitivity analyses examining potential publication bias and outlier effects showed that publication bias was indeed a serious concern, and that the initial effect size estimate was moderately inflated. That said, even taking into consideration publication bias, the magnitude of the average effect remained statistically reliable. (Benjamin et al., 2018).

Limitations and Concerns

Although we know much more about the weapons effect, there are numerous questions that remain to be answered. In addition, it is apparent that there are some limitations to the weapons effect. Let us begin with what we know about the limitations. First, it appears that context plays a potentially important role in whether or not the mere presence of a weapon primes aggressive behavior. For example, Ellis and Weinir (1971) provided evidence that the weapons effect did not occur when participants were led to believe that the weapon in the control room was associated with a police officer. The authors suggested that participants weighed the potential for an aggressive response to be punished, and hence inhibited the level of aggression in their response to a provocation. In addition, although Turner et al. (1975, Exp. 2) showed that participants appeared to be more prone to honk their horns at a vehicle with a gun on a gun rack present than a vehicle with no weapon present, that specific experiment was never successfully replicated (e.g., Halderman & Jackson, 1979; Turner et al., 1975, Exp. 3). A closer examination of Turner et al. (1975, Exp. 2) suggests the apparent successful replication was based on a subsample – a point that seems apparent when examining the pattern of results in that paper's subsequent experiment (Turner et al., 1975, Exp. 3). It is more plausible to conclude that the presence of a gun in that particular context is sufficient to inhibit aggressive behavioral responses, such as horn honking, in everyday life. In addition, Carlson et al., (1990) showed in their meta-analysis that the weapons effect appears to only reliably occur under conditions of high provocation. Finally, how a weapon itself is interpreted, based in part on life experience, may play a role in whether or not a weapon facilitates aggression. For example, Bartholow and colleagues (2005) showed that for hunters, the weapons effect was only present when they were exposed to assault-type firearms, but not to hunting firearms. Furthermore, Bushman (2018) showed that when the weapon is interpreted as one not intended to harm humans, that specific weapon does not prime aggressive thoughts.

In terms of theory, for any cognitive priming theory such as GAM (Anderson & Bushman, 2002) to be useful for explaining the weapons effect, not only does there need to be evidence that the mere presence of weapons increases accessibility of aggressive cognitions and hostile primary appraisals, but there must be solid evidence that merely seeing a weapon increases aggressive behavioral outcomes as well. That appears not to be the case at this time (Benjamin et al., 2018). An alternative to GAM, the Situated Inference Model, was used by Englehardt and Bartholow (2013) to suggest that a number of failures to replicate the weapons effect were due to participants attributing their increased physiological arousal to the weapon itself, rather than to the person provoking them. Although Englehardt and Bartholow's (2013) speculation is reasonable enough, as of yet there is no evidence to support their suggestions – in large part because almost no available research has examined the extent to which weapons increase physiological arousal (Benjamin et al., 2018). For now, it appears that the sort of social cognition approach to the weapons effect that has been in vogue since the 1990s may not be viable.

The current conversation about the weapons effect is embedded within a context in which Psychology (among other sciences) is embroiled in a replication crisis (see, e.g., Open Science Collaboration, 2015). In order to improve replicability, practices such as preregistration of research protocols using properly powered research designs and public archiving of data are increasingly advocated (e.g., Open Science Collaboration, 2015). The weapons effect is one phenomenon that would be ideal for such an approach, given the novelty of the original finding, the relative low effect sizes reported in the literature, and the low power of the vast majority of the experiments measuring the influence of weapons on aggressive behavioral outcomes. For example, a registered replication report (RRR) approach has been used to further explore other phenomena such as hostile priming effects (e.g., McCarthy et al., 2018), in the process shedding light on whether or not the effects reported in classic research articles are reliable. An equivalent approach, in which the original Berkowitz and LePage (1967) experiment were subjected to a RRR utilizing multiple labs and a large overall sample, would enable us in the social sciences to either debunk the phenomenon or to offer some solid support for the phenomenon. Until such an approach is utilized to examine the weapons effect, it is prudent to be skeptical about this particular line of research.

Summary

Recent developments in research on the weapons effect continue to further our understanding of the processes by which the mere presence of weapons can influence aggressive thoughts, hostile appraisals, and aggressive behavior. Although much of that research appears promising, especially regarding cognitive and appraisal processes, research on aggressive behavioral outcomes suggests we as social scientists interpret the available evidence regarding weapons as potential primes of aggressive behavior with considerable caution and skepticism (Benjamin et al., 2018), and that we need to rethink the theoretical models used to interpret the available pattern of findings. Berkowitz (1968) once said, “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.” Although the remarks regarding violence appear doubtful at best, there is some tentative evidence that the mere presence of weapons does influence aggressive thoughts and appraisals. The findings based on experiments measuring behavioral outcomes is considerably more complicated and requires more exploration, especially given the relatively small sample sizes of many of the early behavioral experiments as well as the potential lack of consideration to the psychometric properties of those aggressive behavioral measures (Benjamin et al., 2018). Although skepticism is understandable and quite necessary given the inconclusiveness of the research examining the priming effects of weapons on aggressive behavioral outcomes, this is an area of inquiry worth examining in more depth and with greater rigor.

References

- Anderson, C. A., Benjamin, A. J., Jr., & Bartholow, B. D. (1998). Does the gun pull the trigger? Automatic priming effects of weapon pictures and weapon names. *Psychological Science*, *9*, 308-314. doi:10.1111/1467-9280.00061
- Anderson, C. A., & Bushman, B. J. (2002). Human aggression. *Annual Review of Psychology*, *53*, 27-51. doi:10.1146/annurev.psych.53.100901.135231
- Bartholow, B. D., Anderson, C. A., Carnagey, N. L., & Benjamin, A. J., Jr. (2005). Interactive effects of life experience and situational cues on aggression: The weapons priming effect in hunters and non-hunters. *Journal of Experimental Social Psychology*, *41*, 48-60. doi:10.1016/j.jesp.2004.05.005
- Bartholow, B. D., & Heinz, A. (2006). Alcohol and aggression without consumption: Alcohol cues, aggressive thoughts, and hostile perception bias. *Psychological Science*, *17*, 30-37. doi:10.1111/j.1467-9280.2005.01661.x
- Benjamin, A. J., Jr. & Bushman, B. J. (2016). The weapons priming effect. *Current Opinion in Psychology*, *12*, 45-48. doi:10.1016/j.copsyc.2016.05.003
- Benjamin, A. J., Jr., Kepes, S., & Bushman, B. J. (2018). Effects of the mere presence of weapons on aggressive thoughts, angry feelings, hostile appraisals, and aggressive behavior: A meta-analytic review of the weapons effect literature. *Personality and Social Psychology Review*, *22*(4), 347-377. doi:10.1177/1088868317725419
- Berkowitz, L. (1968). Impulse, aggression, and the gun. *Psychology Today*, *2*, 19-22.
- Berkowitz, L., & LePage, A. (1967). Weapons as aggression-eliciting stimuli. *Journal of Personality and Social Psychology*, *7*, 202-207. doi:10.1037/h0025008
- Blanchette, I. (2006). Snakes, spiders, guns, and syringes: How specific are evolutionary constraints on the detection of threatening stimuli? *The Quarterly Journal of Experimental Psychology*, *59*, 1484-1504. doi:10.1080/02724980543000204
- Bushman, B. J. (2018). Guns automatically prime aggressive thoughts, regardless of whether a ‘good guy’ or ‘bad guy’ holds the gun. *Social Psychological and Personality Science*, *9*(6), 727-733. doi:10.1177/1948550617722202
- Bushman, B. J., Kerwin, T., Whitlock, T., & Weisenberger, J. M. (2017). The weapons effect on wheels: Motorists drive more aggressively when there is a gun in the vehicle. *Journal of Experimental Social Psychology*, *73*, 82-85. doi:10.1016/j.jesp.2017.06.007
- Buss, A. H., Booker, A., & Buss, E. (1972). Firing a weapon and aggression. *Journal of Personality and Social Psychology*, *22*, 296-302. doi:10.1037/h0032869
- Caprara, G. V., Renzi, P., Amolini, P., D’Imperio, G., & Travaglia, G. (1984). The eliciting cue value of aggressive slides reconsidered in a personological perspective: The weapons effect and irritability. *European Journal of Social Psychology*, *14*, 313-322. doi:10.1002/ejsp.2420140306
- Carlson, M., Marcus-Newhall, A., & Miller, N. (1990). Effects of situational aggressive cues: A quantitative review. *Journal of Personality and Social Psychology*, *58*, 622-633. doi:10.1037/0022-3514.58.4.622
- da Gloria, J., Duda, D., Pahlavan, F., & Bonnet, P. (1989). “Weapons effect” revisited: Motor effects of the reception of aversive stimulation and exposure to pictures of firearms. *Aggressive Behavior*, *15*, 265-271. doi: 10.1002/ab.2480150401
- De Oca, B. M., & Black, A. A. (2013). Bullets versus burgers: Is it threat or relevance that captures attention? *The American Journal of Psychology*, *126*(3), 287-300. doi:10.5406/amerjpsyc.126.3.0287
- Ellis, D. P., Weinir, P., & Miller, L., III (1971). Does the trigger pull the finger? An experimental test of weapons as aggression-eliciting stimuli. *Sociometry*, *34*, 453-465. doi:10.2307/2786192
- Engelhardt, C. R., & Bartholow, B. D. (2013). Effects of situational cues on aggressive behavior. *Social and Personality Psychology Compass*, *7*(10), 762-774. doi:10.1111/spc3.12067
- Fox, E., Griggs, L., & Mouchlianitis, E. (2007). The detection of fear-relevant stimuli: Are guns noticed as quickly as snakes? *Emotion*, *7*, 691-696. doi: 10.1037/1528-3542.7.4.691
- Fraczek, A., & Macaulay, J. R. (1971). Some personality factors in reaction to aggressive stimuli. *Journal of Personality*, *39*, 163-177. doi:10.1111/j.1467-6494.1971.tb00034.x

- Frodi, A. (1975). The effect of exposure to weapons on aggressive behavior from a cross-cultural perspective. *International Journal of Psychology*, *10*, 283-292. doi:10.1080/00207597508247340
- Guo, X., Egan, V., & Zhang, J. (2016). Sense of control and adolescents' aggression: The role of aggressive cues. *PsyCH Journal*, *5*, 263-274. Doi:10.1002/pchj.151
- Halderman, B. L., & Jackson, T. T. (1979). Naturalistic study of aggression: Aggressive stimuli and horn honking: A replication. *Psychological Reports*, *45*, 880-882. doi:10.2466/pr0.1979.45.3.880
- Holbrook, C., Galperin, A., Fessler, D. M. T., Johnson, K. L., Bryant, G. A., & Haselton, M. G. (2014). If looks could kill: Anger attributions are intensified by affordances for doing harm. *Emotion*, *14*, 455-461. doi: 10.1037/a0035826
- Klinesmith, J., Kasser, T., & McAndrew, F. T. (2006). Guns, Testosterone, and Aggression: An Experimental Test of a Mediational Hypothesis. *Psychological Science*, *17*, 568-571. doi:10.1111/j.1467-9280.2006.01745.x
- Klosterman, D. F. (1973). *Weapons as aggressive cues*. Unpublished Doctoral Dissertation, University of Nebraska-Lincoln.
- Leyens, J. P., & Parke, R. D. (1975). Aggressive slides can induce a weapons effect. *European Journal of Social Psychology*, *5*, 229-236. doi:10.1002/ejsp.2420050207
- Lindsay, J. J. & Anderson, C. A. (2000). From antecedent conditions to violent actions: A general affective aggression model. *Personality and Social Psychology Bulletin*, *26*, 533-547. doi:10.1177/0146167200267002
- McCarthy, R. J., Skowronski, J. J., Verschuere, B., Meijer, E. H., Jim, A., Hoogesteyn, K., ... Yıldız, E. (2018). Registered Replication Report on Srull and Wyer (1979). *Advances in Methods and Practices in Psychological Science*, *1*(3), 321–336. <https://doi.org/10.1177/2515245918777487>
- Mendoza, A. (1972). *The effects of exposure to toys conducive to violence*. Unpublished Doctoral Dissertation, University of Miami.
- Open Science Collaboration. (2015). Estimating the reproducibility of psychological science. *Science*, *6251*. doi: 10.1126/science.aac4716
- Page, M. M., & Scheidt, R. J. (1971). The elusive weapons effect: Demand awareness, evaluation apprehension, and slightly sophisticated subjects. *Journal of Personality and Social Psychology*, *20*, 304-318. doi:10.1037/h0031806
- Simons, L. S., & Turner, C. W. (1976). Evaluation apprehension, hypothesis awareness, and the weapons effect. *Aggressive Behavior*, *2*, 77-87. doi:10.1002/1098-2337(1976)2:1<77::AIDAB2480020108>3.0.CO;2-A
- Subra, B., Muller, D., Bègue, L., Bushman, B. J., & Delmas, F. (2010). Automatic effects of alcohol and weapon cues on aggressive thoughts and behaviors. *Personality and Social Psychology Bulletin*, *36*, 1052-1057. doi :10.1177/0146167210374725
- Sulikowski, D., & Burke, D. (2014). Threat is in the sex of the beholder: Men find weapons faster than do women. *Evolutionary Psychology*, *12*, 888-906. doi: 10.1177/147470491401200505
- Turner, C. W., & Goldsmith, D. (1976). Effects of toy guns and airplanes on children's antisocial free play behavior. *Journal of Experimental Child Psychology*, *21*, 305-315. doi:10.1016/0022-0965(76)90044-8
- Turner, C. W., Layton, J. F., & Simons, L. S. (1975). Naturalistic studies of aggressive behavior: Aggressive stimuli, victim visibility, and horn honking. *Journal of Personality and Social Psychology*, *31*, 1098-1107. doi:10.1037/h0076960
- Turner, C. W., & Simons, L. S. (1974). Effects of subject sophistication and evaluation apprehension on aggressive responses to weapons. *Journal of Personality and Social Psychology*, *30*, 341-348. doi:10.1037/h0036894