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Examining Media Effects: The General Aggression and General Learning Models

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Abstract

The study of screen media effects is becoming especially important because people spend increasing amounts of time on visually-realistic entertainment media. This chapter applies two related theoretical frameworks to the study of media effects: the General Aggression Model (GAM) and the General Learning Model (GLM). Both theories posit relations between media exposure and internal processes, behavior, and the development of long-term knowledge structures and attitudes. GAM focuses on the development of aggressive knowledge structures and attitudes derived from exposure to violent media depictions (amongst other aggression-related stimuli), and their relation to aggressive behavior. GLM, a broad extension of GAM, posits how long-term attitudes and knowledge structures are formed with continued exposure to any type of media (violent or nonviolent), and how “media-trained behavior” can ensue. How these processes operate, the role of individual differences, and short- and long-term consequences of media exposure are discussed.

Mass media are powerful teachers. As we and many others have noted, the contents of mass media determines what they teach (e.g., Anderson, Sakamoto, Gentile, Ihori, et al., 2008; Gentile, Anderson, Yukawa, Ihori, Saleem, et al., 2009). For instance, Swing and Anderson (2007) noted that electronic media have been used in the classroom to teach topics ranging from photography to flying airplanes. Gentile and Gentile (2008) showed that well-designed mass media, video games in particular, have all of the key features of excellent teaching. The question remains: What behaviors are viewers learning from the mass media?

This chapter describes two theoretical models that predict when, why, and for whom media exposure is related to behavior. The primary focus of this chapter is to describe the General Aggression Model, which posits how media violence exposure is related to aggressive behavior. Then we discuss the tenants of the General Learning Model. This model was more recently developed from the postulates of the General Aggression Model, and, thus, less text will be devoted to describing this model. The General Learning Model can predict how exposure to any type of media content may be related to “media-trained behavior.” In describing these models, we discuss earlier theoretical models that led to the derivation of the General Aggression and General Learning Models, describe the relevant research testing these theories, and describe the role that certain individual differences play in these relations. Finally, future directions and conclusions are offered.

The General Aggression Model

The General Aggression Model (GAM; Anderson & Bushman, 2002) is a dynamic, developmental, and social-cognitive integrative model of human aggression (see Anderson & Carnagey, 2004). GAM has the explanatory power to predict how exposure to any aggression-

related stimulus (including media violence) is related to subsequent aggressive behavior. The full GAM can be dissected into two highly related sets of processes that operate in the immediate situation (proximate) or more distally. Proximate processes are those that are directly related to current aggressive behavior. Distal processes are those that tie immediate short-term effects of a given stimulus to the development of long-term aggressive behavioral tendencies.

Proximate GAM

The proximate GAM (see the lower part of Figure 1) begins with two types of input factors: situation and person factors. Situational variables are those factors that the individual is currently interacting with that are related to the probability of engaging in aggressive behavior in the immediate situation. These may include exposure to media violence (Anderson et al., 2003), provocation (Bettencourt & Kernahan, 1997), heat (Anderson, 1989), and a host of others (Anderson & Huesmann, 2003).

Person factors are those individual difference variables that may directly be related to aggressive behavior (e.g., trait aggression, mood), or that may moderate the effects of situational variables. Research has shown that a variety of person variables moderate the relation between media violence exposure and aggression. For instance, Bushman (1995) found that videotaped violence was more likely to increase aggression in high trait aggressive individuals than in low trait aggressive individuals. Markey and Scherer (2009) found that violent video game exposure was related to more aggressive cognitions and aggressive affect for participants high on trait psychoticism compared to participants with low levels of psychoticism (see also Kirsch, Olczak, & Mounts, 2005 for the moderating role of trait hostility).

One single episodic cycle through GAM's proximate processes focuses on how these input factors influence one's present internal state, consisting of aggressive cognitions,

aggressive affect, and physiological arousal. All of these internal state variables are predicted to be correlated with one another. For example, if one feels hostile or frustrated (aggressive affect) then those feelings may trigger aggressive thoughts. It is important to note that GAM does not state how many or which internal state variables are necessary for aggressive behavior to occur. Any one or combination of internal state variables is able to increase the likelihood of aggressive behavior. For instance, the relation between media violence exposure and aggressive behavior appears to be primarily influenced by the aggressive cognition route, although increases in aggressive affect or physiological arousal may also play a role in some cases (Anderson & Dill, 2000).

GAM further posits that the active contents of one's present internal state both influences and is influenced by a complex appraisal and decision process (See Anderson & Carnagey, 2004, for more details.). Borrowed from the attribution literature (e.g., Anderson, Krull, & Werner, 1996), after experiencing a significant event an individual will make an initial attribution as to why it occurred. This initial appraisal can occur quickly and without conscious awareness, and may include behavioral response options. If the observer does not have the time, motivation, and cognitive resources to change their initial attribution, then an impulsive behavior will likely occur. However, if the person does have the time, motivation, and cognitive resources to reassess the initial attribution, then the observer must decide if the initial attribution is important and unsatisfying. If the outcome is unimportant or satisfactory, then an impulsive behavior is likely to occur. If the outcome is important and unsatisfying, then an individual may engage in a number of re-appraisals of the event. This process iterates until the observer is satisfied with their attribution or until a response is required; then a thoughtful behavior is likely to occur. A thoughtful or impulsive action can be either aggressive or non-aggressive, and re-appraisal does

not guarantee that an initially hostile attribution will be altered. Knowledge of the input factor(s), the present internal state, and other constraints allow one to predict whether the behavioral outcome is likely to be impulsive or thoughtful, aggressive or non-aggressive.

Whether thoughtful or impulsive, aggressive or non-aggressive, the ensuing behavior influences the on-going social encounter. This social encounter will feed back into the situational input factor. Thus, GAM posits a feedback loop that can lead to a violence escalation cycle. Anderson, Buckley, and Carnagey (2008) argued that aggressive behavior can involve any dyadic units that come into conflict with one another (e.g., two people, two nations). An event that triggers a hostile interpretation is coined a triggering event that starts the Violence Escalation processes. This event can range from relatively minor perceived provocation (e.g., hearing a rumor) to a major perceived provocation (e.g., getting punched). After this initial provocation, the victim is likely to retaliate in a manner more severe than the initial provocation warranted. Next, the original aggressor is likely to retaliate with a more severe retaliatory response. This cycle tends to continue. At the person-to-person level, media violence (along with other situational and personological risk factors) are predicted to influence the knowledge structures retrieved, the extent to which the triggering event is perceived as hostile, and the specific behavioral response. Anderson et al. (2008) showed that high trait aggressiveness, paired with a minor triggering event, can initiate the violence escalation cycle.

Distal GAM

GAM incorporates a developmental cycle into its theorizing on aggression via the distal processes. Distal processes predict how continued exposure to aggression-related stimuli influences the development of one's aggressive personality (see upper part of Figure 1). Two types of modifiers are likely to influence the extent to which an aggressive personality is

developed. The first are biological modifiers that can influence the probability of aggressive behavior (see Raine et al., 1997). Anderson and Carnagey (2004) argued that such biological predispositions interact with the second type of modifier: environmental modifiers to influence aggressive personality.

At its heart, GAM is a social learning model of aggression. Each time that an individual interacts with aggression-related situational variables serves as one learning trial. This can include the learning, rehearsal, and reinforcement of aggressive related knowledge structures (Anderson & Carnagey, 2004). Continued exposure to stimuli and situations that evoke aggressive thoughts, feelings, and behaviors will eventually lead to the development of well-practiced knowledge structures that are used to interpret events, make decisions, and ultimately increase the likelihood of aggressive behavior. Figure 3 illustrates a number of ways that violent video games can influence the developmental of aggressive personality. Prior to discussing the different knowledge structures, it should be noted that this is not an exhaustive list related to the development of an aggressive personality.

One process involves desensitization, defined as the “reduction in emotion-related physiological reactivity to real violence” (pp. 490; Carnagey, Anderson, & Bushman, 2007). It has been argued that desensitization is related to aggressive behavior because individuals will have less of a negative emotional and physiological reaction to seeing, thinking about, or planning real-life violence. Research has shown that exposure to violence in the media is related to desensitization (Carnagey et al., 2007; Bushman & Anderson, 2009). Therefore, continued violent media exposure will likely be related to aggressive behavior because viewers may not be as emotionally or physiologically affected by real-life violence.

To test the desensitization hypothesis, Carnagey et al. (2007) had participants play either a violent or non-violent video game and measured their physiological arousal at baseline, after game play, and then after being exposed to film clips of real-life violence. The media violence/desensitization hypothesis predicts that participants who played the violent video game should show less physiological reactivity to the film violence than those who had played a non-violent game. This is exactly what was found (Carnagey et al., 2007). In a pair of follow-up experiments, Bushman and Anderson (2009) tested the relation between media violence exposure and the likelihood of helping a person in distress. Participants who had recently played a violent video game or watched a violent movie were less helpful than those who had just played a nonviolent video game or watched a nonviolent movie.

Other studies have examined how desensitization is related to aggressive behavior. For example, Bartholow, Benjamin, and Sestir (2006) found that the relation between media violence exposure and aggressive behavior was mediated by physiological desensitization, suggesting that desensitization is one process by which media violence is related to aggressive behavior.

Another long-term process involves the development of aggressive attitudes and beliefs. GAM predicts that positive attitudes and beliefs towards violence should be related to the development of one's aggressive personality. GAM argues that these positive attitudes and beliefs regarding aggressive behavior are formed when an aggressive behavior is positively reinforced (see Bandura, 1965). There are numerous studies showing such effects. In the video game domain, Anderson et al. (2004) found that video game violence exposure was positively related to positive attitudes towards violence, and that the relation between violent video game exposure and aggressive behavior decreased substantially (sometimes to non-significance) when positive attitudes towards violence was entered into the model. Longitudinal evidence found that

exposure to violent video games significantly predicted normative beliefs about aggression 30 months later, and that these aggressive beliefs were significantly related to subsequent physical aggression (Moller & Krahe, 2009). This provides support for the hypothesis that positive attitudes towards violence at least partially mediate the relation between violent video game exposure and aggressive behavior.

Another process is formation of aggressive behavioral scripts. Behavioral scripts are a specific type of knowledge structure represented in one's memory. Scripts are defined as mental representations of how the flow of events should occur in a given social situation (Abelson, 1981). Behavioral scripts guide behavior because they help cognitively map how one is to act. Related to aggression, behavioral scripts help dictate when and how one should aggress in certain social situations. Which situations these aggressive behavioral scripts may be utilized depends partially on the individual and what scripts are encoded. At a theoretical level, individuals who are continually exposed to real-life or media violence should have readily accessible aggressive behavioral scripts that are automatic and fairly retrievable, while those who have viewed less violence should have fewer aggressive behavioral scripts accessible, and the scripts that exist may not be as automatically retrieved. Indeed, research shows that short-term exposure to violent video games increases the accessibility of aggressive scripts (e.g., Bushman & Anderson, 2002), and long-term exposure is related to hostile attribution biases (Anderson, Gentile, & Buckley, 2007).

Another long-term process the development of aggressive perceptual schema. This type of knowledge structure can be used to identify simple everyday objects, such as a computer, but also complex social events, such as a provocation (Anderson & Carnagey, 2004). These types of knowledge structures contain nodes, or concepts in semantic memory. Adapted from Cognitive

Neo-Associative Theory (see next section), aggressive concepts with similar meanings (e.g., kill, murder) and concepts that are repeatedly paired with one another (e.g., knife, stab) become strongly linked in semantic memory. Priming one node of a well-developed associative network increases the likelihood that other nodes of that network be activated. Research by Anderson, Benjamin, and Bartholow (1998) showed that after being primed with pictures of aggression-related items (e.g., guns), participants had faster response times to similar aggressive words, such as “injure”, compared to control words, such as “survey”, and compared to trials with non-aggression related picture-primers (e.g., plants).

Anderson et al. (2004) more directly tested the hypothesis that brief exposure to a violent video game primes aggressive thoughts. In Experiment 1, participants played either a violent or a nonviolent video game, then did a word completion task that involved making words from word fragments. As expected, those who had just played a violent game were more likely to create aggression-related words than those who had played a nonviolent game. These studies show that brief exposure to violent media images (e.g., guns) prime aggressive perceptual schemata.

Distal evidence for the relation between media violence exposure and aggressive perceptual schema was found by Anderson et al.'s longitudinal study (2007, Study 3). Violent video game exposure and hostile attribution bias of elementary school children were assessed at two points during a school year separated by about six months. Repeated exposure to violent games predicted increases in hostile attribution bias, a type of aggressive perceptual schema.

Using a very different paradigm, Uhlmann and Swanson (2004) showed that high exposure to violent video games among college students was associated with highly accessible aggressive self-images. Thus, media violence appears to create aggression-related knowledge

structures of various types developmentally (distally), and activates them when they played (proximally).

GAM is Integrative

A strength of GAM is its ability to explain how myriad short and long-term variables and processes are related to aggressive behavior. GAM has such explanatory power because it was derived from a number of other, more specific, aggression theories. Thus, GAM is an integrative model of aggression theories. Several of the theories that were influential to GAM will be discussed.

Cognitive Neo-Associative Theory. Berkowitz's (1984, 1993) Cognitive Neo-Associative Theory posits that specific emotional states and memories are represented as nodes in semantic memory. Once any node becomes activated, other related nodes become activated forming an associative network through a process called spreading activation. Berkowitz's model posits that after a provocation, for example, individuals experience negative affect, which activates at least two associative networks. The first network is the aggression-related tendencies network, in which aggressive thoughts and memories become activated, along with expressive motor responses related to aggression, and physiological arousal. After activation of this network, the aggressive thoughts and memories are going to activate feelings of anger. The second network is the escape-related tendency network, which consists of thoughts and memories related to feeling fear, along with the strong physiological reaction to fear, and gross motor responses to being afraid. Once these networks are active, the result is the affective consequence of fear. Both of these routes then proceed to the next step of analysis, which consists of higher-order processing. The end result is a behavior that is either anger-related (for the aggression route) or fear-related (for the escape route).

Excitation Transfer Theory. Excitation Transfer Theory (Zillmann, 1971) posits that aggressive behavior can be explained by the arousal produced from any stimuli, including the media. The physiological arousal experienced from the media may carryover to another task, because such arousal may not decay quickly. Therefore, the physiological arousal present at the second task is a composite of any physiological arousal created by the second task and the residual arousal experienced by the first task (Zillmann, 1971). If the first and second tasks are close in time, and the second task is related to anger (e.g., a provocation), then that anger may be exaggerated and aggressive behavior may be more likely to occur (Zillmann, 1983). Research has shown that violent media exposure is related to more of a physiological arousal response than non-violent media exposure (Bushman & Huesmann, 2006), and Excitation Transfer Theory would predict that the arousal produced by violent media will increase the probability of aggressive behavior, especially if the second task involves an individual being provoked.

Social Learning Theory. Another important theory that influenced GAM is Social Cognitive Theory (Bandura's later version of Social Learning Theory; e.g., Bandura, 1978). This theory discusses the development of an aggressive personality via myriad methods of learning that can account for individual differences in aggressive personalities. Social Learning Theory posits that observational learning and reinforced performance form the origins of aggression. Bandura (1978) argued that media violence exposure is related to aggressive behavior, because children are taught aggressive styles, the media shapes images of and beliefs about reality, the media desensitizes, and the media alters restraint over behavior. Continued observation and learning of aggressive behaviors may also be related to the development of aggressive beliefs that likely influence how one interprets social situations.

Script Theory. Huesmann's (1986) Script Theory posits that people decide to behave aggressively due to their programs of behavior (behavioral scripts) that are stored in memory. Huesmann (1988) argued that both observational learning and enactive learning are two processes by which scripts are encoded in memory. During learning, individuals will often pay attention to the salient cues and scenes in the environment. The information from these scenes, along with one's current mood and memory, help to evaluate the appropriateness of the behavior just observed. If the observed behavior is positively reinforced (Bandura, 1965), then that behavior is likely to be evaluated as appropriate, and encoded in memory for later retrieval and used as a guide. If a behavioral script gets retrieved from memory, it is evaluated in terms of how socially appropriate the behavior is and how desirable the individual's goals are. If the evaluation of the behavioral script is deemed appropriate, that script gets retrieved and enacted. If the behavior is deemed inappropriate, then memory is searched for a more appropriate script. The mass media is one method by which individuals can observationally learn behavioral scripts, and determine what situations are acceptable for the use of these scripts.

Social Information Processing. Crick and Dodge's (1994) Social Information Processing Theory (SIP) posits that all individuals enter a social situation with a data base of memories, schemata, knowledge about other situations, and social norms regarding appropriate behavior. SIP posits that individuals will encode and then interpret the social situation. Once the cues are interpreted, goals are clarified regarding possible behavior. Appropriate behavior is then accessed from memory, often relying on behavioral scripts from the data base. This response is then evaluated in terms of the appropriateness of the behavior (see Fontaine & Dodge, 2006 for specific factors that are important at this step). If the behavior is deemed appropriate, then

behavior is enacted. If the behavior is evaluated as inappropriate, another response is generated and evaluated.

Role of Individual Differences

Individual differences, or factors related to the personality, have been shown to be related to aggressive behavior. GAM incorporates these individual differences into its theorizing in short-term and long-term processes. Examples of three individual difference variables will be discussed: hostile attribution bias, age, and sex.

Hostile Attribution Bias. A hostile attribution bias is the tendency to perceive ambiguous acts as hostile (see Orobio de Castro et al., 2002). This type of bias may influence attributions of intent in another's behavior in the short-term, and may influence the ease and development of accessibility of aggression-related knowledge structures in more distal processes. In longitudinal media violence research, Anderson and his colleagues (Anderson et al., 2007; 2008) found that hostile attribution bias acts as a partial mediator between violent media exposure and aggressive behavior four to five months later. Violent acts in the media are often portrayed as an acceptable method of conflict resolution. Exposure to this type of content is a learning trial and continued exposure is likely to be related to the development of aggressive behavioral scripts through learning processes. For violent media viewers, the default response to another's ambiguous but harmful behavior (e.g., getting bumped in the lunch line) may be to attribute it as having hostile intent. This often increases the likelihood of aggressive behavior.

Age. Positive relations between media violence exposure and aggressive behavior have been found for adult (e.g., Bartholow, Sestir, & Davis, 2005) and child (e.g., Hoph, Huber, & Weib, 2008) samples. There is theoretical reason to expect age differences in the processes governing aggressive responding after viewing violent media. Bushman and Huesmann (2006)

argued that after media violence exposure, adults are likely to act aggressively because of the activation and retrieval of very well-developed aggressive behavioral scripts. Children, on the other hand, are less likely to have these aggressive scripts readily available to guide behavior, because children should have been exposed to less violence. They argued that children will respond aggressively after viewing violent media because of imitation processes. Early research from Bandura (1965) found that children behaved more aggressively after viewing an aggressive model that was positively reinforced for his/her behavior. This suggests that both children and adults are likely to behave aggressively after exposure to violent media; however, the processes which delineate why this relation exists might differ. More likely, both types of process operate on both children and adults, with priming processes being relatively more predominant among adults, and imitative processes more predominant among young children.

Sex. Meta-analytic reviews have found that males are more physically aggressive than females (e.g., Card et al., 2008). Therefore, sex may moderate the relation between violent media exposure and aggression. In their review, Anderson et al. (2003) cited evidence to suggest that males and females tend to have similar effect sizes in the relation between media violence exposure and aggressive behavior. Some empirical evidence suggests that males who played a violent video game tend to be more aggressive than females who played the same game (Bartholow & Anderson, 2002). One possible explanation for sex differences is that male media characters tend to be more physically violent than female media characters (Anderson et al., 2003). Another explanation is that males tend to seek out media violence more than females, and research has shown that, on average, males play more violent video games than females (Moller & Krahe, 2009). Whatever the reason, when effect sizes from the video game violence and aggression literature are synthesized, results showed no significant differences in effect size

estimates between males and females after exposure to video game violence, a result recently confirmed in a new meta-analysis of the violent video game literature (Anderson et al., 2010).

General Learning Model

Not all mass media depicts violent behavior. Broader theories have been posited to predict when exposure to any media content will be related to its behavioral depiction. The General Learning Model (GLM; Buckley & Anderson, 2006; Gentile et al., 2009; Swing & Anderson, 2008) is one such theory. If the postulations of GAM are correct, then certain media effects can also be explained by a more general learning theory. The overlap between GLM's and GAM's predictions on the relation between media violence exposure and aggressive behavior provide substantial support for GLM. However, there is a paucity of evidence that can uniquely explain the postulates of GLM. One area of research that can be predicted from GLM, but not GAM is the relation between prosocial media viewing and prosocial behavior.

Like GAM, there are distal and proximate processes within GLM. The processes involved in the proximate GLM are similar to GAM. Situational and personality input factors predict one's internal state (consisting of interrelated cognitions, affect, and physiological arousal). These internal state variables influence one's appraisal and decision processes, which influence behavior. The behavioral response feeds back into the dynamic situational input factor at the start of GLM.

The distal GLM (see Figure 3) posits that repeated learning and practice with any media is a learning trial that is related to the formation of three different, but highly related, processes. One process is the development of pre-cognitive and cognitive constructs. Examples of such constructs include expectation and perceptual schemata, beliefs, and behavioral scripts. Another process is the development of cognitive-emotional constructs, which include attitudes and

stereotypes. A third process is the development of emotional constructs, which may include conditioned emotions and affective traits. These constructs are predicted to be related to the development of or changes in one's personality (Gentile et al., 2009).

GLM can predict how any media portrayal can be related to "media-trained behavior," including aggression. However, the majority of work *uniquely* testing GLM has come from research examining the relation between prosocial media exposure and prosocial behavior. Early research in this domain has been mixed. For instance, Chambers and Ascione (1987) found that prosocial video game exposure was unrelated to prosocial behavior; however, the prosocial video game used in their study did not depict many prosocial acts. Conversely, Liss, Reinhardt, and Fredriksen (1983) found that children exposed to a prosocial cartoon helped a fictitious partner significantly more than children who viewed either an aggressive cartoon or a cartoon that depicted aggressive behaviors to accomplish a prosocial goal. Despite the apparent inconsistencies in the early literature, recent empirical work has shed light on both the distal and proximate processes in GLM.

Support for distal processes in GLM would show that continued exposure to prosocial media is related to variables associated with prosocial personality tendencies, such as the likelihood of prosocial behavior, empathy, and cooperation. These predictions were supported by a series of studies conducted by Gentile and his colleagues (2009). First, correlational findings showed significant relations between prosocial video game exposure and helping behavior, cooperation, sharing, and empathy (Study 1). Second, a longitudinal study showed that prosocial video game exposure significantly predicted prosocial behavior four to five months later, even after statistically controlling for other relevant variables (Study 2).

Support for the proximate processes in GLM would show that viewing prosocial media would predict the likelihood of prosocial behavior compared to viewing other (e.g., non-prosocial) media in the short-term. Support for this hypothesis was found by Gentile et al. (2009, Study 3) who had college-aged participants play either prosocial video games, neutral video games, or violent video games and then complete a behavioral measure that afforded participants the ability to engage in prosocial and/or aggressive behavior. Results showed that playing prosocial video games was related to more prosocial behavior compared to the other two game types. Also, playing the violent video game was related to more aggressive behavior compared to the other two game types. Additional evidence from the video game domain found a decreased number of aggressive cognitions after playing a prosocial video game compared to a neutral video game (Greitemeyer & Osswald, 2009).

Prosocial musical lyrics have also been found to be related to prosocial behavior, supporting the short-term processes in GLM. Greitemeyer (2009) found that participants who listened to prosocial song lyrics had significantly higher accessibility to prosocial thoughts, higher levels of state empathy, and behaved more prosocially (donating money to a charity) compared to participants who listened to neutral song lyrics. Furthermore, Greitemeyer (2009) found that participants who listened to prosocial song lyrics (compared to neutral song lyrics) had higher levels of prosocial behavior (picking up pencils and assisting in future laboratory studies), which was mediated by empathy, rather than prosocial thought accessibility. This supports GLM but also suggests that the affective processing route may be the most influential route in predicting short-term prosocial media effects on prosocial behavior; however, more work and replication is needed to support this claim.

Overall Conclusions

In this chapter we have discussed research on the relation between exposure to mass media content and behavior. In doing so, we have elaborated on the General Aggression Model, and we have elucidated how, why, and for whom media violence exposure is likely to be related to aggressive behavior. Second, we briefly discussed the General Learning Model. GLM is a direct generalization of GAM, thus further elaboration was not needed for the basic postulates. GLM has the power to predict many of the behavioral effects that the mass media shape, including aggressive and prosocial behaviors. Both of these models were discussed in terms of their proximate, short-term relations between the mass media exposure and behavior, but also their longer, distal processes regarding the learning, development, and retrieval of several highly related knowledge structures that results from continued media exposure and that are instrumental in understanding long term media effects.

Despite the wealth of evidence for the relation between mass media exposure and behavior, we believe that more work is needed. For instance, more high-quality longitudinal research is needed to test the relation between media violence exposure, various mediating variables, and aggressive behavior. Although accruing longitudinal evidence has become available (Anderson et al., 2007; Anderson et al., 2008, Hoph et al., 2008; Krahe & Moller, 2009), more work and replication are needed to determine more precisely how media violence exposure is related to aggressive behaviors years later. Also, we believe that focus on the effects of prosocial media exposure deserve increased empirical attention. Although recent evidence suggests that prosocial media exposure is related to prosocial behavior (Gentile et al., 2009; Greitemeyer, 2008, Greitemeyer & Osswald, 2009), more work is needed to test for additional moderators and mediators in this relationship.

One research area that needs continued empirical attention that would test the postulates of both GAM and GLM is the relation between exposure to relationally aggressive media depictions and relational aggression. Research has shown that exposure to relationally aggressive media is related to subsequent relational aggression, but also to subsequent physical aggression (Coyne, Nelson, Lawton, Haslam et al., 2008). Coyne et al. (2008) suggested that this provides support for GAM (and thus GLM), but also supports a cross-over effect, such that viewing one type of aggressive behaviors in the media may generalize to other forms of aggressive behaviors.

Mass media are not inherently good or bad, but people learn and content matters (Gentile et al., 2009). What the media portray and teach will likely determine what attitudes, beliefs, and behavior(s) get learned. Research has shown, and theoretical models predict, that violent content is related to aggressive behavior and prosocial content is related to prosocial behavior through such learning processes.

References

- Abelson, R. P. (1981). Psychological status of the script concept. *American Psychologist*, *36*, 15-29.
- Ajzen, I. & Fishbein, M. (2005). The influence of attitudes on behaviors. In D. Albarracin, B. T. Johnson, & M. P. Zanna (Eds.), *The Handbook of Attitudes*, (pp. 173-222). Mahwah, NJ: Lawrence Erlbaum Associates.
- Anderson, C.A. (1989). Temperature and aggression: Ubiquitous effects of heat on the occurrence of human violence. *Psychological Bulletin*, *106*, 74-96.
- Anderson, C.A., Benjamin, A.J., & Bartholow, B.D. (1998). Does the gun pull the trigger? Automatic priming effects of weapon pictures and weapon names. *Psychological Science*, *9*, 308-314.
- Anderson, C.A., Berkowitz, L., Donnerstein, E., Huesmann, R.L., Johnson, J., Linz, D., Malamuth, N., & Wartella, E. (2003). The influence of media violence on youth. *Psychological Science in the Public Interest*, *4*, 81-110.
- Anderson, C.A., Buckley, K.E., & Carnagey, N.L. (2008). Creating your own hostile environment: A laboratory examination of trait aggression and the violence escalation cycle. *Personality and Social Psychology Bulletin*, *34*, 462-473.
- Anderson, C. A., & Bushman, B. J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. *Psychological Science*, *12*, 353-359.
- Anderson, C.A., & Bushman, B.J. (2002). Human aggression. *Annual Review of Psychology*, *53*, 27-51.

- Anderson, C. A., & Carnagey, N. L. (2004). Violent evil and the general aggression model. Chapter in A. Miller (Ed.) *The Social Psychology of Good and Evil* (pp. 168-192). New York: Guilford Publications.
- Anderson, C. A., Carnagey, N. L., Flanagan, M., Benjamin, A. J., Eubanks, J., & Valentine, J. C. (2004). Violent video games: Specific effects of violent content on aggressive thoughts and behavior. *Advances in Experimental Social Psychology*, 36, 199-249.
- Anderson, C.A., & Dill, K.E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology*, 78, 772-790.
- Anderson, C.A., Gentile, D.A., & Buckley, K.E. (2007). *Violent Video Game Effects on Children and Adolescents: Theory, Research, and Public Policy*. Oxford University Press.
- Anderson, C.A., & Huesmann, L.R. (2003). Human aggression: A social-cognitive view. In M.A. Hogg & J. Cooper (Eds.), *Handbook of Social Psychology* (pp. 296-323). London: Sage Publications.
- Anderson, C.A., Krull, D. S., & Weiner, B. (1996). Explanations: Processes and consequences. Chapter in E.T. Higgins & A.W. Kruglanski (Eds.). *Social psychology: Handbook of basic principles*. (pp.271-296). NY: Guilford Press.
- Anderson, C. A., Sakamoto, A., Gentile, D. A., Ihori, N., Shibuya, A., Yukawa, S., Naito, M., & Kobayashi, K. (2008). Longitudinal Effects of Violent Video Games Aggression in Japan and the United States. *Pediatrics*, 122, e1067-e1072.
- Bandura, A. (1978). Social learning theory of aggression. *Journal of Communication*, 28, 12-29.

- Bandura, A. (1965). Influence of models' reinforcement contingencies on the acquisition of imitative responses. *Journal of Personality and Social Psychology, 1*, 589-595.
- Bandura, A., Ross, D., & Ross, S. A. (1961). Transmission of aggression through imitation of aggressive models. *Journal of Abnormal and Social Psychology, 63*, 575-582.
- Bartholow, B.D., & Anderson, C.A. (2002). Effects of violent video games on aggressive behavior: Potential sex differences. *Journal of Experimental Social Psychology, 38*, 283-290.
- Bartholow, B.D., Anderson, C.A., Carnagey, N.L., & Benjamin, A.J. (2005). Individual differences in knowledge structures and priming: The weapons priming effect in hunters and nonhunters. *Journal of Experimental Social Psychology, 41*, 48-60.
- Bartholow, B. D., Bushman, B. J., & Sestir, M. A. (2006). Chronic violent video game exposure and desensitization: Behavioral and event-related brain potential data. *Journal of Experimental Social Psychology, 42*, 532-539.
- Bartholow, B. D., Sestir, M. A., & Davis, E. B. (2005). Correlates and consequences of exposure to video game violence: Hostile personality, empathy, and aggressive behavior. *Personality and Social Psychology Bulletin, 31*, 1573-1586.
- Berkowitz, L. (1993). Towards a general theory of anger and emotional aggression: Implications of the cognitive-neoassociationistic perspective for the analysis of anger and other emotions. In R. S. Wyer & T. K. Srull (Eds.), *Perspectives on Anger and Emotion*, Volume 6 (pp. 1-46). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Berkowitz, L. (1984). Some effects of thoughts on anti- and prosocial influences of media events: A cognitive-neoassociation analysis. *Psychological Bulletin, 95*, 410-427.

- Bettencourt, B. A., & Kernahan, C. (1997). A meta-analysis of aggression in the presence of violent cues: Effects of gender differences and aversive provocation. *Aggressive Behavior, 23*, 447-456.
- Buckley, K. E., & Anderson, C. A. (2006). A Theoretical Model of the Effects and Consequences of Playing Video Games. Chapter in P. Vorderer & J. Bryant (Eds.), *Playing Video Games - Motives, Responses, and Consequences* (pp. 363-378). Mahwah, NJ: LEA.
- Bushman, B. J. (1995). Moderating role of trait aggressiveness in the effects of violent media on aggression. *Journal of Personality and Social Psychology, 69*, 950-960.
- Bushman, B. J. (1998). Priming effects of media violence on the accessibility of aggressive constructs in memory. *Personality and Social Psychology Bulletin, 24*, 537-545.
- Bushman, B.J., & Anderson, C.A. (2002). Violent video games and hostile expectations: A test of the general aggression model. *Personality and Social Psychology Bulletin, 28*, 1679-1686.
- Bushman, B. J., & Anderson, C. A. (2009). Comfortably numb: Desensitizing effects of violent media on helping others. *Psychological Science, 20*, 273-277.
- Bushman, B. J., & Huesmann, L. R. (2006). Short-term and long-term effects of violent media on aggression in children and adults. *Archives of Pediatrics & Adolescent Medicine, 160*, 348-352.
- Card, N. A., Stucky, B. D., Sawalani, G. M., & Little, T. D. (2008). Direct and indirect aggression during childhood and adolescence: A meta-analytic review of gender differences, intercorrelations, and relations to maladjustment. *Child Development, 79*, 1185-1229.

- Carnagey, N. L., & Anderson, C.A., Bushman, B. J. (2007). The effect of video game violence on physiological desensitization to real-life violence. *Journal of Experimental Social Psychology, 43*, 489-496.
- Chambers, J. H., & Ascione, F. R. (1987). The effects of prosocial and aggressive video games on children's donating and helping. *Journal of Genetic Psychology, 148*, 499-505.
- Coyne, S. M., Nelson, D. A., Lawton, F., Haslam, S., Rooney, L., Titterington, L., Trainor, H., Remnant, J., & Ogunlaja, L. (2008). The effects of viewing physical and relational aggression in the media: Evidence for a cross-over effect. *Journal of Experimental Social Psychology, 44*, 1551-1554.
- Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information processing mechanisms in children's social adjustment. *Psychological Bulletin, 115*, 74-101.
- Fontaine, R. G., & Dodge, K. A. (2006). Real-time decision making and aggressive behavior in youth: A heuristic model of response evaluation and decision (RED). *Aggressive Behavior, 32*, 604-624.
- Gentile, D. A., Anderson, C. A., Yukawa, S., Ihori, N., Saleem, M., Ming, L. K., Shibuya, A., Liau, A. K., Khoo, A., & Sakamoto, A. (2009). The Effects of Prosocial Video Games on Prosocial Behaviors: International Evidence from Correlational, Experimental, and Longitudinal Studies. *Personality and Social Psychology Bulletin, 35*, 752-763.
- Gentile, D. A. & Gentile, J. R. (2008). Violent video games as exemplary teachers: A conceptual analysis. *Journal of Youth and Adolescence, 9*, 127-141.

- Greitemeyer, T. (2009). Effects of songs with prosocial lyrics on prosocial behavior: Further evidence and a mediating mechanism. *Personality and Social Psychology Bulletin, 35*, 1500-1511.
- Greitemeyer, T. (2009). Effects of songs with prosocial lyrics on prosocial thoughts, affect, and behavior. *Journal of Experimental Social Psychology, 45*, 186-399.
- Greitemeyer, T., & Osswald, S. (2009). Prosocial video games reduce aggressive cognitions. *Journal of Experimental Social Psychology, 45*, 896-900.
- Hoph, W. H., Huber, G. L., & Weib, R. H. (2008). Media violence and youth violence: A 2-year longitudinal study. *Journal of Media Psychology, 20*, 79-96.
- Huesmann, L. R. (1986). Psychological processes promoting the relation between exposure to media violence and aggressive behavior by the viewer. *Journal of Social Issues, 42*, 125-139.
- Huesmann, L. R. (1988). An information processing model for the development of aggression. *Aggressive Behavior, 14*, 13-24.
- Kirsch, S. J., Olczak, P. V., & Mounts, J. R. W. (2005). Violent video games induce an affective processing bias. *Media Psychology, 7*, 239-250.
- Liss, M. B., Reinhardt, L. C., & Fredriksen, S. (1983). TV heroes: The impact of rhetoric and deeds. *Journal of Applied Developmental Psychology, 4*, 175-187.
- Markey, P. M., & Scherer, K. (2009). An examination of psychoticism and motion capture controls as moderators of the effects of violent video games. *Computers in Human Behavior, 25*, 407-411.
- Moller, I., & Krahe, B. (2009). Exposure to violent video games and aggression in German adolescents: A longitudinal analysis. *Aggressive Behavior, 35*, 75-89.

- Orobio de Castro, B., Veerman, J. W., Koops, W., Bosch, J. D., & Monshouwer, H. J. (2002). Hostile attribution of intent and aggressive behavior: A meta-analysis. *Child Development, 73*, 916-934.
- Raine, A., Brennen, P. A., Farrington, D. P., & Mednick, S. A. (Eds.). (1997). *Biosocial bases of violence*. London: Plenum Press.
- Swing, E. L., & Anderson, C. A. (2007). The unintended negative consequences of exposure to violent video games. *Cognitive Technology, 12*, 3-13.
- Swing, E.L., & Anderson, C.A. (2008). How and what do video games teach? In T. Willoughby & E. Wood (Eds.) *Children's Learning in a Digital World* (pp. 64-84). Oxford, UK: Blackwell.
- Uhlmann, E., & Swanson, J. (2004). Exposure to violent video games increases implicit aggressiveness. *Journal of Adolescence, 27*, 41–52.
- Zillmann, D. (1971). Excitation transfer in communication-mediated aggressive behavior. *Journal of Experimental Social Psychology, 7*, 419-434.
- Zillmann, D. (1983). Arousal and aggression. In R. G. Geen & E. Donnerstein (Eds.). *Human Aggression: Theories, Research, and Implications for Policy* (pp. 75-102). New York: Academic.
- Zillmann, D. (1988). Cognition-excitation interdependencies in aggressive behavior. *Aggressive Behavior, 14*, 51-64.

Figure 1. The General Aggression Model: A Bio-Social Model of Human Aggression.

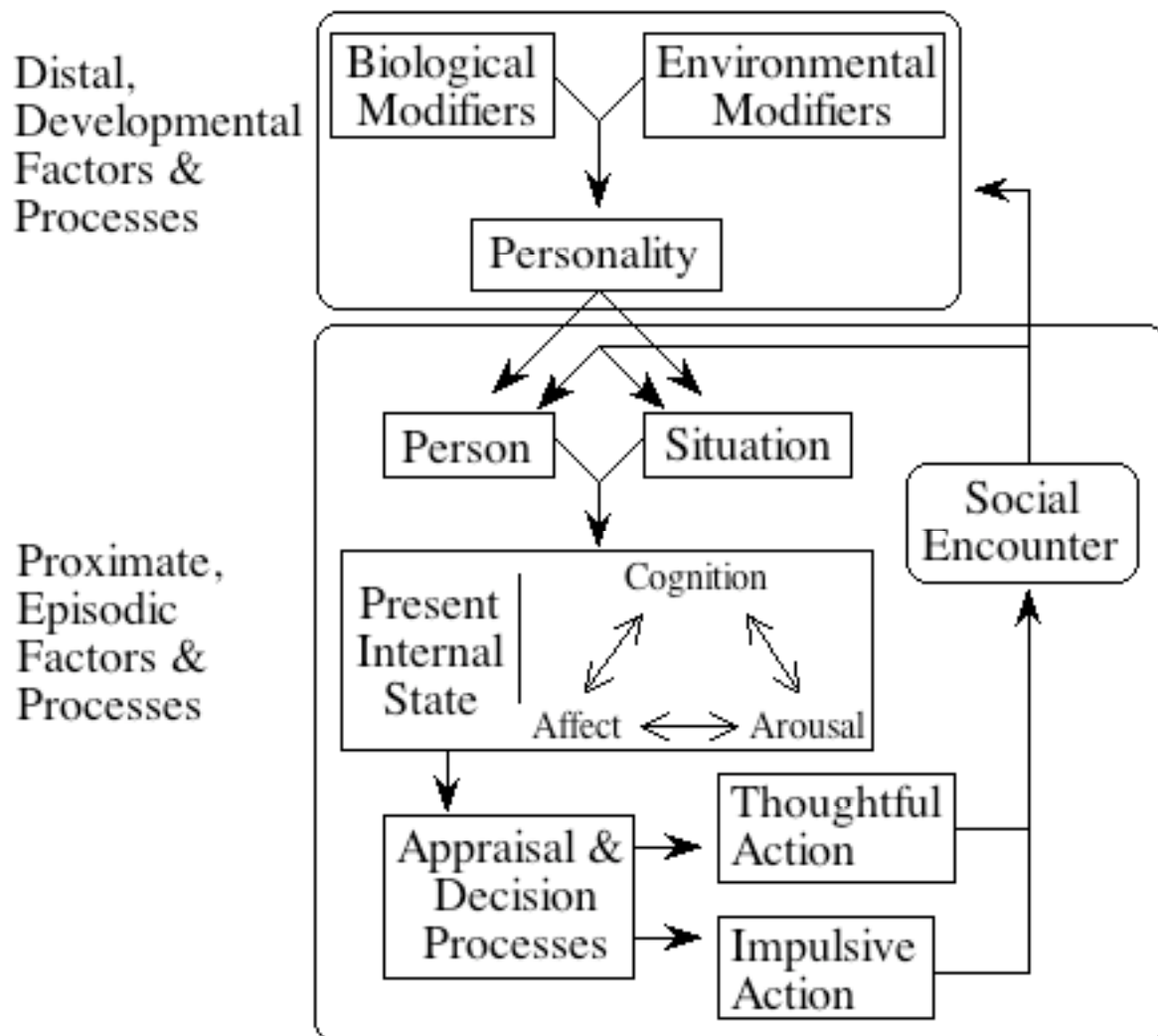
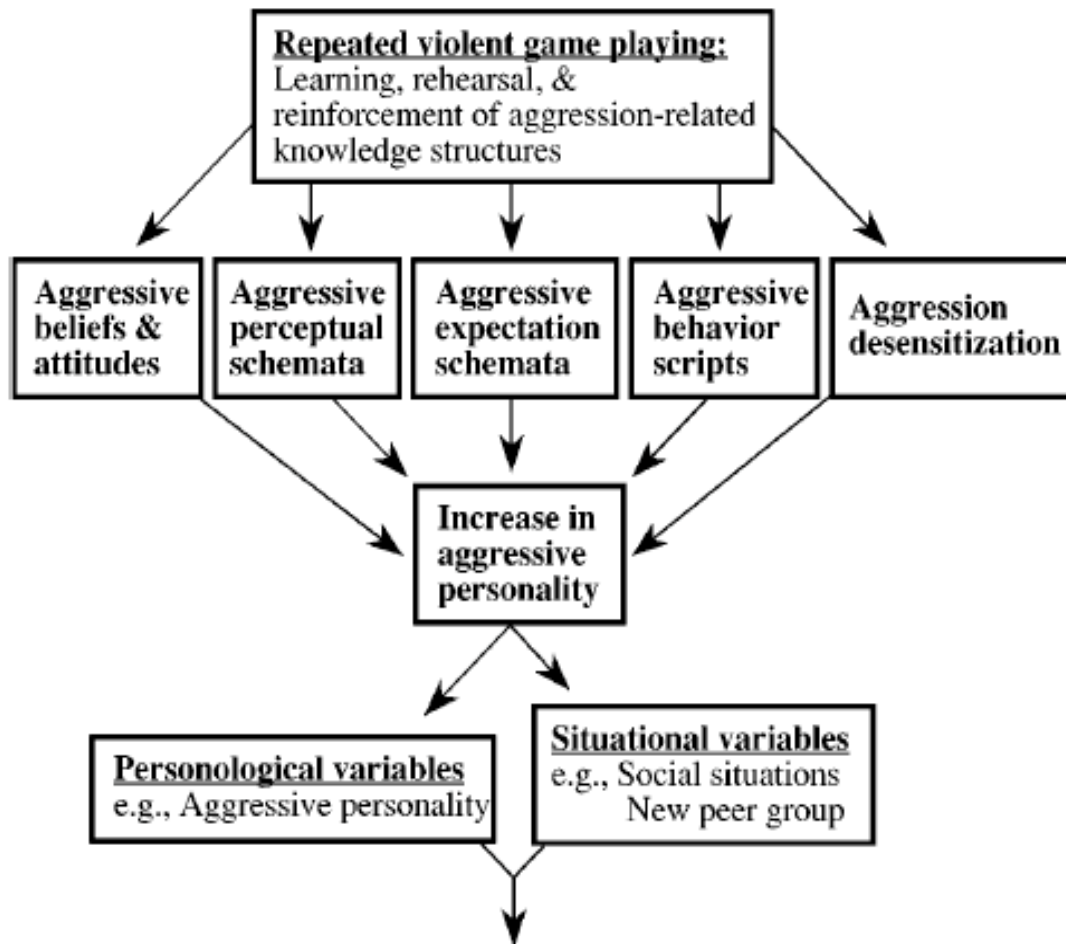


Figure 2. Effects of Repeated Media Violence Viewing.



General Aggression Model, as in Figure 1

Figure 3. The General Learning Model: Extension of GAM to Non-violent Contexts.

