



Anger and inhibitory control as moderators of children's hostile attributions and aggression

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ARTICLE INFO

Article history:

Received 15 June 2009

Received in revised form 28 May 2010

Accepted 29 May 2010

Available online 13 July 2010

Keywords:

Aggressive behavior

Social cognition

Attribution

Anger

Self-control

Children

ABSTRACT

The moderating role of mother-reported dispositional anger and inhibitory control (IC) in the relationship of children's hostile attributions of intent (HAI) to aggressive behavior at age 6 years was examined using data from the NICHD-SECCYD. For both teacher- and mother-rated aggression ($n = 921$), a hypothesized moderating effect of anger was observed, such that HAI was only positively associated with aggressive behavior for children high in anger. For maternal-rated aggression a further 3-way interaction was found, indicating that HAI was only significantly positively associated with aggression for children with high levels of anger and low IC. An unexpected negative relationship between HAI and mother-rated aggression was observed for children low in both anger and IC, such that children with low HAI showed more aggressive behavior under this condition than did children with high HAI. Implications for intervention efforts and for integration of emotion and HAI research are considered.

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Introduction

After a period when the role of emotions in children's social cognitive processing was recognized but little studied, the new millennium has seen a rise in theory and research addressing affect and social information processing (SIP). As early as 1987, Dodge and Somberg demonstrated that under conditions of threat, aggressive boys' attributions became more hostile than when the boys were relaxed, illustrating the potency of affective states on SIP. In their 2000 paper, Lemerise and Arsenio built on Crick and Dodge's (1994) model to outline how each step of the SIP model (i.e., cue encoding, interpretation, goal elicitation, response planning and enactment) may be influenced by emotional cues, affective states or temperamental traits. Subsequently, researchers have begun to look at these factors and are finding that emotion processes are of widespread importance to how children process social information and the behaviors that derive from that processing (e.g., Lemerise, Gregory, & Fredstrom, 2005; Peets, Hodges, Kikas, & Salmivalli, 2007). This growing body of work has made clear that understanding how emotion processes contribute to SIP is an important goal for research on children's social development.

The integration of emotion processing may also help to solve a puzzle in the SIP literature. Numerous studies have shown that children with aggressive behavior problems report more hostile attributions of intent (HAI) than do children who show little aggressive behavior (e.g., Dodge, 1980; Guerra & Slaby, 1989), and in normative samples of children, hostile attribution tendencies correlate positively with aggression (e.g., Dodge & Coie, 1987; Runions & Keating, 2007), albeit inconsistently (de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002). The effect size of the link between HAI and aggressive behavior varies widely across studies. A meta-analysis of the link between HAI and children's externalizing problems found a range of effect sizes from $-.29$ to $.65$, with an average effect size of $.17$ (de Castro et al.). de Castro and his colleagues (2002) were able to identify several key moderators of effect size, including methodological factors such as the mode of presentation. But variance in effect size remains to be accounted for by considering other potential moderators. That is to say, further research is needed that addresses the conditions under which HAI is a weaker or stronger predictor of behavior problems.

In taking up the challenge highlighted by Lemerise and Arsenio (2000), recent research has helped to clarify emotion-related contextual factors that might account for additional effect size variance in the relationship between HAI and aggression. In the vignettes typically used to measure HAI, a hypothetical provocateur is presented who, for deliberately ambiguous reasons, behaves in a manner such that some harm (hypothetically) befalls the participant. The participant is then asked whether the provocation is likely to have resulted from a malicious (e.g., intended) or benign (e.g., accidental)

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intention or motivation. Lemerise, Gregory and Fredstrom (2005) have shown that children's responses depend on the emotion displayed by the provocateur. Children rated angry-looking provocateurs as more hostile in their intent than sad- or happy-looking provocateurs. Hostile attribution tendencies also depend on the emotional tone of the relationship of the participant to the provocateur: children's self-nominated enemies are seen as more hostile in their intent than were their neutral peers or their friends (Peets, et al., 2007). Similarly, children's affective stance toward the provocateur (e.g., liked versus disliked) influences their perception of hostile intent, even controlling for the provocateur's overall reputation (Peets, Hodges, & Salmivalli, 2008). However, children who are more aggressive are more likely to attribute hostility, regardless of the relationship context (Burgess, Wojslawowicz, Rubin, Rose-Krasnor, & Booth-LaForce, 2006). Thus, although hostile attribution tendencies may depend on relationship context, this context may be less important for aggressive children. Nevertheless, this new wave of SIP research demonstrates that exogenous emotion factors are highly relevant to our understanding of hostile attribution tendencies in children generally.

By contrast, much less research has been conducted on the role of endogenous affective factors in children's SIP. As shown by Dodge and Somberg (1987), state affect can influence SIP, and Lemerise and Arsenio (2000) have noted that dispositional emotion tendencies (e.g., temperament) may also influence social information processing. But few studies have examined dispositional emotion factors in relation to children's SIP, and none to our knowledge has examined these processes in young children. The present study focuses on dispositional anger and inhibitory aspects of self-control as endogenous child factors that could moderate the relationship between HAI and aggressive behavior.

Dispositional anger as a condition for the HAI–aggression link

Anger is foremost amongst the emotions linked with aggressive behavior (Berkowitz, 1983). A number of recent studies have pointed out the importance of anger in interpretive processes that result in HAI. In adults, dispositional anger and hostile attribution tendencies are intertwined (Epps & Kendall, 1995), such that individuals who are high in self-reported trait anger are more likely to report hostile interpretations of ambiguous scenarios. Recent experimental research has shown that undergraduate students high in trait anger project an automatic hostile interpretation on ambiguous scenarios before detailed encoding of visual cues (Wilkowski, Robinson, Gordon, & Troop-Gordon, 2007). Only via a controlled process does attention to non-hostile cues get allocated (i.e., a dual-process model of social cognition; Wilkowski & Robinson, 2008). According to this framework, by adulthood, dispositional anger tendencies have become entwined with real-time perceptual processes that support hostile interpretations.

It is important to note as well, however, that HAI can also give rise to state anger. Functionalist accounts of anger hold that when an individual's goals are blocked and the individual attributes responsibility for the goal-blockage to another person, state anger is a likely response, even in individuals who are not high in trait anger (Izard, 1977; Stein & Jewett, 1986). State anger then motivates the individual to reinstate the blocked goal and eliminate barriers or agents perceived to be blocking the goal (Frijda, 1986; Keltner & Gross, 1999); in the real world these behaviors may be proximal drivers of aggressive behavior. Conceptually, then, HAI may give rise to state anger, which serves as proximal motivation to act aggressively in enacting plans to reinstate the goal or remove the agent who is perceived to block the goal.

Empirical evidence, however, suggests that state anger leads to HAI mainly in individuals who are prone to aggression. Burgess et al. (2006) observed that aggressive boys (but not girls) were more likely

to report anger as a response to provocation. Similarly, in Tiedens' (2001) study of university students, anger induction led to more hostile inferences, but only amongst participants who had high scores on a self-report aggression-screening instrument. These studies suggest that anger and HAI have a special conjoint relationship for aggressive individuals that may not hold for people who show little aggressive behavior.

The bi-directional relationship between anger and HAI, whereby dispositional anger may make individuals more likely to attribute hostile intent, and an attribution of hostile intent may make people more likely to feel or report overt state anger, may be an example of a positive feedback loop that can result in the coupling of affect and cognition over the course of development. Conceptually, dynamic systems approaches posit that the coupling of affective states and cognitive interpretations may result in an attractor state, such that the elicitation of one element automatically recruits the other (e.g., Lewis, 1995). We believe that it is under this coupled condition that anger and HAI would be most strongly predictive of aggressive behavior problems. It is important to note that not all children who tend toward HAI have problems with aggressive behavior. Indeed, HAI has been established as an aspect of non-aggressive problems such as depression and social withdrawal (e.g., Burgess et al., 2006; Quiggle, Garber, Panak, & Dodge, 1992). For many children, HAI does not result in aggressive behaviors. We believe that it is when anger and HAI have become coupled over time that they serve as an important determinant of the HAI–aggression link. We hypothesized that dispositional anger would serve as a moderating condition under which the positive relationship between children's HAI and their aggressive behavior is strengthened, such that the relationship between HAI and aggressive tendencies is stronger for children with high levels of dispositional anger.

Inhibitory control, anger, and the HAI–aggression link

de Castro, Merk, Koops, Veerman, and Bosch (2005) have noted that any consideration of the relationship of anger and HAI in children's aggressive behavior must take into account children's capacities for emotion regulation (e.g., Cole, Martin, & Dennis, 2004). Because anger is a common and normative emotion for young children and usually does not lead to aggression (Cole, Zahn-Waxler, & Smith, 1994; Radke-Yarrow & Kochanska, 1990), it is important to consider how well or poorly children regulate their anger (Eisenberg et al., 1999). It is clear that, over time, most children develop capacities to regulate their behavior and exert self-control, even in moments of intense emotional arousal (Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002). It is possible that even the co-occurrence of dispositional anger and HAI would not lead to aggressive behavior for children who have well-developed capacities for behavioral self-regulation.

Effortful control seems a strong candidate for a role in emotion regulation generally (Derryberry & Rothbart, 1997). Effortful control reflects voluntary regulatory capacities that individuals are able to deploy as needed (Eisenberg & Morris, 2002). Such effortful control has been shown to be a stronger unique predictor of children's externalizing problems than was dispositional anger (Eisenberg et al., 2007). Although a number of studies have found that effortful control appears to serve a buffering role, protecting children and youth who are high in dispositional anger from externalizing behavior problems (Eisenberg et al., 2005; Eisenberg et al., 2007; Oldehinkel, Hartman, Ferdinand, Verhulst, & Ormel, 2007), results have not been consistent (e.g., Colder & Stice, 1998; Eisenberg et al., 2004). This inconsistency may derive from the disparity of sub-components embedded within the effortful control construct, which include attentional focusing and inhibitory control. Of these sub-constructs, inhibitory control may be more relevant to describing the sort of control that may serve as a

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