

# **Introductory Psychology Spring 2019**

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*The Journal of Psychology, 129(2), 121-132*

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## The Effect of Video Games on Feelings of Aggression

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**ABSTRACT.** Fueled by the media, the controversy over whether playing popular arcade/computer games increases aggressiveness has only been compounded by inconsistencies within empirical research. This experiment, conducted with university students in Scotland, was designed to explore some of these inconsistencies. Aggressiveness was manipulated as the independent variable. As dependent variables, the Buss-Durkee Hostility Inventory (Buss & Durkee, 1957) and the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975) were used. There was no linear pattern in aggressive affect change across three games that contained varying levels of violence. Results are discussed in terms of the general lack of support for the commonly held view that playing aggressive computer games causes an individual to feel more aggressive.

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THE LINK BETWEEN TELEVISION VIEWING AND VIOLENCE has been researched and debated for some time (Andison, 1977; Berkowitz, 1984; Eron, 1982; Gunther, 1981; Pearl, Bouthilet, & Lazar, 1982). More recent concerns have included how not only television but also cinema and video viewing might influence levels of aggression (*Screen Violence*, 1993): "Over the last 10-15 years, the limited data suggest, if anything, a decrease in the quantity of violence on the four main TV channels, although information on shifts in the type of violence is lacking" (p. 353).

During the last decade, attention and accusations within the media have turned more to the meteoric rise in popularity of arcade-type home computer and console games. Considerable anecdotal evidence abounds about how teenagers are affected by shoot-em-up and beat-em-up games. Zimbardo

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(1982) remarked that video games are so addictive to young people that they may be socially isolating and may actually encourage violence between people. Another comment came from the surgeon-general of the United States, who expressed his personal view that video games were one of the root causes of family violence in America. He was quoted as saying that children "are into the games, body and soul—everything is zapping the enemy. Children get to the point where when they see another child being molested by a third child, they just sit back" (Koop, 1982).

The similarities between television and video games have also been noted (Silvern & Williamson, 1987). Both have entertainment value, violent content, and various physical feature similarities (action, pace, and visual change). A majority of video games are violent in nature and feature death and destruction (Dominick, 1984; Loftus & Loftus, 1983). In the survey by Bowman and Rotter (1983), 85% of the video games examined ( $n=28$ ) involved participation in acts of simulated destruction, killing, or violence. In addition, concern has been raised that video games may have a greater adverse effect than television because of the active involvement of the player (Bowman & Rotter; Greenfield, 1984). This issue is further detailed by Griffiths (1991).

Because most research into television violence does demonstrate a relationship between the exposure to aggression and subsequently exhibited aggression, investigations of the effects of video game playing usually have predicted a similar relationship. However, many variables are involved, and researchers offer no clear statement on the role of game playing and aggressiveness. Parameters include, for instance, gender, age grouping, expressed hostility (feelings of aggressiveness) versus exhibited aggression (overt behavior), the behavioral measurement (e.g., toward a life-size doll, or in terms of shocks administered from an "aggression machine"), experimental duration of exposure (time spent playing), and personality traits. Also, studies may be laboratory based or observational.

Findings from studies using various subject groups and various methodologies have been mixed. Dominick's (1984) questionnaire-based study reported a significant relationship between video game playing and aggressive delinquency in adolescents. Conversely, in another questionnaire study (also involving teenagers), Kestenbaum and Weinstein (1985) reported that aggressive games had a calming effect.

Researchers have compared children's free-play behavior after aggressive and nonaggressive video game play (Cooper & Mackie, 1986; Schutte, Malouff, Post-Gorden, & Rodasta, 1988; Silvern, Williamson, & Countermin, 1983). In laboratory research, Cooper and Mackie found that girls increased their aggressive free play after an aggressive game and increased quiet play after a nonaggressive game. The free play of the boys, however, was not significantly altered by either game.

Using a similar paradigm with younger children, Schutte et al. (1988) evaluated the changes in 5- to 7-year-old children after they had played violent or nonviolent video games. In subsequent free play, the children involved in the aggressive game were more violent. In an observational study of free play, Silvern and Williamson (1987) demonstrated increased aggression and decreased prosocial behavior in 4- to 6-year-olds after playing violent video games. Dominick (1984) used a video game survey, and Nelson and Carlson (1985) examined the type of video game preferred in a free-choice situation.

In addition to the problems of inconsistency, certain studies seem to have been methodologically flawed. Graybill, Kirsch, and Esselman (1985) found that children who played the violent video game exhibited fewer defensive fantasies and more assertive fantasies than did the children who played the nonviolent game. In addition, they noted that the barrier responsible for frustration was more salient for the nonaggressive girls after frustration than for the aggressive girls. They concluded that playing the violent video game may have had some short-term beneficial effects for the children, but they later acknowledged that the projective technique used (the Rosenzweig Picture-Frustration Study) was not a valid measure (Graybill, Strawniak, Hunter, & O'Leary, 1987).

In this second study of Graybill et al. (1987), children of the same age group played a violent or nonviolent video game for just 7 min (and observed a partner play for 7 min). Despite using projective, behavioral, and two self-report measures, this study again showed no differences between the violent and nonviolent conditions. The behavioral measure required the children to press buttons that ostensibly would hurt another child.

Apart from the ethical problems involved, it is noteworthy that one of the three nonaggressive games used consisted of a frog catching and devouring flies with its tongue. Another was a Pac Man type game where a mouth chases food items and has to gobble these up before being itself destroyed by other chasing mouths. These do not seem good examples of a nonaggressive games. Indeed, Cooper and Mackie (1986) reported that the girls in their study saw little difference in aggressiveness between Pac Man and their aggressive game, Missile Command.

Graybill et al. (1987) suggested that graphics are not as realistic in video games as on television, but since then technological changes have led to remarkably realistic graphics. Graybill et al. (1987) also argued that the differences in typical results for TV viewing and their video game study were possibly due to their subjects' being in the presence of a peer partner, and that the presence of a peer may have caused the children to be more attentive to the scores than to the content of the games.

Winkel, Novak, and Hopson (1987) found no relationship in adolescents between playing a violent video game and aggression, here defined as the amount of money one subject fined another subject (actually a computer)

from a total payment. Winkel et al. suggested that, in the adolescent age group, personality traits and social contextual variables were more important as determinants of behavior than was exposure to video games. In a somewhat older age group, Anderson and Ford's (1986) questionnaire study demonstrated that violent video games increased hostility among university undergraduates.

In brief, there have been inadequacies and inconsistencies in choice of both independent and dependent variables. It is therefore necessary to attempt a more valid and thorough assessment of the possible associations between video game playing and aggression. What actually constitutes aggression and how it may be quantified has been the subject of much debate. For example, in their treatise on the measurement of aggression, Edmunds and Kendrick (1980) stated that aggression may more precisely be classified into *aggression*, which would seem generally to cover overt and direct behaviors, and *aggressiveness*, which is typically represented by hostile feelings.

One major problem with previous studies is that they contain no single, standardized and well-validated measure of aggressiveness that identifies its various types. Although several MMPI-derived inventories measuring aggression/hostility have been developed since the mid-1950s and prior to the Buss-Durkee Inventory (1957), no questionnaire was available that gave more than a very global measurement. For example, a nonverbal, physically assaultive individual might receive the same score as a nonassaultive, verbally aggressive person.

The Buss-Durkee Inventory (1957) groups items into subscales representing various aspects of aggression and hostility, thus provides a finer analysis of the general concept of aggression, and classifies seven types of aggressiveness (in the sense of reported *feelings*, rather than demonstrated behaviors) derived from factor analysis studies. Often, as in the present study, the Guilt scale is omitted, which leaves 66 items classified into the following subscales:

1. Assault—physical violence against others. This includes getting into fights with others but not destroying objects.
2. Indirect Hostility—both roundabout and undirected aggression. Roundabout behavior such as malicious gossip or practical jokes is indirect in the sense that the hated person is not attacked directly but by devious means. Undirected aggression, such as temper tantrums and slamming doors, consists of a discharge of negative affect against no one in particular; it is a diffuse rage reaction that has no direction.
3. Irritability—a readiness to explode with negative affect at the slightest provocation. This includes quick temper, grouchiness, exasperation, and rudeness.
4. Negativism—oppositional behavior, usually directed against author-

ity. This involves a refusal to cooperate that may vary from passive compliance to open rebellion against rules or conventions.

5. Resentment—jealousy and hatred of others. This refers to a feeling of anger at the world over real or fantasied mistreatment.
6. Suspicion—projection of hostility onto others. This varies from merely being distrustful and wary of people to beliefs that others are being derogatory or are planning harm.
7. Verbal Hostility—negative affect expressed in both the style and content of speech. Style includes arguing, shouting, and screaming; content includes threats, curses, and being overcritical.

It seems reasonable to assume that the inconsistency of previous findings is due not only to inadequate consideration of what constitutes aggressiveness but also to personality differences. Individuals of differing personality types undoubtedly react differently to particular situations and events. Of the numerous personality assessments available, one of the most reliable and widely validated is the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975), which consists of four scales: E (introversion–extraversion), N (stability–instability), P (tough-mindedness), and L (social desirability, or the Lie scale).

My principal aim in the present study was to investigate to what extent, if any, aggressive computer game playing would have on individuals of differing personality composition and in which particular aspects of aggressiveness this might be experienced. The study was limited to measuring aggressiveness, or aggressive affect, rather than overt aggression. It was also intended to examine the different effects of exposure in male and female participants. To avoid confounding effects of age, educational level, and so forth, I used a homogeneous group of university students.

The next issue was choice of stimulus material—the games played. I decided to have three levels of aggression or violence in the content of the games; nonaggressive, moderately aggressive, and highly aggressive. I hypothesized that there would be a linear increase in aggressive affect after playing nonaggressive, moderately aggressive, and highly aggressive games. I also examined interactions among gender and aggressiveness, among gender, aggression level, and personality, and among gender, aggression level, and type of aggressiveness.

## Method

### *Participants and Equipment*

A total of 117 students from Strathclyde University participated (42 men, 75 women).

The main piece of equipment was an Amstrad "Mega" PC486SLC, which incorporates a "Sega" compatible games cartridge drive. The monitor was a VGA color Amstrad PC14DSM 14" designed for the domestic games market. The computer contained an Ad-Lib compatible sound card, and the monitor contained built-in stereo speakers. The manual peripherals involved were an "ergonomically designed" Quick Shot QS-123 ("Warrior 5") analog joystick featuring fire and auto-fire controls and a two-handed Amstrad Mega PC games paddle.

The nonaggressive game was *Tetrisc*, a Shareware version of *Tetris*. Essentially, this game involves manipulating geometric blocks as they fall down the screen. It contains the joystick movements and fire button involvement, sound (musical accompaniment changing along with level of game play achieved), color, and the necessarily fast speed of control that are fundamental features of the other two games; yet *Tetrisc* had no aggressive element.

The moderately aggressive game was *Overkill* (Shareware), a typical, modern arcade-type "space blasters," joystick controlled, vertically scrolling game. One has to shoot up as many alien ships as possible and maneuver to avoid being hit. It is accompanied by firing sound effects and digitized cries of "kill kill kill" when hits are made.

The highly aggressive game was a Sega Mega Drive cartridge of *Fatal Fury*. It is generally regarded as one of the most violent paddle games available outside of the amusement arcades. Essentially, the player takes the form of a martial arts expert and has to kick, punch, head-butt, and so on, the (computer-controlled) opponents before they do likewise to oneself. The graphics are large-scale, realistic-looking human characters. Attention has undeniably been paid by the programmers to convey an impression of pain and injury. Sounds of thumps and groans accompany the bodily impacts.

### *Procedure*

A before-and-after between-subjects design was used, in which each student participated in only one condition (played one game). An equal number of men and women took part in the three conditions. Split-half versions were created for the EPQ and Buss-Durkee inventories, with an occasional repetition across versions to accommodate an uneven number of items on some subscales. Half the subjects were administered Version A first, and half were given Version B first.

The students were told that the study concerned a hand-eye coordination task in relation to personality. They were asked to complete one half of the (merged) inventories and were introduced to the games with standardized instructions. They played the game for 10 min, after which they completed the second half of the inventory. They were then asked briefly about previous experience and present involvement with this sort of entertainment. Before

being debriefed, many of the subjects were asked to rate the game in terms of aggressive content on a 0–10 scale.

### Results

The results of 3 participants were discarded because of an overhigh score ( $> 14$ ) on the combined two parts of the L (social desirability) subscale of the EPQ. Replacement data were obtained from 3 other participants.

Aggression ratings were derived as a change in aggressiveness, measured before and after participation; they could be positive (more aggressiveness) or negative (less aggressiveness). As there were unequal numbers of items in the various subscales of the Buss–Durkee Inventory, these data were calculated as percentages and percentage changes rather than as absolute values.

Table 1 contains the means of the total aggressiveness change between the levels of aggressiveness and between men and women. Table 2 contains the results on the aggressiveness subscales.

A three-way analysis of variance (ANOVA) with two between factors (gender and level of aggression) and one within factor (type of aggression) revealed a significant difference,  $F(2,111) = 4.39, p < .05$ , only between levels of aggression. There were no second- or third-order interactions.

This difference between levels of aggression was clearly between the non-aggressive versus moderately aggressive games, and between the highly ag-

**TABLE 1**  
Means of Total Aggressiveness Change (in Percentages) Between Levels of Aggressiveness and Between Men and Women

Participants	Before	After
<i>Nonaggressive</i>		
Men	35.357	67.436
Women	-2.720	70.574
Total	10.949	76.794
<i>Moderately aggressive</i>		
Men	-25.286	84.063
Women	-33.720	76.804
Total	-30.720	78.485
<i>Highly aggressive</i>		
Men	-20.714	75.667
Women	0.154	82.185
Total	11.840	84.833



**TABLE 2**  
**Means and Standard Deviations on the Aggressiveness Subscales**

Subscale	<i>M</i>	<i>SD</i>	Maximum	Minimum
Assault	1.97	21.79	60.00	-40.00
Indirect Hostility	2.03	25.17	60.00	-60.00
Irritability	-3.26	24.64	50.00	-67.00
Negativism	-0.32	35.74	77.00	-100.00
Resentment	3.13	21.14	57.00	-48.00
Suspicion	0.47	30.77	80.00	-80.00
Verbal Hostility	3.13	21.14	57.00	-48.00
Total aggression	-6.56	80.53	250.00	-170.00

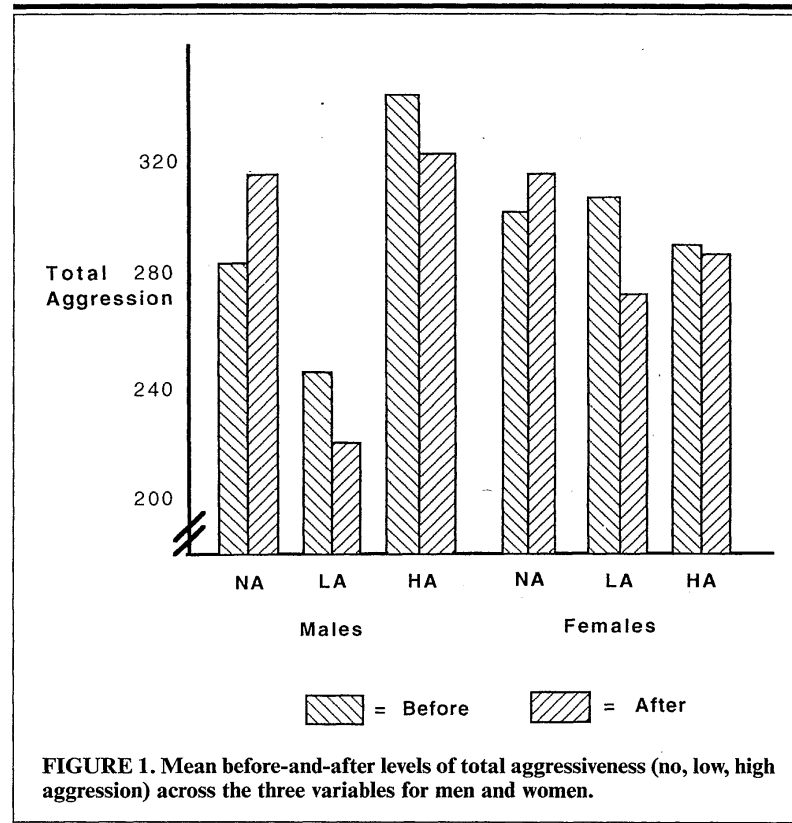
gressive versus moderately aggressive games rather than between nonaggressive games and highly aggressive games, and hence warranted no ad hoc statistical analysis. In other words, there was no linear trend.

A Kruskal-Wallis one-way ANOVA showed no significant differences between overall change in aggressiveness (total) scores and level of game aggression. Nor was there any significant difference (point-biserial correlation) between total aggressiveness change and game aggression level.

Pearson's correlation coefficients were computed on total aggressiveness scores and also on the seven subscales versus the personality variables of extraversion, neuroticism, and psychopathy (a total of 24 correlations); all failed to show significant differences. The mean average (and standard deviations) of aggressiveness content rating given by subjects on the nonaggressive, moderately aggressive, and highly aggressive game were 0.8 (1.4), 5.7 (2.4), and 6.7 (1.8), respectively. Figure 1 shows mean before-and-after levels of total aggressiveness across the three variables for men and women. Finally, it must be remarked that there was a distinct irregularity across the results.

### Discussion

I had hypothesized that there would be a linear increase in aggressive affect after playing nonaggressive, moderately aggressive, and highly aggressive games, but no such increase occurred. The overall pattern was that the moderately aggressive game substantially decreased feelings of aggression, whereas the highly aggressive game resulted in much less of an increase in aggressiveness than I expected, although no more so than occurred in the control game. Generally, the participants did regard the games to be more aggressive in the expected order, although the difference of feelings about the



two aggressive games was not as great as might have been expected. However, this pattern could not account for the irregularity of aggressiveness changes that were found.

The greatest change was among the men who participated in the nonaggressive game. They showed substantially more overall aggressiveness afterward. However, the men who played the nonaggressive game had generally been considerably (although at chance level) less aggressive both before and after playing than the men randomly assigned to the two aggressive games. This finding only emphasizes the fact that individual variability is more important than variability in affect induced by playing computer games.

I also examined second- and third-order interactions between gender, aggression level, and personality. Despite careful choice of variables and materials, none were found.

For over a decade, proponents of video games have championed their educational value (Malone, 1981), value for social interaction and growth, and therapeutic value (Leerhsen, Zabarsky, & McDonald, 1983). However, an explanation for the present results may be more physiological than psychological. One approach to understanding the causes of aggression emphasizes the role played by the sympathetic nervous system, with heightened sympathetic activity seemingly facilitating overt aggression. Winkel et al. (1987) found that, for male adolescents, personality traits and heart rate were separately related to aggression. Personality characteristics similar to those of the Type A individuals were related in a positive direction to heart rate in women. Winkel et al. concluded that there was no evidence that the link between game playing and aggression is due to mimicry per se. Their results suggest that home video games, regardless of their aggressive content, may stimulate a more violent reaction in girls than in boys.

The interactions between the variables are obviously complex, and glib statements relating aggression to game playing, whether appearing in the mass media or in scientific journals, seem totally unwarranted. In addition, Cooper and Mackie (1986) suggested that only their female participants felt there was little difference in aggressiveness content between the games played—Pac Man and Missile Command.

In general, one should not overgeneralize the negative side of computer games playing. During the last decade, the market for fun-laden *educational* software has exponentially increased. Also, Funk (1992) suggests that playing home video games may have a less adverse impact on academic functioning than playing in an arcade.

There may also be individual differences in the effect of game playing. Some people may be able to spend a great deal of their free time playing arcade videos without any resulting aggression. Huesmann (1982) concluded that children who are exposed to the least violence may be the most aroused and most likely to act aggressively. Because girls are likely to have less experience with violence, they are the group likely to be more aroused by the exposure.

The present study points up the need for considering the strength of individual differences when researching the effects of video games on feelings of aggression.

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*Received July 25, 1994*