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The effect of violent games on aggression

REVIEW

The aim of this study was to examine the effects of violent video games on aggressive behaviour when played by children and adolescents. This was done by investigating several theories and by conducting a structured literature review in which the studies were considered separate by methodology. Eight articles were included in the review after computerized searches of the psychological database PsycINFO. The results showed a small effect of violent video games on aggressive behaviour. However, several other factors have been found to play a role and to make the effect larger. Examples of these factors are wishful identification, competitiveness, arousal, and trait aggression. Gender has also been found to play an important role: the effects of the games are higher within boys when compared to girls.

Keywords: video games, aggressive behaviour, children, adolescents

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INTRODUCTION

Problem

In the past decade, there has been a significant increase in the number of children and adolescents that play video or computer games. Data from the first nationally representative study of video game play in the United States indicate that 97% of adolescents aged 12 to 17 play computer, web, portable, or console video games (in this study “video games” will be used to refer to all), with 31% of the sample playing on a daily basis and another 21% playing 3 to 5 days a week (Lenhart et al., 2008). Interestingly, half of the adolescents that were surveyed reported playing violent video games and that half of the 10 most frequently played games were violent games.

The high prevalence of violent video games raises questions about the possible psychological and behavioural effects, especially whether the violent content would lead to an increase of aggressive behaviour in children and adolescents. Aggression includes a range of behaviours which can be verbal, physical, emotional or mental. These behaviours can have consequences such as being psychologically and/or physically harmful to oneself or others and are therefore important social issues.

Many studies have been conducted in the past few years to examine aforementioned questions and to find a causal association between violent games and aggression. The results of these studies are inconsistent. There are several studies suggesting that playing games with violent contents leads to an increase of aggressive behaviour. However, there are also studies suggesting that violent games do not lead to an increase of aggressive behaviour but rather decrease aggression, and studies that found no effect of video games on aggression at all.

The aim of the present review is to examine the association between violent videogames and aggression by examining, analyzing and summarizing several studies in the literature. Given the distinction between correlational and causal evidence, there are controversial results when this is done by the use of the specific question "What is the effect of violent games on aggression in children and adolescents?". Many studies are correlational and can be confounded, and only experiments can answer the question. These differences in methodology (correlational vs. causal) can explain the different results of the studies and the controversy. In this review, the results of these studies will be compared with the following research question "If you consider studies separately by methodology (i.e. correlational versus experimental), do the results in each category then become more equivocal?". The results will provide a clearer picture of the association between violent video games and aggression. The next section will first consider several theories that are relevant to the problem and relevant to address the research question correctly.

Theoretical framework

Social learning theory

According to the social learning theory of aggression, learning can result from direct experience but can also occur by observation. This latter kind of learning enables organisms to acquire large, integrated patterns of behaviour without having to form them gradually by tedious trial and error (Bandura, 1978).

According to the theory, violent video games provide both children and adolescents the opportunity to learn aggressive behaviour by observing the aggressive styles of behaviour used in the games. They will be able to imitate the aggressive character(s) of the game in real-life if they have the subskills that are necessary for the action. This ability to imitate will be more likely when the child can identify himself or herself with the game. Rewards and punishments also play a role in this theory. When children see someone rewarded after an aggressive behaviour, they are more likely to imitate the behaviour. However, this is in general only done when a real-life equivalent of the reward used in the game exists.

The social learning theory also has some predictions about specific effects of

exposure to violence in the media, which we can adapt to exposure to violence on computer or video games: (1) it teaches the players aggressive styles of behaviour, (2) it changes the restraints over aggressive behaviour, (3) the players become desensitized and habituated to violence, and (4) their image of the reality becomes shaped because they cannot differentiate the game and the reality.

Cognitive neoassociation theory

The cognitive neoassociation theory includes another kind of learning. Berkowitz (as cited in Anderson & Bushman, 2002) has proposed that aversive events such as frustrations and provocations, produce negative affect, and subsequently aggression. Negative affect becomes linked, through learning and conditioning during other life experiences, to various thoughts, memories, expressive motor reactions, and physiological responses (Gentile, 2003). This linkage means that when negative affect is present, it automatically activates the other responses. These responses are associated with both fight and flight tendencies, which are immediate and simultaneous. The associations of fight lead to primitive feelings of anger, whereas the associations of flight lead to primitive feelings of fear. If the fight tendency is stronger, it will most likely give rise to aggression. If the flight tendency is stronger, it will inhibit the aggression.

This so-called cognitive neoassociation theory further assumes that cues present during an initial aversive event become associated with the cognitive, emotional and motor responses triggered by the event. When these cues are present later in different situations and events, they may trigger the same responses as those present at the initial event.

Adapting these predictions of the cognitive neoassociation theory to violent video games gives rise to the suggestion that violent video games will activate related cognitive structures because the violent content will give them feelings of frustration and provocation, making it more likely that other incoming information would be processed in an “aggression” framework, possibly increasing aggressive behaviour (Griffiths, 1999).

However, higher-order cognitive processes are also taken into account in the theory. Appraisal and attribution are examples of such processes and people may use these processes to analyze their situations (by thinking about their feelings, making causal attributions and considering the consequences of acting) if they are motivated to do so. More clearly differentiated kinds of feelings of anger and/or fear are produced by this deliberate manner of thought. These thoughts can also suppress or enhance the tendencies to act which are linked with the feelings. When we apply this to games, it is possible that people become less aggressive if they think about the difference between games and real-life and consider that acting in an aggressive manner like in the games will lead to serious consequences in real-life.

Excitation transfer theory

Excitation transfer theory is based on the fact that the dissipation of physiological arousal occurs slowly. If two arousing events are separated by a short period of time, some of the arousal caused by the first event may transfer to the second event and add to the arousal caused by the second event (Gentile, 2003). When this is the

case, an improper attribution of the arousal from the first event to the second event may occur. Thus, if the second event is related to anger, then the person should be even angrier with the additional arousal. The theory suggests that even after the arousal has dissipated, the person may still remain ready to get angry and behave aggressively when he/she attributes the heightened arousal to anger and for as long as that label persists.

This theory is relevant to the understanding of game violence because the violent content can be arousing. The arousal from the game can transfer to other emotional experiences because it dissipates slowly. If a person is already feeling angry or aroused, a violent video game can increase the intensity of this feeling because of aggressive content and thereby increase the possibility to respond aggressively. Thus, according to the excitation transfer theory, it would be expected that violent video games only increase aggression in the presence of anger from some other source or cause.

General aggression model (GAM)

The general aggression model is a theoretical framework that integrates the existing domain specific or mini theories into a unified whole. The three main foci concern (a) person and situation inputs; (b) cognitive, affective, and arousal routes through which these input variables have their impact; and (c) outcomes of the underlying appraisal and decision processes (Anderson & Bushman, 2002) (Figure 1). This manner of approach in a unified whole provides a more comprehensive understanding of human aggression.

The input consists of factors that influence aggressive behaviour. These factors can be put in the category of features of the situation or in the category of features of the person in the situation. The features of the person include all the characteristics of a person that he or she brings to the situation and together form the preparedness of a person to be aggressive. Traits are relevant person factors in the theory because certain traits make persons more likely to exhibit high levels of aggression. Sex, beliefs, attitudes, and values are other examples of inputs in the category of person factors. Situational factors include all of the important features in the situation. Both types of factors have an impact on aggression by influencing cognition, affect, and arousal. Relevant factors in the category of situational features are aggressive cues, provocation, and frustration.

Input variables influence the final outcome behaviour through the present internal state that they create (Anderson & Bushman, 2002). The most relevant internal states, which are called 'routes' in the model, are cognition (for example 'hostile thoughts' and 'scripts'), affect (for example 'mood and emotion' and 'expressive motor responses'), and arousal.

The third focus of the model, which is on outcomes, consists of several complex information processes. Results from the inputs enter into the appraisal and decision processes through their effects on cognition, affect, and arousal (Anderson & Bushman, 2002) (Figure 2). These processes range from relatively automatic, called 'immediate appraisal', to heavily controlled, called 'reappraisal'. The final action is determined by the outcomes of these decision processes. The final outcomes then

go through the cycle to become the inputs for the next episode. The figures below illustrate the model and the way in which aggression due to violent games can be interpreted with this model.

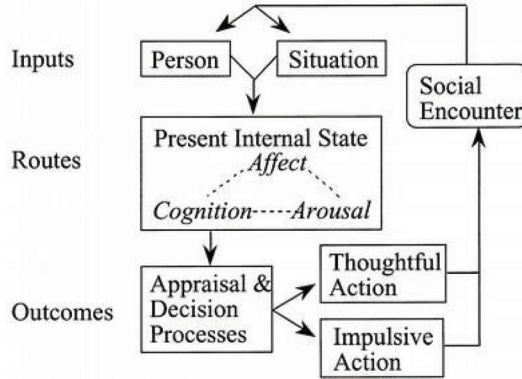


Figure 1. A simplified version of the main foci of the model. Adopted from Anderson & Bushman (2002).

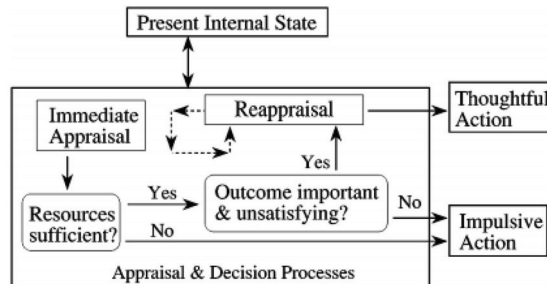


Figure 2. The appraisal and decision processes. Adopted from Anderson & Bushman (2002).

METHODS

The present study is a literature review which was conducted by finding relevant articles through computerized searches of the psychology database PsycINFO on EBSCOhost. The relevant concepts of the research question are ‘aggression’, ‘violent games’, and ‘children and adolescents’. These concepts were combined together, including their synonyms, by the use of logical operators to compose the search query. The resulting search query was: (aggression OR “aggressive behaviour” OR “violent behaviour” OR “behavioural effects” OR violence) AND (“violent games” OR “violent video games” OR “violent computer games” OR “violent online games”) AND (children OR adolescents). Using this search query in March 2012 on the database of PsycINFO yielded 90 hits.

These 90 articles were filtered for language and availability, leaving 48 hits that were further filtered on game violence and aggression, and original research

articles, which finally resulted in 8 articles used in present review.

RESULTS

Correlational studies

The first study, conducted by Funk et al. (2002), investigated whether individuals with a high preference for violent games report more problem behaviours and emotions, particularly aggressive behaviour, than individuals with a low preference for violent games on a standardized self-report measure of adolescent problem behaviours. They also examined gender differences, with the prediction that the relationship would be stronger for males.

The results of the study did not support the prediction that adolescents with a preference for violent games would report more externalizing problems, such as delinquent and aggressive behaviour.

A study with a similar aim as the previous one was conducted by Willoughby et. al (2011), involving a longitudinal study investigating the link between sustained video game play and aggressive behaviour in adolescents, with the anticipation that higher levels of sustained violent video game play would be related to increases in aggression over time.

The sample of the study was 1492 students from eight high schools in Ontario, Canada. Direct aggression was assessed by the use of two scales of overt aggression. Prevalence of violent video game play was assessed by asking the participants to indicate 'yes' or 'no' to the question whether they played action or fighting video games and an index ranging from 0 to 1 was created by calculating the ratio of number of time periods (consists of grade 9, 10, 11 and 12) in which the participant reported playing those games to the number of waves that the participant completed. Both main study variables, aggression and violent video game play, were measured at each of the four time periods. In addition, each analysis included a comprehensive set of potential third variables as covariates (e.g., nonviolent video game play, overall video game play, & gender).

The first set of analyses showed that even after controlling for potentially relevant third variables, adolescents playing violent video games across years reported significant steeper increases in aggression over time when compared to participants who reported less play. However, the effect was suggested to be small. Further results showed that playing violent video games, but not playing nonviolent games, predict higher levels of aggression over time. This was still the case after controlling for stability in aggression and the third variables. In contrast, the frequency of aggression did not predict higher levels of violent video game play, which means that there was no support for the selection hypothesis. In sum, all of the three sets of analyses provide strong support for the socialization hypothesis.

A different longitudinal study about video games and aggression was conducted by Lemmens et al. (2011). The aim of the study was to expand our understanding of excessive and pathological involvement with computer or video

games and how this is related to physical aggression. Specifically, the study had four aims: (1) to examine whether pathological gaming among adolescents predicted an increase in the frequency and duration of game behaviour, (2) to determine whether pathological gaming leads to an increase in physical aggression, (3) to examine whether violent content of games caused or aggravated the effect of pathological gaming on physical aggression, and (4) to examine whether there were sex differences in the possible effects of pathological gaming on aggression.

The results of the study showed that, first higher levels of pathological gaming predicted an increase in the frequency and duration of gaming six months later. This finding indicates that pathological gaming is progressive. Second, higher levels of pathological gaming predicted an increase in physical aggression six months later, regardless of a violent or non-violent content of the game. However, this effect was only found for boys and the adolescent boys in the study predominantly played violent games. This pathological involvement with violent games may have strengthened the effect on physical aggression. Finally, not just time spent playing games but time spent playing violent games, caused an increase in physical aggression.

Experimental studies

In order to investigate the association between violent video games and aggression, Konijn et al. (2007) conducted a study and tested whether violent games are likely to increase aggression, especially when players identify themselves with the violent characters in the game. They used 99 Dutch boys from VMBO classes as participants. It was believed that male adolescents with lower educational ability may be especially vulnerable because they are more likely than others to consume violent media and are also more likely to engage in aggressive behaviour (Konijn et al., 2007).

Two weeks prior to the experiment the participants completed a questionnaire including measures of trait aggressiveness, sensation seeking, and video game exposure. Then, the participants were randomly assigned to play a violent-realistic game, a violent-fantasy game, a nonviolent-realistic game, or a nonviolent-fantasy game. After playing the game for about 20 minutes, the participants were asked to complete a competitive reaction time task with an ostensible partner. As a measure of aggression, the winner (faster response) could blast the loser (slower response) with loud noise through headphones but they were told that high noise levels could lead to permanent hearing damage. The researchers were especially interested in the first of the 25 trials because that one provides a measure of unprovoked aggression while the rest concerns aggression converged on beliefs about what the partner has done. After the task, the participants were asked to complete several rating scales. These rating scales included a measure of wishful identification with the main character in the game they had played, a measure of immersion level, and a measure of realism.

The results showed that the players of violent games were more aggressive than the players of nonviolent games. Furthermore, there was a positive relation between sensation seeking and aggression, and simple effects analyses showed a significant relation between wishful identification with the main characters in

violent games and aggression, while such a relation was not found when identification with nonviolent games was the case. Another study with an ostensible partner and noise through headphones was conducted by Bartholow & Anderson (2002), using 43 undergraduate students who were not habitual game players and who first were assigned to a violent or nonviolent video game condition.

The severity of the noises that the participants set were used as a measure of aggressive behaviour and an analysis of the mean intensity settings show that participants who played the violent game, set higher levels of noise in comparison to the participants in the nonviolent condition. This finding supports the prediction that violent games could increase aggressive behaviour. Simple effects examinations revealed that the effects of playing violent games only existed for males and that females set similar levels of noise regardless of the game condition. These findings give rise to the suggestion that male adolescents may be more affected by violent video games than are female adolescents.

The study conducted by Adachi & Willoughby (2011) consisted of two pilot studies, which tested whether the games that were chosen differed or matched in terms of competitiveness, difficulty, pace of action, and violence, and two experiments.

At the first experiment, each of the 42 participants (college students) randomly played a violent game or a nonviolent game for 12 minutes. Then, The Hot Sauce Paradigm (Lieberman et al., 1999) was used for the measurement of overt aggressive behaviour. The participants had to prepare some hot sauce for another participant who does not like spicy food but in reality no other participant existed. Participants knew that the other participant had to drink whatever they prepared and could choose the intensity of hot sauce and the amount. In addition to this measurement of aggressive behaviour, a questionnaire was used to measure trait aggression and to examine the validity of The Hot Sauce Paradigm. The results of this first experiment show that there is a positive correlation between the paradigm and the trait aggression questionnaire. There was no difference in hot sauce scores between the participants who played the violent game and the participants who played the nonviolent game. This finding suggests that the violent content alone is not sufficient to produce an increase in aggressive behaviour.

As violent content alone was not found to be sufficient, the second experiment examined the effects of competitiveness. Each of the 60 participants (college students) were randomly assigned to play one of the four video games. These games included a highly competitive violent video game, a competitive nonviolent video game, a less competitive violent video game, and a less competitive nonviolent video game. The violent games were also classified into levels of a high violent content or moderate violent content. The procedure and used measurements after the game session were the same as in the first experiment: The Hot Sauce Paradigm was used to measure overt aggressive behaviour and a questionnaire was used to measure trait aggression. However, there was an additional measurement of heart rate by the use of ECG at baseline and throughout the game session. The results show that only the two highly competitive games led to an increase in the heart rate from the baseline. These two most competitive games also produced greater scores for aggressive behaviour than the less competitive games did. Another relevant finding was that the combination of a high level of violent content with a moderate level of

competitiveness was not sufficient for an elevation in aggressive behaviour when compared to a game with less competitiveness and nonviolent content. These findings suggest that competitiveness plays a relevant role in the relation between video games and aggression.

The study of Fleming & Rickwood (2001) examined the effects of violent versus nonviolent video games or paper-and-pencil games on children's arousal, aggressive mood, and positive mood. In addition, gender differences and the role of prior experience with video games is examined to see whether this leads to any desensitization to violence. The participants were 36 boys and 35 girls with a mean age 10 years from a public junior school in Australia.

The independent variable of the study was the level of game violence (paper-and-pencil game, non-violent video game, or violent video game) and the dependent measures were heart rate, self-reported arousal, aggressive mood, positive affect, and general mood. Heart rate was measured by the use of a Bioview Series IV Biofeedback system and was a measure of physical arousal and the other dependent variables were measured with scales. In addition, earlier experience with video games was the covariate. Every child played all the games after being assigned to an order of game play.

The results show that playing the violent game led to a significant increase in arousal when compared to the other two game conditions. Girls were more aroused than boys. However, playing the violent game did not lead to a significant increase in aggressive mood for either boys or girls. Positive mood measured by positive affect did not show any effects but positive mood measured by general mood showed a significant increase for both genders after playing the violent video game.

The study of Unsworth et. al (2007), acknowledges the possibility of three distinct outcomes of violent video game play: a negative effect, no detrimental effects, or a positive effect on aggression. The role of predictors in the context of all three outcomes were examined.

The participants of the study consisted of 111 males and 15 females between the ages of 12 and 18 years. These participants first completed a gaming questionnaire, as a measure for game habits, and three other questionnaires that measured personality traits (psychoticism, neuroticism, and extraversion), trait anger, and trait anxiety. Then, the participants played the game Quake II, because of its violence ratings. During their playing, accessibility to aggressive thoughts were assessed by the use of the Articulated Thoughts in Simulated Situations (ATSS) Paradigm (Davison, Vogel, & Coffman, 1997). This method recorded and measured the thoughts of the participants after they were asked to talk out their thoughts loud into a microphone during the game. When the game session ended, the questionnaires on trait anger and trait anxiety were re-administered.

The results show for some people an increase, for some a decrease and for the majority no changes in anger ratings/aggression. Using state and trait variables was found to be useful to predict these reactions. A "labile" temperament coupled with high state anger at pregame-play led to a cathartic effect (decrease); a "labile" temperament coupled with low state anger at pre-game-play led to an increase in angry affect; and a "stable" temperament led to no change in angry effect following game-play (Unsworth et al., 2007). Another relevant finding of the study was that exposure to violent video game was not related to angry affect or aggression temperament.

DISCUSSION

The first question of this study, “What is the effect of violent games on aggression in children and adolescents?”, was examined by a structured literature review. The most relevant finding in the included research articles about the effect of violent games on aggression is that there mainly was a small but no significant support for a positive effect of playing violent video games on aggressive behaviour, suggesting that a violent content alone is not sufficient to predict aggression. The second question, “If you consider studies separately by methodology (i.e. correlational versus experimental), do the results in each category then become more equivocal?”, was examined by considering the studies separately by methodology. The results show that even when studies are considered separate (i.e. correlational versus experimental), there are still inconsistent findings. The reason for this is the differences in the measurements (different scales, different games) used within the categories and the many possible confounders.

There are several results revealing that there are other factors that play a role in influencing aggressive behaviour. One of these factors is gender. Results show a greater increase in aggression for boys playing violent games, while girls were reported to have a very small increase or even no increase at all. This finding suggests that boys are more likely to be affected by violent video games. According to the results, another relevant factor is wishful identification. A significant relation between wishful identification with the main characters in violent games and aggression was found, while such a relation was not found when identification with nonviolent games was the case. The next main finding is that higher levels of competitiveness in games lead to higher levels of aggression, predicting an important role of competitiveness in the relation between violent games and aggression.

All those influencing factors actually provide support for the General Aggression Model, which is previously described and which includes all of the found factors. A support for the Social learning theory is provided by the study of Konijn et al. (2007) in which wishful identification with the characters in violent games had a positive relation with aggressive behavior (according to the theory people are more likely to imitate if they identify themselves with the model). The study of Fleming & Rickwood (2001) shows that there is an increase in general mood after playing violent games, which is inconsistent with the Cognitive neoassociation theory that suggests that violent games will lead to an increase in aggression because it will activate negative feelings and related cognitive structures.

However, more researches are needed for a better understanding of the relationship and for a clearer answer on the research question of this study.

After all these findings, it is still not possible to give a clear answer on the research question. Studies with findings that indicate an association between violent games and aggression are mostly not matched in terms of competition and pace of action for example and violent content alone is not sufficient for a significant effect, there are many other factors that have an influence on the relation between violent video games and aggressive behavior. More research has to be done to get a clearer understanding of the association and to be able to provide a clear answer on the research question.

A suggestion for future research is the examination of more factors with a possible role in the relation between violent video games and aggression at once and to match conditions in terms of game characteristics, competitiveness and pace of action. It is also relevant for future research that methods other than self-report scales are used because of the lack in reliability of these self-report scales. Finally, we can say that there is still more research needed to be able to say something about the association between violent video games and aggression.

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