

Anger, Sympathy, and Children's Reactive and Proactive Aggression:  
Testing a Differential Correlate Hypothesis

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## EMOTIONS IN REACTIVE AND PROACTIVE AGGRESSION

### Abstract

This study tested the theoretical assertion that anger and sympathy would be differentially associated with “hot-blooded” reactive and “cold-blooded” proactive aggression in an ethnically diverse community sample of 4- and 8-year-olds from Canada ( $N = 300$ ;  $n = 150$  in each age group; 50% female). We conducted structured interviews with children to elicit their self-reported anger in response to social conflicts (anger reactivity), ability to effectively manage feelings of frustration (anger regulation), and the degree to which they felt concern for others in need (sympathy). Caregivers completed questionnaires assessing the degree to which children engaged in reactive and proactive overt aggression. Across ages, dysregulated anger was more strongly associated with reactive aggression, whereas lower sympathy was more strongly linked to proactive aggression. Anger reactivity did not predict children’s aggressive behavior, with one exception: lower anger reactivity in 8-year-old males was associated with higher levels of proactive aggression. These findings support the hypotheses that anger and sympathy are differentially involved in reactive and proactive aggression, and that these distinct affective correlates are evident by the preschool years.

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*Keywords:* anger, sympathy, reactive aggression, proactive aggression, early childhood, middle childhood

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Children's capacities to appropriately experience and regulate their emotions in social interactions are essential for healthy behavioral development (Eisenberg, 2000; Malti & Noam, 2016). Emotion processes involving anger and sympathy, in particular, have long played important roles in developmental theories of aggression (Hay, 2017; Lochman, Barry, Powell, & Young, 2010; Malti, Dys, Colasante, & Peplak, 2018; Miller & Eisenberg, 1988). Contemporary researchers have posited that anger and sympathy may uniquely contribute to distinct types of aggressive behavior. Specifically, dysregulated anger may be more strongly linked to the development of reactive or "hot-blooded" aggression in response to threat/provocation, whereas a dearth of other-oriented concern may be more indicative of proactive or "cold-blooded" aggression in the pursuit of goals or resources (Arsenio & Lemerise, 2001, 2004; Hubbard, Morrow, Romano, & McAuliffe, 2010).

To date, however, few studies have incorporated assessments of both anger and sympathy to compare the relative strength of their associations with different types of aggressive behavior. Moreover, relatively little is known about the distinct affective correlates of reactive and proactive aggression prior to middle childhood. Examining these processes in early childhood is necessary to develop effective interventions targeting the unique emotional factors associated with different aggressive subtypes before long-term problematic behavioral trajectories become canalized (Malti, Chaparro, Zuffianò, & Colasante, 2016; Shaw & Taraban, 2017; Vitaro, Brendgen, & Barker, 2006). To address these gaps in the literature, we examined whether 4- and 8-year-olds' self-reported intensity of anger arousal in response to social conflict, ability to

regulate anger, and sympathy for others in need were differentially associated with caregiver ratings of reactive and proactive overt aggression.

### **Anger and Aggression**

Anger is a negatively valenced emotional state in response to perceived environmental threats and goal blocking that functions as a signal to warn or intimidate others (Lochman et al., 2010). Although anger can be adaptive when appropriately matched to the immediate social context (e.g., when directly threatened), children who have difficulty regulating and controlling the subjective experience and outward expression of anger show heightened levels of aggression from early childhood onward (Lemerise & Harper, 2010; Lochman et al., 2010). Infants as young as 6 months of age display verbal and facial signs of anger while engaging in overtly aggressive acts such as hitting and forcefully taking toys from others (Hay, 2017). Beyond infancy, children who frequently engage in aggressive interactions with peers are more prone to intense anger and frustration—and possess less adaptive strategies for coping with these emotions—than less aggressive youth (Arsenio, Cooperman, & Lover, 2000; Musher-Eizenman et al., 2004; Schultz, Izard, & Bear, 2004; Zeman, Shipman, & Suveg, 2002). As such, intense and dysregulated anger is conceptualized as a motivating force underlying many (but not all) aggressive interactions.

### **Sympathy and Aggression**

Sympathy (i.e., empathic concern) is an affective response to another's emotional state or condition. Whereas empathy entails feeling the same or a similar emotion to what others are feeling (e.g., sadness when others are sad), sympathy specifically refers to the experience of concern or sorrow for others in need (Eisenberg et al., 2014; Malti et al., 2018). Although sympathy can arise from empathy, it may also stem from a cognitive awareness of another's state or condition (Eisenberg et al., 2014). Distinguishing sympathy from empathy is critical because

unregulated empathy can lead to an aversive, self-focused emotional state of personal distress (Eisenberg et al., 2014). In contrast, sympathy directs children's attention outward to the consequences of actions for others' rights and wellbeing. As such, experiencing sympathy—but not empathy or personal distress—in anticipation of or in response to another's suffering is thought to inhibit children's tendency to engage in aggressive actions that harm others (Eisner & Malti, 2015; Zuffianò, Colasante, Buchmann, & Malti, 2018).

Despite this conceptualization of sympathy as a protective factor, researchers have frequently utilized measures of empathy-related responding that do not differentiate sympathy from empathy and personal distress (Eisenberg et al., 2014; Miller & Eisenberg, 1988). As such, empirical support for the inhibiting role of sympathy on aggression is mixed. Whereas past studies have documented negative associations with antisocial behavior in clinical (e.g., conduct-disordered youth; Cohen & Strayer, 1996) and community samples of children and adolescents (Strayer & Roberts, 2004; van Norden, Haselager, Cillessen, Bukowski, 2015; Zuffianò et al., 2018), others have failed to find an association (see Lovett & Sheffield, 2007) and there is some evidence that empathy-related responding may be positively linked to aggression in early childhood (Gill & Calkins, 2003).

An additional reason for these conflicting findings may be that past research has often focused on general antisocial or conduct problems (e.g., externalizing symptoms, delinquency) rather than aggression involving intentional harm towards others (Tremblay, 2010). Children bereft of sympathy may be more likely to harm others in certain situations (e.g., when doing so leads to rewards) while nevertheless demonstrating the ability to act in accordance with social norms in other contexts. As discussed below, the association between other-oriented concern and aggression likely varies depending on the type of aggressive behavior in question.

### **Reactive and Proactive Aggression**

Whereas prior research has focused on the roles of anger and sympathy in the development of children's overt aggression, less attention has centered on whether these affective processes are differentially associated with reactive and proactive aggression. Reactive or hostile aggression reflects a "hot-blooded" response to perceived threat or goal blocking in the environment. It is frequently conceptualized as involving intense feelings of anger and frustration, and functions as an impulsive act of defense or retaliation against provocation. Proactive or instrumental aggression, on the other hand, entails the "cold-blooded" use of coercion or harm in the pursuit of goals, rewards, or power (Hubbard, McAuliffe, Romano, & Morrow, 2010; Little, Henrich, Jones, & Hawley, 2003; Vitaro et al., 2006).

Although often overlapping, reactive and proactive aggression represent distinct behaviors that show different patterns of association with children's psychosocial functioning (Card & Little, 2006; Hubbard, McAuliffe, et al., 2010). Compared to proactive aggression, reactive aggression is more closely linked to past experiences of peer rejection and victimization (Dodge et al., 1997), externalizing problems (e.g., hyperactivity; Little et al., 2003), and the tendency to perceive ambiguous social situations as hostile and threatening (hostile attribution bias; Crick & Dodge, 1996). Proactive aggression, by contrast, is not consistently associated with poor psychosocial functioning (see Card & Little, 2006) and has been positively linked to some indicators of social competence (e.g., popularity, perspective-taking; Poulin & Boivin, 2000; Renouf et al., 2010). These findings suggest that children who proactively aggress do not always fit the "deficit" stereotype associated with antisocial behavior in general (Sutton, Smith, & Swettenham, 1999). Nevertheless, proactive aggression constitutes a core feature of bullying perpetration (i.e., deliberate and repeated use of harm against a less powerful victim) and, is

more likely than reactive aggression to involve the presence of callous-unemotional (CU) tendencies (Marsee & Frick, 2012; Zych, Ttofi, & Farrington, 2016). Proactive aggression may also be uniquely predictive of interpersonal violence in adolescence (Brendgen, Vitaro, Tremblay, & Lavoie, 2001). Given the conceptual distinction between the subtypes, and their differential associations with children's functioning, researchers have posited that unique emotion processes may contribute to reactive and proactive aggression (Arsenio & Lemerise, 2001; 2004; Hubbard, Morrow, et al., 2010; Vitaro, et al., 2006).

**Anger in reactive and proactive aggression.** Experiencing intense and dysregulated anger is hypothesized to increase the likelihood that children will reactively aggress in response to perceived provocation or threats in the environment. Consistent with this notion, research conducted in late childhood and adolescence utilizing self-, teacher-, and caregiver-reports of anger have found that reactively aggressive youth are prone to strong feelings of frustration and have difficulty regulating their anger once aroused (Little, Brauner, Jones, Nock, & Hawley, 2004; McAuliffe, Hubbard, Rubin, Morrow, & Dearing, 2007; Orobio de Castro, Merk, Koops, Veerman, & Bosch, 2005). A longitudinal study by Rohlf, Busching, and Krahe (2017) demonstrated that observed anger dysregulation during middle childhood was directly associated with higher levels of reactive (but not proactive) aggression concurrently and indirectly linked to relative increases in reactive aggression 1 year later by eliciting victimization from peers.

The conceptualization of proactive aggression as “cold-blooded” implies that children utilizing aggressive tactics in the pursuit of rewards are less prone to dysregulated anger. Whereas some studies have documented autonomic under-arousal in proactively aggressive youth (Moore, et al., 2018; Raine, et al., 2014), others have produced mixed support for this hypothesis. For instance, Hubbard and colleagues (2002) engaged 8-year-olds in a lab-based

competitive task designed such that children lost a game (and prizes) to a confederate who cheated. Greater physiological arousal—measured via skin conductance reactivity—and observed behavioral expressions of frustration during the task were associated with higher levels of teacher-reported reactive (but not proactive) aggression. Nonetheless, children higher in proactive (but not reactive) aggression showed increases in self-reported anger over the duration of the competitive task. Similar conflicting findings emerged in a longitudinal study by Ostrov, Murray-Close, Godleski, and Hart (2013), which demonstrated that teacher-reported anger at 3 years of age predicted higher levels of observed reactive and proactive physical aggression 4 months later, whereas greater emotion regulation skills were weakly but positively associated with greater proactive (but not reactive) aggression over time.

One potential explanation for these conflicting results is that experiencing intense anger in response to social conflicts may be indicative of both aggressive subtypes, yet children who engage in proactive aggression may be more adept than reactively aggressive youth at *regulating* their emotional responses (Hubbard, Morrow, et al., 2010). Indeed, reactivity (the intensity of affect) and regulation (the capacity to modulate an affective response) constitute related but distinct emotion processes (Cole, Martin, & Dennis, 2004; Eisenberg, 2000;). Although aggressively responding to threat has clear adaptive value, the ability to effectively manage the experience and expression of anger allows children to attend to relevant social information (e.g., others' benign intent) and enact behavioral strategies that are appropriate in a given social context (Lemerise & Harper, 2010; Lochman et al., 2010). To date, few studies have examined both anger reactivity and regulation to disentangle their distinct associations with reactive and proactive aggression (but see Hubbard et al., 2002; Moore et al., 2018). We therefore included assessments of both anger reactivity and regulation in the present study.

**Sympathy in reactive and proactive aggression.** Children who proactively harm others for instrumental gain are more likely than reactively aggressive and non-aggressive children to believe that aggression is an effective means of achieving goals and obtaining positive rewards (Arsenio, Adams, & Gold, 2009; Crick & Dodge, 1996; Dodge et al., 1997). As Arsenio and Lemerise (2001) note, however, expecting aggression to “get you what you want” does not explain why a child would consider harming others to be an acceptable course of action. To address this disconnect, developmental researchers have posited that a limited capacity to experience sympathy may be an important factor underlying proactive aggression (Arsenio & Lemerise, 2001, 2004). Indeed, a dearth of other-oriented concern constitutes a defining characteristic of CU, which has been linked to proactive aggression in community and clinical samples (see Frick et al., 2014; Marsee & Frick, 2010). The degree to which sympathy accounts for this relation remains unclear, however, given that CU traits encompass a broad array of characteristics including a general poverty of emotional expression, lack of guilt over misbehavior, low achievement motivation, and an insensitivity to punishment.

Although identifying the affective mechanisms underlying different types of aggression is essential for successful intervention (Vitaro et al., 2006), surprisingly little research has explicitly tested whether children lower in sympathy are more likely to engage in proactive versus reactive aggression. Arsenio and colleagues (2009) interviewed low-income, primarily African American adolescents regarding hypothetical vignettes depicting characters engaged in aggressive conflicts with peers. When asked to imagine themselves as the transgressors, adolescents higher in teacher-reported proactive aggression were more likely than less aggressive youth to expect to feel positive emotions after aggressing and less likely to reference the welfare of the victims when explaining their emotions; reactive aggression was not associated with self-

reported emotions or reasoning. In a more direct test of the sympathy–proactive aggression link, Peplak and Malti (2017) found that combined teacher- and peer-reports of proactive (but not reactive) aggression were uniquely associated with lower levels of teacher-reported sympathy in 5- to 10-year olds. To clarify whether these findings could be replicated using different informants, we examined whether sympathy was more strongly associated with proactive compared to reactive aggression.

### **Developmental Considerations**

Physical aggression peaks in frequency between 2 and 4 years of age before normatively declining across the preschool and school years (Eisner & Malti, 2015); by adolescence, only a minority of chronically problematic youth continue to exhibit high levels of this behavior (Tremblay, 2010). Correspondingly, children’s abilities to adaptively regulate their anger and experience sympathy for others increase from early to middle childhood (Eisenberg et al., 2014; Lemerise & Harper, 2010). Moreover, programs are more effective at reducing problem behaviors and promoting empathy-related and prosocial tendencies when implemented in early childhood rather than at later ages (Ellis, Volk, Gonzalez, & Embry, 2016; Malti, Chapparo, Zuffiano, & Colasante, 2016; Shaw & Taraban, 2017). Understanding whether the distinct affective correlates of reactive and proactive aggression observed in middle childhood are also evident in early childhood is necessary to inform efforts targeting the specific emotion processes associated with each subtype. Teaching children how to adaptively cope with their anger has been effective at reducing reactive aggression (Lochman et al., 2010). In contrast, interventions specifically designed to foster children’s concern for others’ rights and wellbeing (e.g., providing opportunities for affective perspective-taking; Hubbard, McAuliffe, et al., 2010) may be especially important for reducing proactive aggression (but see Ellis et al., 2016).

### **Current Study**

Our central aim was to test the hypothesis that intense and dysregulated anger would be more strongly associated with reactive aggression, whereas a lack of sympathy would be more strongly linked to proactive aggression. We focused on 4- and 8-year-olds in order to clarify whether the differential affective correlates of reactive and proactive aggression evidenced stability or age-related differences. We limited our investigation to overt aggression (e.g., direct physical harm and verbal attacks) because it represents the most common form of childhood aggression and is a robust predictor of later maladjustment (Eisner & Malti, 2015).

In line with contemporary theorizing and findings from past research, we expected that children reporting more intense anger in response to hypothetical acts of victimization and less effective anger regulation strategies would evidence higher levels of reactive aggression. In contrast, we hypothesized that children who expressed less sympathy for others would evidence higher levels of proactive aggression. Given the mixed pattern of findings regarding anger and proactive aggression (Hubbard et al., 2002; Ostrov et al., 2013), it was unclear whether anger reactivity and regulation would be associated with this subtype of aggression.

Although overt aggression normatively declines from early to middle childhood (Eisner & Malti, 2015), little research has examined whether the emotional correlates of reactive and proactive aggression differ in younger and older children. Similarly, whereas males are more likely to engage in overt aggression than females, the extent to which anger and sympathy show different patterns of association with each subtype as a function of gender is unknown. We therefore compared the strength of these effects across age and gender but did not have specific hypotheses. We controlled for children's verbal ability in all analyses given its demonstrated associations with aggression (Eisner & Malti, 2015), anger (Giesbrechta, Miller, & Müller,

2010), and sympathy (Malti, Gummerum, Keller, Chaparro, & Buchmann, 2012).

## Method

### Sample

The present sample consisted of 300 four- and 8-year-olds ( $n = 150$  in each age group; 50% female) and their primary caregivers (84% mothers; 98% biological parents) drawn from the first wave of an ongoing longitudinal study of children's social-emotional development and aggression. Participants were recruited from a pre-existing database of families from Mississauga, Canada. Over 93% of caregivers reported being married or in a domestic partnership. Caregivers' self-reported highest level of education included 1% less than high school, 4% high school, 1% apprenticeship or trade school, 17% college degree, 49% bachelor's degree, 21% master's degree, and 3% Ph.D.; 4% chose not to answer. Reflecting Mississauga's population (Statistics Canada, 2013), the sample was ethnically diverse: 15% American, 15% South/Southeast Asian, 13% Western European, 9% East Asian, 5% Eastern European, 4% Central/South American, 3% West/Central Asian, 3% African, 1% Middle Eastern, 19% multi-ethnic, and 1% other; 11% refused/chose not to answer. Four and 8-year-olds did not differ along any demographic characteristics ( $ps = .20-.80$ ).

### Procedure

The university's ethics review board granted approval for the study prior to the start of data collection. Children and their caregivers attended the laboratory for a single 60- to 90-minute session. Verbal assent was obtained from children and written informed consent was obtained from caregivers. Child assessments were conducted in a designated room while caregivers remained in a waiting area and completed questionnaires on a touchscreen tablet. Children were instructed on the use of all scales prior to task completion and trained undergraduate psychology research assistants conducted the sessions. At study end, caregivers

were debriefed and children were gifted an age-appropriate book for their participation.

### Measures

**Reactive and proactive aggression.** Caregivers rated children's reactive and proactive aggression using 12 items (six items each) adapted from a self-report measure developed by Little et al. (2002). The items described overt acts of verbal and physical aggression indicative of reactive (e.g., "...puts others down if upset or hurt by them/fights back when hurt by someone") and proactive aggression (e.g., "...says mean things to others/starts fights...to get what (s)he wants"). Responses were scored on a 7-point scale ranging from 0 (*never*) to 6 (*always*). Separate principal components analyses (PCAs) with varimax rotation conducted on items within each aggression subscale revealed single factor solutions accounting for 66% of the variance in reactive (standardized loadings = .77–.86) and proactive scores (standardized loadings = .76–.87) for 4-year-olds, and 59% (standardized loadings = .69–.81) and 60% (standardized loadings = .74–.83) of the variance in reactive and proactive scores, respectively, for 8-year-olds. Items were averaged within each subscale to create composite scores representing reactive ( $\alpha = .89$  and  $.85$  for 4- and 8-year-olds, respectively) and proactive aggression ( $\alpha = .89$  and  $.86$  for 4- and 8-year-olds, respectively), with higher scores reflecting higher levels of aggression.

**Anger regulation.** Children's self-reported ability to manage their feelings of anger and frustration was assessed using the four-item Emotion Regulation Coping subscale of the Children's Anger Management Scale (CAMS; Zeman et al., 2002). Item wording slightly differed between the 4- and 8-year-old versions: "When I'm feeling mad, I can control my anger/When I'm feeling mad, I can control my temper", "I stay calm when I'm mad/I stay calm and keep my cool when I'm feeling mad", "I can stop myself from getting angry/I can stop myself from losing my temper when I'm mad", "I calmly deal with what makes me mad/I try to calmly deal with what is making me mad". The experimenter read each item and asked children, "Does

this sound like you? Or not?” They were given the forced choice of responding “No, this does not sound like me” or “Yes, this sounds like me”. Affirmative responses were followed up by asking, “Does it really sound like you? Or sort of sound like you?” Responses for each item were coded on a 3-point scale ranging from 0 (*not like me*) to 2 (*really sounds like me*). A PCA revealed a single factor solution accounting for 61% (standardized loadings = .63–.84) and 58% (standardized loadings = .71–.80) of the variance in scores for 4- and 8-year-olds, respectively. Items were averaged to create a single composite of anger regulation ( $\alpha$ s = .78 and .76 for 4- and 8-year-olds, respectively), with higher scores reflecting better anger regulation ability.

**Anger reactivity.** Children’s anger reactivity in response to conflict was assessed via semi-structured interviews regarding six hypothetical vignettes involving social transgressions. Similar measures have been extensively used and validated to assess children’s self-reported emotions in response to social conflicts in children as young as 4 years of age (Malti, Gummerum, Keller, & Buchmann, 2009; Smetana, Toth, Cicchetti, Bruce, Kane, & Daddis, 1999). Children were trained to use a 3-point rating scale (see below) prior to the start of the interviews. Stories were presented to children on a computer screen, accompanied by illustrations and an audio-recorded narration of the events. The six vignettes depicted a range of everyday events experienced by young children that have negative implications for others’ physical and/or psychological wellbeing: *not sharing* (eating an ice cream cone that was intended for a friend and not telling them about it), *stealing* (taking and eating a peer’s chocolate bar without them knowing), *failure to act prosocially* (refusing to help a peer who asked for help learning to play an instrument), *shoving* (pushing someone and cutting in line to get the last lollipop from the teacher), *exclusion based on school membership* (excluding someone from a different school from a group painting exercise), and *exclusion based on social class* (refusing to

let a peer share a seat on a bus because they live in a run-down house).

In line with past research (██████████), children were first instructed to imagine themselves as the transgressor and were asked how they would feel if they had engaged in the actions and why. As these assessments are not the focus of the present study they are not considered further. Next, using a 3-point scale depicting squares of increasing size corresponding to different levels of intensity, children were asked to rate how angry they would feel if the acts had been done to them (i.e., as the victims). Responses were coded as 1 (*not strong*), 2 (*somewhat strong*), and 3 (*very strong*). Although the vignettes depict different types of morally relevant situations, a PCA revealed a single factor solution in both age groups accounting for 67% (standardized loadings = .78–.85) and 50% (standardized loadings = .66–.79) of the variance in scores for 4- and 8-year-olds, respectively. Scores across the six stories were averaged to create a single measure of anger reactivity ( $\alpha = .90$  and  $.80$  for 4- and 8-year-olds, respectively), with higher scores reflecting more intense feelings of anger in response to the events.

**Sympathy.** Children's self-reported sympathy was assessed using a five-item scale from Eisenberg et al. (1996; e.g., "I feel sorry for other children who are being teased"), which has been successfully employed in studies with children as young as 4 years of age (Ongley & Malti, 2014). The experimenter read each item and asked children, "Does this sound like you? Or not?" Children were given the forced choice of responding "No, this does not sound like me" or "Yes, this sounds like me." Affirmative responses were followed up by asking, "Does it really sound like you? Or sort of sound like you?" Responses for each item were coded on a 3-point scale ranging from 0 (*not like me*) to 2 (*really sounds like me*). PCAs conducted separately for each age group revealed that one item ("I feel sorry for kids who don't have toys and clothes") loaded

onto a separate factor for 4-year-olds. One factor emerged for 8-year-olds, but the same item loaded less strongly (.56) compared to other items (.71–.85). After removing this item, a revised PCA revealed a single-factor solution accounting for approximately 60% of the variance in scores for both age groups, with high standardized loadings for 4- (.72–.80) and 8-year-olds (.72–.85). Items were averaged across the four items to create a sympathy scale ( $\alpha = .77$ ), with higher scores reflecting greater levels of sympathy.

**Verbal ability (control variable).** Children's verbal ability was measured using the verbal subtest of the Kaufman Brief Intelligence Test 2<sup>nd</sup> edition (KBIT-2; Kaufman & Kaufman, 2004). Scores were calculated by subtracting each participant's number of errors from their total correct responses ( $M_s = 13.89, 29.23$ ,  $SD_s = 4.23, 5.15$ ,  $Ranges = 1–26, 16–44$ , for 4- and 8-year-olds, respectively). As older children demonstrated greater verbal ability than younger children (Cohen's  $d = 3.66$ ), this variable was mean-centered within each age group prior to analyses.

### **Missing Data**

A preliminary inspection revealed a relatively small amount of missing data ( $range = 0\%–5.70\%$ ). Little's missing completely at random (MCAR) test conducted on all study variables was significant,  $\chi^2(41, N = 300) = 62.067, p = .018$ , indicating that the pattern of missing data was associated with observed scores across the study variables. Follow-up analyses revealed that 4-year-olds were more likely than 8-year-olds to have missing data on all three emotion variables, males were more likely than females to have missing anger regulation scores, children with lower verbal ability were more likely to have missing sympathy scores, and more proactively aggressive children were more likely to have missing sympathy and anger regulation data. We therefore estimated missing data under the missing-at-random (MAR) assumption using full information maximum likelihood estimation (FIML) with robust standard errors. The

Satorra-Bentler scaled chi-square difference test was used to compare nested models when appropriate.

### **Data Analysis Plan**

All data analyses were conducted using *Mplus* 7.3. We first screened for multivariate outliers using multiple indices available in the *Mplus* program, including the Mahalanobis distance, Cook's D parameter estimate influence measure, loglikelihood contribution from each individual, and loglikelihood distance influence measure. We next examined mean-level differences by age group and gender across all study variables. To test our main study hypotheses, we estimated an initial path model simultaneously regressing reactive and proactive aggression onto the three emotion variables and verbal ability (see Figure 1). This approach differs from the common practice of estimating separate models that control for the non-focal form of aggression (e.g., regressing proactive aggression onto reactive aggression and predictors; Arsenio et al., 2009). This latter method has been critiqued on the grounds that removing *all* of the shared variance between the two behaviors produces an artificial estimate that is difficult to interpret (Miller & Lynam, 2006). A simultaneous path model also allowed us to explicitly test the proposition that different emotion processes would be *more strongly* associated with one form of aggression compared to the other, rather than relying exclusively on whether an effect was significantly different from zero or not. After the initial model, we employed multi-group modeling to test whether the strength of the effects varied across age group and gender (categorical variables). This was accomplished by comparing the  $\chi^2$  values of models with the standardized regression parameters across the four groups (4-year-old females, 4-year-old males, 8-year-old females, 8-year-old males) constrained to equality to models with the parameters freely estimated. Separate comparisons were conducted for each path between the three emotion

variables and the two aggression outcomes (six total comparisons). In the final step, we examined whether the different emotion processes were more strongly associated with reactive or proactive aggression by comparing the  $\chi^2$  values of models freely estimating paths between predictors and aggression outcomes to models with each path constrained to equality. All variables were z-standardized prior to entry into the models.

## Results

### Outlier Screening

Two 4-year-olds (one male and one female) were identified as multivariate outliers: Mahalanobis distance = 43.54 and 28.80 ( $M = 7.80$ ), Cook's  $D = 0.90$  and  $0.77$  ( $M = 0.14$ ), loglikelihood contribution from each individual =  $-25.87$  and  $-21.49$  ( $M = -10.37$ ), and loglikelihood distance influence measure = 4 and 2 ( $M = 0.17$ ), respectively. Follow-up sensitivity analyses revealed that including these two cases did not substantially influence the magnitude or direction of the regression parameters, but their inclusion did lead to increased standard error estimates and, in some instances, impacted the interpretation of statistical significance tests. The results we report below are based on analyses with these two outliers removed. Results based on the full sample are provided in the Online Supplemental Material.

### Descriptive Statistics

Descriptive statistics and bivariate correlations among all study variables are provided in Table 1. Detailed descriptive statistics broken down by age and gender are included in the Online Supplemental Material. We first tested multi-group models to examine age and gender differences in means across the study variables. Consistent with past findings (Eisner & Malti, 2015; Lemerise & Harper, 2010), compared to 4-year olds, 8-year olds scored higher in anger regulation ability,  $\chi^2(1) = 14.58, p = .001$ , Cohen's  $d = 0.32$ , and sympathy,  $\chi^2(1) = 120.70, p <$

.001,  $d = 1.32$ , reported less anger in response to social conflicts,  $\chi^2(1) = 10.06$ ,  $p = .002$ ,  $d = 0.38$ , and engaged in less reactive and proactive aggression,  $\chi^2s(1) = 3.78, 6.90$ ,  $ps = .05, .008$ ,  $ds = 0.23, 0.30$ , respectively. In contrast to these consistent age differences, males and females did not significantly differ along most study variables,  $\chi^2s(1) = 0.02-1.30$ ,  $ps = .25-.90$ ,  $ds = 0.02-0.18$ , with the exception that caregivers rated males as more reactively aggressive than females,  $\chi^2(1) = 8.17$ ,  $p = .004$ ,  $d = 0.33$ .

### **Direct Effects of Anger and Sympathy on Reactive and Proactive Aggression**

We tested an initial path model examining the overall direct effects of anger (reactivity and regulation) and sympathy on each aggression subtype. As hypothesized, children better at regulating their anger were less reactively aggressive,  $\beta = -.148$  [95% CI:  $-.278, -.018$ ],  $p = .026$ , whereas anger regulation was not significantly associated with proactive aggression,  $\beta = -.038$  [ $-.158, .082$ ],  $p = .54$ . Also consistent with theoretical expectations, lower sympathy was significantly associated with greater proactive,  $\beta = -.143$  [ $-.284, -.001$ ],  $p = .05$ , but not reactive aggression,  $\beta = -.003$  [ $-.159, .154$ ],  $p = .97$ . Unexpectedly, anger reactivity was not associated with reactive,  $\beta = .005$  [ $-.127, .136$ ],  $p = .94$ , or proactive aggression,  $\beta = -.011$  [ $-.145, .124$ ],  $p = .87$ .

### **Moderation by Age and Gender**

We next tested a series of models to examine whether the effects of anger and sympathy on reactive and proactive aggression were moderated by age and/or gender. Detailed statistics for each model comparison are provided in the Online Supplemental Material. The effects of anger regulation and sympathy on reactive ( $ps = .22-.38$ ) and proactive aggression ( $ps = .41-.75$ ) did not significantly differ across groups. The effect of anger reactivity on reactive aggression also did not differ ( $p = .29$ ). Significant group differences did emerge for the association between

anger reactivity and proactive aggression ( $p = .006$ ). Follow-up analyses revealed that the effect for 8-year-old males differed from the three remaining groups ( $ps = .002-.035$ ). Eight-year-old males who reported less anger in response to social conflicts were rated by caregivers as *higher* in proactive aggression. The effect of anger reactivity on proactive aggression did not differ between 4-year-olds and 8-year-old females ( $ps = .30-.70$ ); anger reactivity was not associated with proactive aggression for these children. Complete parameter estimates for the final revised model allowing a unique path between anger reactivity and proactive aggression for 8-year-old males are provided in Table 2.

### **Comparing the Relative Strength of Anger and Sympathy on Aggression Subtypes**

As a final step, we tested models examining whether the magnitude of the effects of anger and sympathy differed for reactive and proactive subtypes. As hypothesized, anger regulation was more strongly associated with reactive compared to proactive aggression,  $\Delta \chi^2(1) = 5.25, p = .022$ , whereas sympathy was a significantly stronger predictor of proactive compared to reactive aggression,  $\Delta \chi^2(1) = 31.55, p < .001$ . For 4-year-olds and 8-year-old females, the (null) effects of anger reactivity on the two subtypes of aggression did not differ in strength,  $\Delta \chi^2(1) = 1.41, p = .24$ . For 8-year-old males, however, the negative effect of anger reactivity on proactive aggression was significantly stronger than the corresponding path to reactive aggression,  $\Delta \chi^2(1) = 7.00, p = .008$ .

### **Discussion**

Anger and sympathy have long played central roles in developmental theories of aggression (Hay, 2017; Miller & Eisenberg, 1988). The present study contributed new knowledge to this theorizing by simultaneously examining whether anger reactivity, anger regulation, and sympathy demonstrated distinct patterns of association with two subtypes of

overt aggression—“hot-blooded” reactive and “cold-blooded” proactive aggression—in a large, ethnically diverse community sample of Canadian 4- and 8-year-old children. In support of a differential correlate hypothesis, we found that reactive aggression was more strongly associated with dysregulated anger, whereas lower sympathy was more strongly linked to proactive aggression. These results illustrate the utility of distinguishing between different types of emotion processes to generate novel, in-depth information on the heterogeneous motives underlying aggression in early and middle childhood.

Anger over-arousal constitutes a defining feature of reactive aggression, whereas proactive aggression is conceptualized as a more deliberate and controlled behavioral expression (Crick & Dodge, 1996; Hubbard, McAuliffe, et al., 2010). Consonant with this view, anger dysregulation was more strongly associated with caregiver-reported reactive than proactive aggression. Interestingly, reactively aggressive children did not report feeling more intense anger as victims of social conflict than other youth. Anger is commonly linked to poor mental health outcomes, but it is also adaptive in certain social contexts (e.g., when threatened; Lochman et al., 2010) and motivates prosocial behaviors aimed at rectifying perceived injustices (Malti et al., 2018). Problems arise, however, when children have difficulty *controlling* their frustration once the immediate threat has subsided or during social encounters where threat cues are ambiguous or imagined. Although past studies have also found null associations between anger regulation and proactive aggression (Little et al., 2003; Rohlf et al., 2017), demonstrating that this effect was significantly weaker than for reactive aggression provides confirmatory evidence that proactive aggression is not primarily driven by emotion regulation difficulties (for experimental evidence, see Phillips & Lochman, 2003).

In support of Arsenio and Lemerise’s (2001, 2004) claim, and extending Peplak and

Malti's (2017) recent findings using different informants, lower child-reported sympathy was uniquely—and more strongly—associated with caregiver ratings of proactive compared to reactive aggression. Disruptive, delinquent, and impulsive behaviors are distinct from self-serving harm and coercion enacted against others (Hawley, 2014; Little et al., 2003; Tremblay, 2010). Theorists have postulated that the inconsistent link between empathy-related responding and conduct problems found in past research stems in part from a failure to adequately differentiate regard for others' wellbeing (sympathy or empathic concern) from the general capacity to share the affective experience of others (empathy; Eisenberg et al., 2014; Lovett & Sheffield, 2007; Miller & Eisenberg, 1988). Our results illustrate the utility of attending to the type and nature of antisocial behavior under investigation as well. Knowing that a child acts aggressively towards others provides little insight into the motivations driving their behavior. Although children who harm others to accomplish instrumental goals often do not fit the “deficit” profile commonly observed in youth exhibiting severe conduct problems (Card & Little, 2006; Hawley, 2014; Sutton et al., 1999), our findings align with recent studies indicating that proactive aggression is uniquely characterized by reduced sympathy for others (Arsenio et al., 2009; Peplak & Malti, 2017).

Our final aim was to examine whether the relations between anger and sympathy with aggression differed between early and middle childhood. Consistent with past studies (Eisner & Malti, 2015; Lemerise & Harper, 2010), we found mean level differences between younger and older children across all of the study variables. Interestingly, the unique associations between anger regulation and reactive aggression, and sympathy and proactive aggression, did not differ by age. This suggests that the distinct affective correlates of each aggressive subtype may already be evident by the preschool years. As overall levels of overt aggression peak between 2

to 4 years of age (Tremblay, 2010), studies conducted at earlier ages are needed to determine precisely when these associations emerge in development.

Anger reactivity was the one exception to this age-related pattern: higher proactive aggression was associated with *lower* levels of self-reported anger in 8-year-old males only. Although this finding was unexpected, it is consistent with past research linking proactive aggression to the presence of CU tendencies involving a dearth of emotional reactivity (Marsee & Frick, 2012). We drew from a community sample of 4- and 8-year-olds, whereas much of the CU literature has focused on samples of older children and adolescents (Frick et al., 2014). As such, one explanation for this finding is that, as overt aggression declines in frequency with age, children who continue to engage in overt proactive aggression beyond the preschool years may represent a subset of youth with severe conduct problems and high CU tendencies. Children who possess little regard for others, but who do not exhibit broad impairments in their general levels of affective arousal (particularly anger), may desist in the use of physical harm in favor of more subtle and indirect aggressive tactics at later ages. That this effect only emerged for males could reflect the finding that physical aggression is less socially acceptable and gender-typical for females compared to males during middle childhood (Ostrov & Godleski, 2010). Even among girls who are high in CU traits, an awareness of gender-specific social roles and expectations may lead females to develop non-physically aggressive strategies at earlier ages than males (also see Tremblay, 2010).

The differential effects observed in the present study call attention to the need for tailored intervention strategies targeting the unique affective correlates of reactive and proactive aggression (Malti et al., 2016; Vitaro et al., 2006). Given that aggressive children often engage in both types of behavior (Hubbard, McAuliffe et al., 2010), multi-faceted treatment packages that

simultaneously address the distinct emotion processes underlying reactive and proactive aggression are likely to prove most beneficial. Anger regulation training successfully lowers the frequency and severity of reactive aggression (Lochman et al., 2010), whereas promoting children's concern for the consequences of their actions for others (e.g., through inductive discipline or perspective-taking training) may be more effective at curbing proactive aggression (Hubbard, McAuliffe, et al., 2010). Although school-based programs aimed at fostering prosocial skills have been shown to reduce conduct problems in early and middle childhood (Malti et al., 2016), the degree to which these effects are specific to proactive aggression remains unknown. Identifying strategies to prevent or reduce proactive aggression during the childhood years is particularly important in light of research indicating that similar school-based programs have little impact on bullying perpetration when implemented in adolescence (Ellis et al., 2016).

### **Limitations and Future Directions**

This study provided novel insights into the emotion processes implicated in reactive and proactive aggression, but several limitations need to be noted. First, the cross-sectional design precludes us from drawing causal conclusions regarding the influence of emotions on aggression. Indeed, it is likely that children's aggressive peer interactions also contribute to their emotional development. For instance, repeatedly experiencing positive outcomes (e.g., resources, social influence) through the use of harm and coercion with peers may serve to dampen children's affective concern for others' wellbeing over time. Relatedly, as we focused on overt aggression, it is unclear whether similar findings would emerge for relational forms of aggression (Ostrov & Godleski, 2010). Examining changes in the links between emotion processes and distinct forms and functions of aggression from early to middle childhood represents a direction for future study.

In line with past studies (Card & Little, 2006), ratings of reactive and proactive aggression were highly correlated. Path analyses allowed us to examine the unique effects of anger and sympathy on both types of aggression simultaneously. In addition, using different informants to assess emotions and aggression reduced the potential for shared method effects. Nevertheless, researchers have long noted the limitations associated with adult-report questionnaires differentiating between reactive and proactive functions (Hubbard, Morrow, et al., 2010; Little et al., 2003). Additional research utilizing other informants (e.g., peers) and methods (e.g., observational, experimental) will strengthen the validity of our findings. Similarly, observational measures of children's anger and sympathy (Eisenberg et al., 2014; Rohlf et al., 2017) are necessary to examine these constructs at earlier ages than studied here.

As this study was conducted with a community sample, caution should be employed when generalizing these findings to populations with clinically elevated conduct problems. By definition, children and adolescents exhibiting severe behavioral issues have difficulty interacting with peers and successfully navigating social interactions. For these youth, proactive aggression may be less skillful and adaptive and more impulsive and disruptive to their social functioning compared to typically developing youth (also see Hawley, 2014). As such, anger dysregulation and dampened other-oriented concern may not *differentially* predict reactive and proactive functions in these populations.

One final issue we did not address in the present study concerns the potential influence of parents. Numerous studies have documented how responsive and harsh parenting contribute to children's anger regulation abilities, sympathy, and aggression (Eisenberg et al., 2014; Eisner & Malti, 2015; Lemerise & Harper, 2010). Theorists have also speculated that reactive and proactive aggression may stem from distinct types of family experiences (Brennden et al., 2001;

Vitaro et al., 2006). The pathways by which distinct parenting practices may contribute to different types of aggression through their effects on children's affective functioning have thus far received scant attention (Hubbard, McAuliffe, et al., 2010). As parent-training programs are a key component of successful childhood interventions for reducing antisocial behavior (Shaw & Taraban, 2017), identifying the unique family factors associated with reactive and proactive aggression is a critical next step for future research.

The present investigation provided novel insights regarding the affective correlates of aggression in young children. Simultaneously assessing distinct emotion processes and behaviors from multiple informants allowed us to explicitly test the theoretical assertion that anger and sympathy are differentially implicated in reactive and proactive aggression. We also demonstrated, for the first time, that these links are evident as early as the preschool years. Taking into account how different emotions contribute to diverse forms of social behavior and whether these processes show stability or change from early to middle childhood will foster a greater understanding of the emergence and perpetuation of aggression.

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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Table 1

*Descriptive Statistics and Correlations Among Study Variables*

	<i>M</i>	<i>SD</i>	Observed Range	1	2	3	4	5	6	7	8
1. Age group (8-year)	6.00	2.00	4 or 8	1	.00	-.01	.55**	.22**	-.19**	-.11*	-.15**
2. Gender (male)	1.50	.50	1 or 2		1	-.06	-.07	-.01	.01	.16*	.09
3. Verbal ability <sup>a</sup>	0.00	4.67	-13.28 to 14.72			1	.13*	.04	.04	.06	-.05
4. Sympathy	1.23	0.69	0 to 2				1	.56**	.03	-.12*	-.22**
5. Anger regulation	0.83	0.63	0 to 2					1	-.02	-.17**	-.15*
6. Anger reactivity	2.35	0.59	1 to 3						1	.03	-.01
7. Reactive aggression	1.07	0.91	0 to 4							1	.73**
8. Proactive aggression	0.48	0.60	0 to 2.83								1

*Note.*  $N = 298$ . 8-year = 8-year-olds.

<sup>a</sup> Verbal ability was mean-centered within each age-group

<sup>†</sup>  $p < .10$ . \*  $p < .05$  \*\*  $p < .01$ .

Table 2

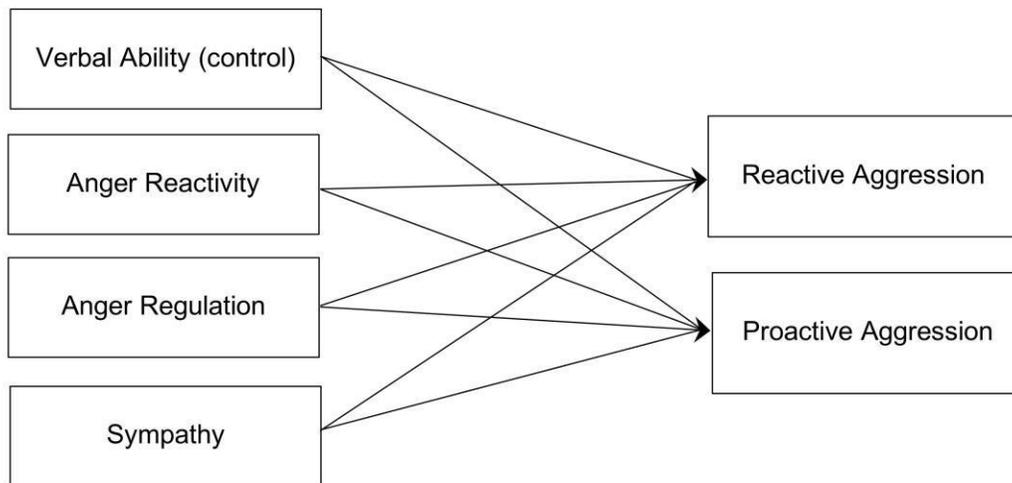
*Parameter Estimates for the Final Structural Model*

	Reactive aggression			Proactive aggression		
	$\beta$	SE	95% CI	$\beta$	SE	95% CI
Verbal ability	.056	.062	[-.060, .173]	-.011	.060	[-.112, .089]
Sympathy	-.020	.070	[-.172, .131]	<b>-.156</b>	<b>.069</b>	<b>[-.297, -.015]</b>
Anger regulation	<b>-.133</b>	<b>.068</b>	<b>[-.262, -.004]</b>	-.043	.067	[-.160, .073]
Anger reactivity	.011	.060	[-.120, .141]	.060 <sup>a</sup>	.064 <sup>a</sup>	[-.064, .185] <sup>a</sup>
				<b>-.218<sup>b</sup></b>	<b>.089<sup>b</sup></b>	<b>[-.440, -.051]<sup>b</sup></b>
R <sup>2</sup> estimate	.03			.04 <sup>a</sup>		.10 <sup>b</sup>

*Note.*  $\beta$  = standardized regression coefficient; SE= standard error (SE), CI= confidence interval.

Unlabeled parameters represent the estimated effects for the full sample.

<sup>a</sup> overall estimate across 4-year-olds and 8-year-old females. <sup>b</sup> unique estimate for 8-year-old males.



*Figure 1.* Diagram of the initial path model.