

The General Aggression Model

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The General Aggression Model (GAM) is a comprehensive, integrative, framework for understanding aggression. It considers the role of social, cognitive, personality, developmental, and biological factors on aggression. Proximate processes of GAM detail how person and situation factors influence cognitions, feelings, and arousal, which in turn affect appraisal and decision processes, which in turn influence aggressive or nonaggressive behavioral outcomes. Each cycle of the proximate processes serves as a learning trial that affects the development and accessibility of aggressive knowledge structures. Distal processes of GAM detail how biological and persistent environmental factors can influence personality through changes in knowledge structures. GAM has been applied to understand aggression in many contexts including media violence effects, domestic violence, intergroup violence, temperature effects, pain effects, and the effects of global climate change.

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Introduction

Many theories have been proposed to explain human aggression—defined as any behavior intended to harm a target who is motivated to avoid that harm [1*]. The General Aggression Model (GAM) is one of the most comprehensive and widely used theories for understanding aggression. The present review describes the current state of knowledge of GAM, and briefly outlines recent applications of GAM and possibilities for future directions.

The General Aggression Model

GAM is a comprehensive, integrative framework for understanding human aggression. It considers the role of social, cognitive, developmental, and biological factors on aggression [1*,2**,3,4,5**]. GAM includes elements from many domain-specific theories of aggression, including: cognitive neoassociation theory [6,7], social learning theory [8,9], script theory [10,11], excitation transfer theory [12], and social interaction theory [13]. By unifying these theories into one coherent whole, GAM provides a broad framework for understanding aggression in many contexts.

GAM posits that human aggression is heavily influenced by knowledge structures, which affect a wide variety of social-cognitive phenomena including perception, interpretation, decision, and behaviors [14–18]. Some of the most important knowledge structures include beliefs and attitudes (*e.g.*, believing aggression is normal, evaluating it positively), perceptual schemata (*e.g.*, perceiving ambiguous events as hostile), expectation schemata (*e.g.*, expecting aggression from others), and behavioral scripts (*e.g.*, believing that conflicts should be resolved with aggression) [2**]. These knowledge structures are developed through experience and can influence perception at multiple levels, ranging from simple perception of objects to complex perception of social events. Knowledge structures can also become automatized with repeated practice (as is the case with scripts), and can include both cognitive and affective components. For example, anger is strongly linked with hostile attribution biases (the tendency to interpret ambiguous events as hostile) [19].

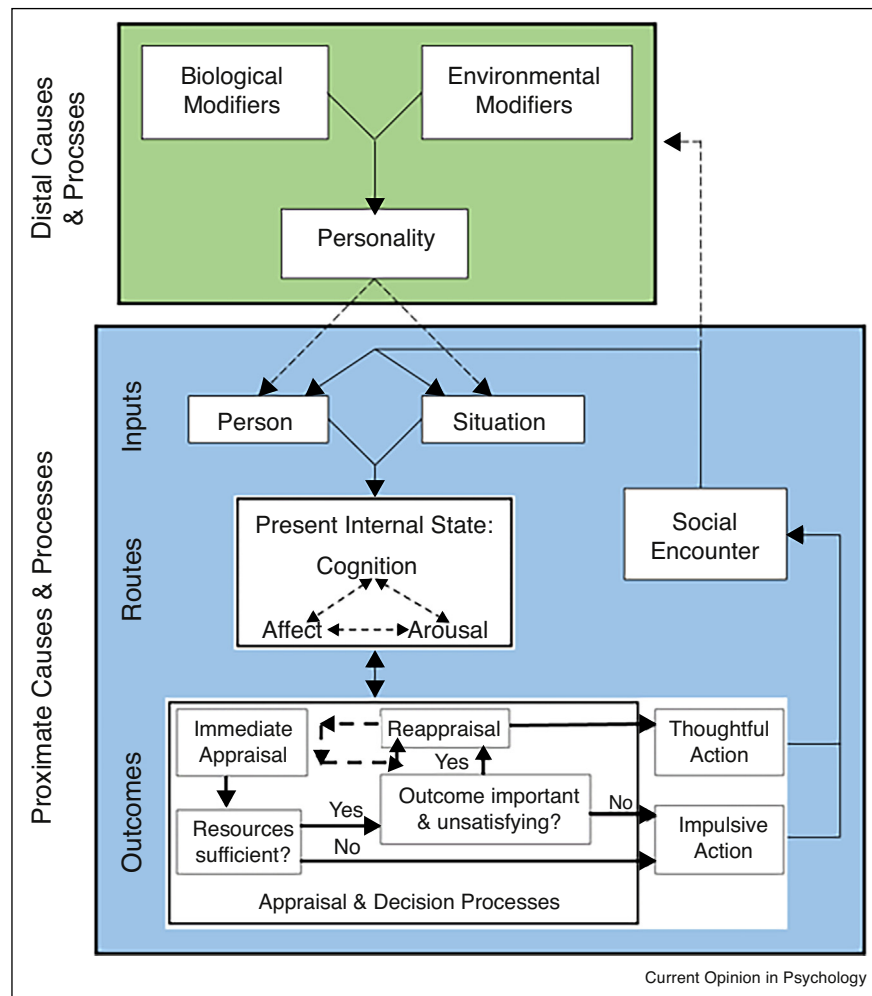
Proximate processes

GAM is separated into two major aspects: proximate and distal processes (see [Figure 1](#)). The proximate processes explain individual episodes of aggression using three stages: inputs, routes, and outcomes. Inputs influence a person's present internal state, which in turn affects appraisal and decision processes, which in turn influence aggressive and nonaggressive outcomes. Importantly, each episode of aggression (or non-aggression) serves as a learning trial that can influence the development of aggressive knowledge structures (and thereby *personality*) over time.

Stage one: inputs

The first stage of the proximate processes outlines how person and situation factors increase or decrease the likelihood of aggression through their influence on present internal state variables (*i.e.*, cognition, affect, and arousal) in stage two. Input variables that increase the

Figure 1



The General Aggression Model (GAM): proximate and distal causes and processes. With permission from Ref. [56].

likelihood of aggression are considered risk factors, whereas those that decrease the likelihood of aggression are considered protective factors.

Person factors are any individual differences that may influence how a person responds to a situation. These factors tend to be fairly stable over time and across situations as long as the person consistently uses the same knowledge structures [9]. Through this lens, personality can be considered the summary of a person's knowledge structures. Aggressive knowledge structures make aggression more likely. Many person factors have been identified as risk factors for aggression. These include (but are not limited to): unstable high self-esteem and narcissism, aggressive self-image, long-term goals supportive of aggression, high self-efficacy for aggressive behavior, normative acceptance of aggression, positive attitudes toward aggression, hostile attribution biases, aggressive behavioral scripts, moral justification of

violence, dehumanization, displacement of responsibility, high trait anger, certain personality disorders, low self-control, high neuroticism, low agreeableness, and low conscientiousness [1*,3,20]. For example, people with hostile attribution, perception, and expectation biases are more aggressive than people without those biases [21,22]. Many of the risk factors that have been identified serve as protective factors when reversed. For example, negative attitudes toward aggression, low neuroticism, high agreeableness, and high conscientiousness would all make aggression less likely.

Situation factors are aspects of the situation that may influence whether aggression occurs. Many situation factors have been identified that increase the likelihood of aggression. These include (but are not limited to): social stress, social rejection, provocation, frustration, bad moods, exercise, alcohol intoxication, violent media, pain or discomfort, ego depletion, anonymity, hot

temperatures, noise, the presence of weapons, and threatening or fear-inducing stimuli [1*,3]. For example, the presence of a gun (as compared to a badminton racquet) can increase the aggression of angered individuals [23,24]. Some situation factors also serve as protective factors, such as good moods or exposure to prosocial media [25].

Person and situation factors can work additively or interactively to influence cognition, affect, or arousal. Generally, as the number of risk factors for aggression increases, (either person or situation factors), the likelihood of aggression increases [26]. This means, for example, that a person who believes aggression is normal and useful is more likely to be aggressive than a person who believes aggression is abnormal. That same person would be even more likely to behave aggressively if he or she was provoked, especially if the provocation occurred in a hot, noisy setting. In contrast, as the number of protective factors increases, the likelihood of aggression decreases. For example, someone who is highly agreeable and has just received a gift is relatively less likely to behave aggressively.

Stage two: routes

Stage two focuses on the routes through which person and situation factors exert their influence on appraisal and decision processes (and thus affect aggressive or nonaggressive outcomes). Person and situation factors can change a person's affect, cognition, and arousal. These three variable types make up a person's present internal state; changes in these variables alter the likelihood of aggression. Different input variables affect different present internal state variables, but present internal state variables also influence each other in interactive and reciprocal ways, as indicated by the dashed lines in Figure 1 with arrows at both ends. Affect can influence cognition and arousal [27]. For example, feeling angry can encourage hostile thoughts and increase arousal. Similarly, cognition and arousal can influence affect [28]. For example, interpreting a situation in a hostile manner can increase anger, which in turn can increase arousal. GAM does not propose that the present internal state variables must occur in a certain order. Any of the three variables can occur first and then influence the other two. Alternatively, some factors can influence aggression primarily through one route. For example, weapons increase aggression by priming aggressive thoughts [24].

Affect

Input variables can influence our moods and emotions. For example, people high in trait hostility (a person factor) also have higher state hostility in a particular situation (*i.e.*, greater aggressive affect) [29,30]. Additionally, situation factors can increase aggressive affect. Pain increases state hostility and anger [31,32], and uncomfortably hot temperatures also increase state hostility [33].

Cognition

Input variables can also influence aggressive thoughts. Aggressive concepts can be activated by certain situational factors (*i.e.*, priming) or can become chronically accessible after repeated activation (as with scripts) [34,35]. Aggressive priming occurs when a situational factor (such as exposure to media violence) causes a short-term increase in the accessibility of aggressive concepts [36*,37]. Certain input variables (*e.g.*, trait aggression) can lead aggressive thoughts to become highly accessible at all times in the form of scripts [11] and hostile attribution biases [21,38].

Arousal

Finally, input variables can influence arousal (both physiological and psychological) by increasing it (*e.g.*, exercise), or decreasing it (*e.g.*, alcohol). Arousal can affect aggression in at least three ways. First, arousal from irrelevant sources (*e.g.*, exercise) can be mislabeled as anger, increasing the likelihood of aggression (this is known as excitation transfer) [39]. Second, arousal from irrelevant sources can strengthen aggressive action tendencies, as when a person is provoked while highly aroused [40]. Finally, very high or low levels of arousal can serve as aversive states that increase aggressive affect and cognition in the same way that pain and uncomfortably hot temperatures do [31–33].

Stage three: outcomes

The third stage of the proximate processes focuses on appraisal and decision processes, and on aggressive or nonaggressive outcomes. In stage three, the person appraises the situation and decides how to respond. The action that is selected then influences the encounter, which in turn influences the person and situation factors, beginning the episodic cycle anew.

As can be seen in Figure 1, the first part of stage three is an immediate appraisal of the situation, which occurs automatically (*i.e.*, spontaneously, unconsciously, and with little-to-no cognitive effort) and is influenced by the person's present internal state. Immediate appraisals often include trait or situational inferences. For example, if a man bumps into a woman at a crowded party, she could make a trait inference (*e.g.*, "He meant to do that—what a jerk!") or a situational inference (*e.g.*, "It's so crowded—I'm sure that was an accident."). Immediate appraisals also include affective, goal, and intention information (*e.g.*, "I am angry. I want to retaliate. I want to push this jerk."). When a person's present internal state is conducive to aggression, negative immediate appraisals—including a goal, plan, and script to harm the perpetrator—are more likely. Input variables influence immediate appraisals indirectly, through their effects on present internal state. For example, hostile attribution biases increase the likelihood of interpreting ambiguous event as being intentionally harmful [21].

After immediate appraisal, the person decides how to respond to the event. This process depends on available resources and the event itself. If the person has sufficient time and mental resources, and if the outcome of the immediate appraisal feels both important and unsatisfying, then the person will engage in a deliberative reappraisal of the event (*i.e.*, considering alternate interpretations). If not, then the behavioral script that was activated during immediate appraisal is enacted, with little or no awareness of a decision having been made.

When the reappraisal process is activated, it can influence present internal state variables. For example, if the woman who was bumped at the party reconsiders her initial hostile interpretation as an accidental event, then she may feel less angry and have fewer aggressive thoughts, depending on what other pieces of information are discovered or brought to bear during reappraisal. Of course, reappraisal can also yield information confirming the immediate appraisal of intentional harm, and can thus lead to more anger and aggressive thoughts. Once reappraisal has occurred, the person decides on and carries out a thoughtful action, which can be aggressive or non-aggressive.

Once an action has been carried out, that action influences the social encounter, which can alter person and situation factors, restarting the cycle of proximate processes. For example, if the woman decides to push the man who bumped into her, he may decide to insult her, which may provoke her to further escalating aggression [41].

Distal processes

The second aspect of GAM focuses on distal processes (see Figure 1), which operate in the background of each episode of proximate processes. This aspect of GAM outlines how biological and persistent environmental factors work together to influence personality, which in turn change person (and situation) factors [3].

Biological modifiers that increase the likelihood of developing an aggressive personality include (but are not limited to): ADHD, impaired executive functioning, hormone imbalances, low serotonin, and low arousal [3]. For example, testosterone is positively associated with aggression [42]. Individuals with more testosterone tend to be more aggressive [43] and dominating others increases testosterone [44].

Environmental modifiers that increase the likelihood of developing an aggressive personality include (but are not limited to): cultural norms supportive of violence, maladaptive families or parenting, difficult life conditions, deprivation, victimization, violent neighborhoods, violent or antisocial peer groups, group conflict, diffusion of responsibility, and chronic exposure to violent media [3]. For example, aggressive behavior is more likely if

one has received poor parenting or lived with coercive families [45–47].

Applications of the General Aggression Model

GAM has been applied to a wide variety of aggressive contexts including: temperature effects [33,48], violence associated with global climate change [5**,49,50], media violence effects [51,52], pain [31,32], intergroup violence [5**], intimate partner violence [5**], sexual aggression [53], domestic violence [54*], suicide [5**], and personality disorders with an aggression component [20]. By increasing the understanding of aggression and violence, GAM has guided research and informed interventions aimed at reducing aggression and violence, such as the treatment and assessment of violent offenders [55].

Summary and conclusions

GAM has effectively organized theoretical insights gleaned from several key theoretical perspectives. Proximate processes of GAM detail how person and situation factors influence aggressive thoughts, angry feelings, and arousal levels, which in turn affect appraisal and decision processes, which in turn influence aggressive or non-aggressive behavior. Each cycle of the proximate processes serves as a learning trial that can create aggressive knowledge structures after many repetitions, contributing to an aggressive personality. Distal processes of GAM detail how biological and environmental factors can influence personality through changes in knowledge structures.

GAM has already been used to guide research and interventions in many domains of aggression, but there is always more work to be done. New research is needed to further develop GAM as a comprehensive model of human aggression and violence. Promising directions include more detailed applications to understanding and treatment of perpetrators of violent crime, intimate partner violence, and sexual aggression. Similarly, GAM could be applied to help develop aggression prevention programs at the individual, family, community, and societal levels. The first step toward reducing aggression and violence is understanding the underlying processes. GAM sheds light on these underlying processes.

Conflict of interest statement

Nothing declared.

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Papers of particular interest, published within the period of review, have been highlighted as:

- of special interest
- of outstanding interest

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This chapter provides additional information about aggression in general, including a discussion of major theories of aggression, how aggression develops and its stability over time, and a detailed discussion of person and situation factors relevant to aggression as well as the most influential affective, cognitive, and arousal factors.

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This impactful article first introduced the General Aggression Model (GAM). It provides excellent background information on many of the domain-specific theories of aggression that were incorporated into the GAM. This article also provides more detail about the GAM than the current review (due to space limitations).

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