

A Longitudinal Study of Forms and Functions of Aggressive Behavior in Early Childhood

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The purpose of this study was to investigate the distinct forms (i.e., physical and relational) and functions (i.e., proactive and reactive) of aggressive behavior during early childhood ($n = 101$; M age = 45.09 months). Forms, but not functions, of aggressive behavior were stable over time. A number of contributors to aggression were associated with distinct subtypes of aggressive behavior. Females and socially dominant children were more relationally aggressive and older children were less physically aggressive than their peers. Longitudinal analyses indicated that social dominance predicted decreases in physical aggression and peer exclusion predicted increases in relational aggression. Overall, the results provide support for the distinction between subtypes of aggression in early childhood.

Engagement in aggressive behavior is associated with a host of problems, including internalizing symptoms (e.g., Murray-Close, Ostrov, & Crick, 2007), peer rejection (see Bierman, 2004), and other indices of maladjustment (see Dodge, Coie, & Lynam, 2006). However, to adequately understand the development of aggression and the outcomes associated with such conduct, it is important to consider the forms and functions of aggression (Little, Jones, Henrich, & Hawley, 2003). Recently, researchers have provided an empirical framework for disentangling the forms from the functions of aggression so that unique correlates of each can be assessed (Fite, Stauffacher, Ostrov, & Colder, 2008; Little et al., 2003). However, this work is limited in three important ways. First, little research has simultaneously examined these forms and functions of aggressive behavior in early childhood. Second, limited longitudinal research is available to address the stability of each subtype of aggression. Finally, few studies have examined concurrent and longitudinal predictors of forms and functions of

aggression. The first goal of this study was to test a newly developed measurement and analysis system for disentangling forms and functions of aggression (Little et al., 2003) in early childhood. Second, we examined the stability of these “pure” aggression subtypes. Finally, we examined whether potential risk factors for aggression, such as gender, age, social dominance, and experiences of peer exclusion, predicted concurrent subtypes of aggression and increases in these subtypes of aggression over time.

The field generally has agreed on an overall definition of aggression (see Coie & Dodge, 1998), which is behavior intended to hurt, harm, or injure another person. Research has demonstrated that children engage in a variety of forms and functions of aggressive behavior. For example, one important distinction is whether aggression is physical or relational in form. Whereas physical aggression is defined as behaviors that harm others through damage to one’s physical well-being, relational aggression includes behaviors that harm others through damage to relationships or feelings of acceptance, friendship, or group inclusion (e.g., social exclusion, threatening to end a friendship unless a peer complies with a request, or giving another child the “silent treatment”; Crick & Grotpeter, 1995; Tomada & Schneider, 1997; for discussion regarding related constructs such as indirect or social aggression, see Björkqvist, Lagerspetz, & Kaukiainen, 1992; Galen &

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Underwood, 1997). It is important to note that behaviors are only defined as aggression when they involve *the intent to harm*; thus, exclusionary behaviors that are considered fair (e.g., excluding a slow runner from a track team; Killen & Stangor, 2001) are not examples of relational aggression. Moreover, neither physical nor relational aggression includes many common conflictual interactions, such as those that are prosocially resolved or that do not have a victim (see Ross, Ross, Stein, & Trabasso, 2006). Although correlations between physical and relational aggression tend to be moderate to large in size (e.g., Crick, 1996; Crick & Grotpeter, 1995; Hawley, 2003; Putallaz et al., 2007), studies have provided evidence that physical and relational aggression are distinct factors (e.g., Crick & Grotpeter, 1995; Hart, Nelson, Robinson, Olsen, & McNeilly-Choque, 1998).

Children's aggressive behaviors can differ in their function. One important distinction is whether aggression is proactive or reactive in function. Whereas proactive aggression is defined as planned and goal-directed aggressive behaviors, reactive aggression consists of aggressive displays enacted in anger following perceived negative experiences such as provocation or frustration (Card & Little, 2006; Crick & Dodge, 1996; Dodge, 1991). Although proactive and reactive physical aggression tend to be highly correlated (e.g., Dodge & Coie, 1987), studies have provided evidence that they are distinct factors (e.g., Dodge & Coie, 1987; Fite, Colder, & Pelham, 2006; Poulin & Boivin, 2000; Raine et al., 2006; Vitaro, Brendgen, & Tremblay, 2002).

Distinguishing between the various forms and functions has important implications for understanding potentially different developmental manifestations and trajectories of aggressive behavior. First, subtypes of aggression have distinct theoretical frameworks; for example, proactive aggression is conceptually based on social learning theory (Bandura, 1973) whereas reactive aggression is supported by the frustration aggression hypothesis (Berkowitz, 1963). In addition, both forms and functions of aggression are hypothesized to relate to distinct social information processing patterns (Crick, 1995; Crick, Grotpeter, & Bigbee, 2002; Crick & Dodge, 1994, 1996; Salmivalli, Ojanen, Haanpaa, & Peets, 2005). Thus, the study of subtypes of aggression is essential to elucidate the theoretical underpinnings of aggression.

The utility of examining these forms and functions of aggression has been documented in several studies examining differential associations with maladjustment (Card & Little, 2006; Merk, Orobio

de Castro, Koops, & Matthys, 2005). For example, reactive aggression is related to hostile attribution biases, physiological reactivity to provocation, poor social skills, peer rejection, hyperactivity, impulsivity, internalizing problems, attention deficit hyperactivity disorder (ADHD) symptoms, peer rejection, and victimization (e.g., Barry et al., 2007; Card & Little, 2006; Crick & Dodge, 1996; Hubbard et al., 2002; McAuliffe, Hubbard, Rubin, Morrow, & Dearing, 2006; Waschbusch, Willoughby, & Pelham, 1998). In contrast, proactive aggression is associated with delinquency (Card & Little, 2006) and psychopathy (e.g., Marsee & Frick, 2007; Miller & Lynam, 2003; see Card & Little, 2006, for a meta-analysis of associations between social adjustment and proactive and reactive aggression). Relational aggression has also been shown in several studies to uniquely predict adjustment problems (e.g., externalizing symptoms) even after controlling for the variance associated with physical aggression (e.g., Crick, 1996; Marsee, Silverthorn, & Frick, 2005; Prinstein, Boergers, & Vernberg, 2001). Finally, studies that have combined both form and function have documented differential associations (e.g., Marsee & Frick, 2007; Prinstein & Cillessen, 2003). Thus, the study of subtypes of aggressive behavior is important in understanding the severity and type of risk associated with aggressive conduct.

Despite the many benefits of studying forms and functions of aggression, an important limitation of much research in this area is that most measures confound function and form (Little et al., 2003). For example, an item such as "If other children anger this child, s/he will often hit, kick, or punch them" includes both the form (physical) and the function (reactive) of the aggressive behavior. Recently, Little et al. (2003) presented a measurement and analysis system allowing researchers to disentangle the forms and functions of aggression so that unique correlates of each can be assessed. The authors measured pure forms of physical and relational aggression (i.e., without reference to function) and assessed proactive and reactive functions of aggression. Structural equation modeling (SEM) was used to disentangle these measures by creating pure form and function latent variables.

To date, only two studies have disentangled forms and functions of aggression using this approach (Fite et al., 2008; Little et al., 2003). In both studies, although physical and relational aggression were highly correlated, they were unique constructs. In addition, proactive and reactive aggression were negatively correlated once physical and relational forms of aggression were

controlled. Finally, each form and function of aggression was associated with demographic and outcome variables in theoretically meaningful ways. For example, hostility was associated with reactive, physical, and relational aggression but not proactive aggression (Little et al., 2003). These studies provide compelling evidence that it is necessary to simultaneously consider forms and functions of aggression so that unique correlates of each can be assessed. Both of these studies used self-reports of aggression in adolescent samples; thus, an important extension of this work is to examine whether this empirical approach can be used with younger samples and with other measures of aggression.

Previous studies, using a methodological approach that combines forms and functions rather than disentangling them, have demonstrated that distinct forms (i.e., physical and relational) and functions (i.e., proactive and reactive) of aggression are evident in children as young as 30 months old (Ostrov & Crick, 2007). Moreover, these forms and functions uniquely predict important developmental outcomes among children of this age (Ostrov & Crick, 2007). Thus, we expected that the model proposed by Little et al. (2003) could be effectively applied to a sample of young children and that the four distinct forms and functions of aggression would emerge in these analyses. We did, however, expect a different pattern of associations between pure forms and functions of aggression in early childhood than in older samples. A number of theorists have argued that development involves increasing differentiation of qualities over time (see Hawley & Little, 1999). The theoretical association between development and differentiation has been discussed in a number of domains, including perceptual development (Lickliter & Bahrick, 2000; Meltzoff & Kuhl, 1994), emotional development (Sroufe, 1995), and intelligence (Detterman & Daniel, 1989). Recently, Hawley and Little (1999) applied the theoretical concept of differentiation to the behavioral domain when they argued that coercive and prosocial control strategies will become increasingly distinct from early to middle childhood, as prosocial skills emerge and some children begin to employ prosocial strategies as a means of resource control whereas others continue to use predominantly coercive strategies.

In a similar vein, young children may tend to be "aggressive" without attending to the functions of their aggressive behaviors. However, as cognitive capacities mature, children may be better able to understand how aggression can be used to attain one's goals (i.e., for proactive functions; Barker,

Tremblay, Nagin, Vitaro, & Lacourse, 2006) and to hurt others or protect oneself against threats (i.e., for reactive functions; e.g., Dodge, 1990). Thus, across development, some aggressive children may begin to use their aggressive tendencies to reach instrumental goals whereas others may begin to use these tendencies to cope with anger or frustration, making proactive and reactive functions of aggression more distinct. Physical and relational forms of aggression may also exhibit differentiation across development. For example, as children develop the social and cognitive skills for using relatively subtle forms of aggression (e.g., Björkqvist et al., 1992; Murray-Close et al., 2007), some aggressive children may channel their aggressive tendencies into relational forms whereas others may continue to employ physical forms. To date, little research has examined whether subtypes of aggression become increasingly distinct with age. However, in contrast to the prediction of differentiation, Card and Little (2006) found increasing associations between proactive and reactive aggression with age, and Card, Stucky, Sawalani, and Little (2008) did not find age differences in the correlations between physical and relational aggression. It is important to note, however, that these meta-analyses did not examine correlates of "pure" forms and functions of aggression over time. Thus, based on this developmental principle, we expected that "pure" forms and functions of aggression would be less differentiated (i.e., more highly correlated) in young children than in older samples.

A second important extension of previous research in this area is the examination of the stability of pure forms and functions of aggression. Studies have documented that physical and relational forms of aggression (e.g., Cillessen & Mayeux, 2004; Crick et al., 2006; Rose, Swenson, & Waller, 2004) and proactive and reactive functions of aggression (e.g., Fite & Colder, 2007; McAuliffe et al., 2006) are stable over time. It is essential to examine the stability of both forms and functions of aggression for a number of reasons. First, children may be most at risk for psychopathology when they engage in subtypes of aggression that persist over time. Second, prevention and intervention efforts may be most useful when targeting relatively stable subtypes of aggression. Third, many researchers classify children into groups of aggressive children (e.g., relational vs. physical, Crick & Grotpeter, 1995; proactive, reactive, proactive-reactive, Vitaro et al., 2002) to assess the correlates of subtypes of aggression. An assumption underlying this empirical approach is that there are groups of children

who characteristically engage in certain forms or functions of aggression. Finally, information regarding the stability of subtypes of aggression may help future researchers elucidate the processes that contribute to the maintenance of or desistance from aggression.

Although a number of studies have demonstrated that forms and functions of aggression are stable over time, no research to date has examined the stability of these pure subtypes. It is possible, for example, that only forms of aggression are stable over time and the stability of functions demonstrated in previous research reflects the confound between form and function in these measures. Thus, the second goal of this study was to examine the stability of pure forms and functions over time. Because no previous research has investigated the stability of pure forms or functions of aggression, these analyses were largely exploratory in nature. However, we hypothesized that functions of aggression may be relatively unstable in early childhood. Specifically, given the salience of immediate instrumental goals (Ostrov & Crick, 2007) and poor emotion-regulation capabilities (Barker et al., 2006) in early childhood, young children may be especially likely to alternate between different functions of aggression to meet these varied goals and needs. In other words, young children may not consistently engage in one function of aggression, resulting in a relatively low stability in functions of aggression over time. In contrast, given their limited cognitive and social abilities, young children may be likely to engage consistently in fairly simple, physical forms of aggression, resulting in relatively high stability during this developmental period.

A third important question in this area involves potential contributors to the development of each form and function of aggression. One potential risk factor for involvement in subtypes of aggressive behavior is gender. In contrast to the gender breakdown observed with physical aggression, many peer relations studies during early childhood have found that girls are more relationally aggressive than boys (Crick & Grotpeter, 1995; e.g., Bonica, Arnold, Fisher, Zeljo, & Yershova, 2003; Crick et al., 2006; Hawley, 2003; McNeilly-Choque, Hart, Robinson, Nelson, & Olsen, 1996; Ostrov & Keating, 2004; Ostrov, Woods, Jansen, Casas, & Crick, 2004; Sebanc, 2003). However, this gender difference has not been found in all early childhood research studies (see Estrem, 2005; Hart et al., 1998; McEvoy, Estrem, Rodriguez, & Olson, 2003). A recent meta-analysis by Card et al. (2008) concluded that, across development, a significant but relatively small

effect size exists in favor of girls being more relationally aggressive than boys. Inconsistent findings may reflect differences in type of assessment and developmental period (Archer, 2004). Archer and Coyne (2005) suggest that when girls are aggressive, they tend to engage in covert forms of aggression (e.g., relational aggression); in contrast, aggressive boys are often more likely to engage in physical than relational aggression.

Importantly, only two known studies have examined gender differences for "pure" relational aggression using the current SEM approach and none have done so during early childhood. Little et al. (2003) reported a small difference in favor of boys for relational aggression, arguing that the use of self-reports and a German adolescent sample may have contributed to this effect. Fite et al. (2008) found no association between gender and relational aggression using self-reports and a U.S. sample during early adolescence. Given the mixed findings with the SEM approach used in this study, we relied on past work with observational measures to inform our predictions. These studies have generally found support in favor of girls as more relationally aggressive (e.g., Crick et al., 2006; McNeilly-Choque et al., 1996; Ostrov & Keating, 2004; Ostrov et al., 2004; see Archer, 2004). Therefore, we expected that girls would exhibit greater levels of relational aggression whereas boys would display more physically aggressive behaviors during early childhood. In contrast, no hypotheses were generated regarding gender differences in functions of aggression (see Connor, Steingard, Anderson, & Melloni, 2003; Kempes, Matthys, de Vries, & van Engeland, 2005). Of the two studies that have simultaneously examined forms and functions of aggression, one found that boys were more proactively and reactively aggressive than girls (Little et al., 2003), whereas the other reported no gender differences in functions of aggression (Fite et al., 2008).

A second possible predictor of forms and functions of aggression is age. A number of researchers have proposed that young children will engage in physically aggressive behaviors, but as their verbal and cognitive capacities mature, they will instead engage in more subtle forms of aggressive behavior such as gossip (e.g., Björkqvist et al., 1992). Consistent with this hypothesis, evidence suggests that physically aggressive behaviors decline in frequency from early childhood into the elementary school years (Cote, Vaillancourt, Barker, Nagin, & Tremblay, 2007; NICHD Early Child Care Research Network, 2004) and that, at least for some children,

aggressive behaviors such as gossip and social exclusion become increasingly common across this developmental period (Cote et al., 2007; Vaillancourt, Miller, Fagbemi, Cote, & Tremblay, 2007). Age may also be associated with proactive and reactive aggression. For example, due to improving social-cognitive and emotion-regulation skills, involvement in reactive aggression may decrease whereas proactive aggression may increase across development (Barker et al., 2006; although see Ostrov & Crick, 2007). In this study, then, we expected that older children would be more likely to engage in relational and proactive aggression and less likely to engage in physical and reactive aggression.

A third potential contributor to subtypes of aggression is children's socially dominant behavior. Social dominance includes resource control and social influence and is distinct from aggressive behavior in that these tactics are not intended to hurt, harm, or injure another person (Barrett & Yarrow, 1977; Deluty, 1985). Consistent with social dominance theory, past studies have supported associations between physical and relational aggression and indices of social dominance (Hawley, 2003; Ostrov & Keating, 2004; Ostrov, Pilat, & Crick, 2006; Pellegrini & Long, 2003). However, once dominance relationships or hierarchical structure is set, aggressive behavior typically decreases until group composition changes (Pellegrini, 2003). We also expected an association between social dominance and proactive aggression given the conceptual similarity between resource control (i.e., social dominance) and definitions of proactive or instrumental aggression (Hawley, 2003). Given past theory and findings, we predicted that social dominance would be associated with high levels of concurrent aggressive behavior (physical, relational, and proactive) and with decreases in such conduct over time.

A final potential predictor of subtypes of aggression is experiences of social exclusion. Some researchers have argued that experiences of social exclusion might reduce one's ability to inhibit aggressive behaviors and interfere with socialization regarding aggression (Twenge, Baumeister, Tice, & Stucke, 2001); in fact, research suggests that genetic risk for aggressive conduct may be mediated by hypersensitivity to experiences of exclusion (Eisenberger, Way, Taylor, Welch, & Lieberman, 2007). In addition, children who are frequently the targets of relationally aggressive behavior, including being left out or excluded, are at risk for both physically and relationally aggressive conduct (Sullivan, Farrell, & Kliewer, 2006). Moreover,

heightened cognitive and physiological reactivity to relational stress such as exclusion is more strongly associated with relational than with physical forms of aggression (Crick, 1995; Crick et al., 2002; Murray-Close & Crick, 2007). In addition, research suggests that rejection is more strongly associated with reactive than proactive aggression (e.g., Price & Dodge, 1989), perhaps because children respond to experiences of exclusion with aggression. Overall, then, we expected that exclusion would predict aggression, and that this effect would be strongest for relational and reactive aggression.

In sum, the goal of this study was to examine forms and functions of aggression in an early childhood sample. We expected that each form and function would be a distinct factor in this sample, but that correlations among pure subtypes of aggression would be higher than observed in older samples. We also expected that functions of aggression would be relatively unstable whereas physical aggression would be highly stable over the school year. Finally, we expected that gender, age, social dominance and exclusion would be important predictors of concurrent and future subtypes of aggression.

Method

Participants

Participants were 101 children (61 girls; $M = 45.09$ months, $SD = 9.17$) who participated in an ongoing longitudinal study. The family's ethnic composition was 12.8% African American, 12.8% Asian, 63.4% Caucasian, 4.0% Indian, 3.0% Latino, 1.0% Native American, and 3.0% multiracial/other. The families were on average middle class based on family income and education status. The study was conducted in a large Northeastern city at two time points for two cohorts. The cohorts were recruited from the same or similar nationally accredited (NAEYC) early childhood schools and classrooms (four schools, 13 classrooms) 1 year apart. Of the 101 children who participated at Time 1, 15 did not participate at Time 2 because they had moved out of participating schools during the study. Attrition was not associated with gender, $\chi^2(1, n = 101) = .37, p = .57$ or ethnicity, $\chi^2(6, n = 101) = 7.27, p = .27$. In addition, multivariate analyses indicated that observer ratings of relational aggression, physical aggression, proactive relational aggression, proactive physical aggression, reactive relational aggression, and reactive physical aggression were not associated with attrition, $F(6,$

91) = 1.12, $p = .36$. All parents provided written consent for their children's participation and head teachers provided written consent before completing reports (for further details, see Ostrov, 2008).

Measures

Observer ratings of behavior. Observer ratings were used to assess children's proactive and reactive physical and relational aggressive behavior to avoid shared method variance with other study measures. Although behavioral observations of aggression (see Ostrov & Keating, 2004) were available for the sample, there was not enough variance in these measures for the structural equation models used in this study. Observations were collected by 16 trained male and female advanced undergraduate students and 4 female graduate students of diverse ethnicities. Observers were unaware of the key hypotheses of the study. Observers were carefully trained to recognize physical and relational aggression and victimization (see Crick et al., 2006). Observers spent a minimum of 2 days in the classroom prior to observations in order to diminish reactivity. Observers were in the classrooms for 249.33 hr and approximately 2 months at each of the two time periods. After completing all of the behavioral observations for the first or second time period, respectively, 1 randomly chosen observer per classroom completed the observer ratings for each participating child in the classroom. The number of participating children in each classroom ranged from 6 to 12 participants.

Observer ratings of aggression. Observers completed the Preschool Social Behavior Scale–Teacher Form (PSBS–TF, Crick, Casas, & Mosher, 1997; termed the PSBS–OF in this study to indicate that it was completed by observers), which was used to assess observer perceptions of children's physical and relational aggression with peers. This widely used measure assesses relational aggression (six items; e.g., "This child tells a peer they won't be invited to their birthday party unless s/he does what the child wants"), physical aggression (six items; e.g., "This child kicks or hits others"), and prosocial behavior (positively toned filler items). Observers rated how often focal children engaged in each behavior on a 5-point scale ranging from 1 (*never to almost never true*) to 5 (*always or almost always true*). Past research has supported the favorable validity and reliability of this measure (e.g., Bonica et al., 2003; Crick et al., 1997, 2006; Hart et al., 1998; Hawley, 2003; Ostrov & Keating, 2004). Appropriate internal consistency at Time 1 and

Time 2 was demonstrated for observer ratings of physical aggression ($\alpha = .90$ and $.93$) and relational aggression ($\alpha = .94$ and $.93$). Observer ratings of both relational aggression, $r = .61$, $p < .001$, and physical aggression, $r = .66$, $p < .001$, were stable across the course of the study.

Observer ratings of forms and functions of aggression. Observers completed the Preschool Proactive and Reactive Aggression–Teacher Report (PPRA–TR; Ostrov & Crick, 2007; termed the PPRA–OR in this study to indicate that it was observer reports). This measure assesses proactive physical aggression (three items; e.g., "This child often hits, kicks, or pushes to get what s/he wants"), reactive physical aggression (three items; "If other children anger this child, s/he will often hit, kick, or punch them"), proactive relational aggression (three items; e.g., "To get what s/he wants, this child often tells others that s/he won't be their friend anymore"), reactive relational aggression (three items; e.g., "When this child is upset with others, s/he will often ignore or stop talking to them"), and prosocial behavior (positively toned filler items). Observers responded on a 5-point scale from 1 (*never or almost never true*) to 5 (*always or almost always true*). Adequate internal consistency ($\alpha > .82$) and moderate associations between teachers and naturalistic observations for each subscale have been demonstrated in previous research (Ostrov & Crick, 2007).

In this study, each PPRA–OR subscale was internally consistent at Time 1 and Time 2: proactive relational aggression ($\alpha = .85$ and $.91$), reactive relational aggression ($\alpha = .77$ and $.88$), proactive physical aggression ($\alpha = .80$ and $.87$), and reactive physical aggression ($\alpha = .90$ and $.89$). In addition, proactive physical aggression ($r = .58$, $p < .001$), proactive relational aggression ($r = .57$, $p < .001$), reactive physical aggression ($r = .43$, $p < .001$), and reactive relational aggression, $r = .49$, $p < .001$, were all stable over the course of the study. Observer ratings of aggression were not available for 22 participants at Time 2 due to a failure of one observer to complete the forms in a timely manner.

Validity of observer ratings of aggression: Correlations with teacher reports and observations. For validity purposes, we examined the association between observer ratings and teacher reports (assessed with the PSBS–TF) of forms of aggression at Time 1. Observer ratings and teacher ratings agreed regarding relational aggression ($r = .32$, $p < .001$) and physical aggression ($r = .32$, $p < .001$). The association between observer ratings and behavioral observations (assessed using the Early Childhood

Observation System; see Ostrov, 2008; Ostrov & Keating, 2004; reviewed by Leff & Lakin, 2005) of aggression at Time 1 was also assessed. The observer ratings were significantly correlated with the naturalistic observations for relational aggression ($r = .30, p = .003$) and physical aggression ($r = .44, p < .001$), even though the observations were completed by small groups of research assistants and only one of these observers completed the ratings. These correlations between observer ratings and naturalistic observations are similar in magnitude to correlations between teacher ratings and naturalistic observations (Crick et al., 2006; Ostrov & Keating, 2004). Overall, then, observer ratings of physical and relational aggression were significantly associated with behavioral observations and teacher ratings of these behaviors.

To validate the observer ratings of functions of aggression, correlations between teacher reports (assessed with the PPRA-TR) and behavioral observations at Time 1 were also conducted. Teacher and observer ratings were correlated at Time 1 for proactive physical aggression ($r = .26, p = .01$), reactive physical aggression ($r = .27, p = .007$), proactive relational aggression ($r = .37, p < .0001$) and reactive relational aggression ($r = .28, p = .007$). At Time 1, observer ratings and behavioral observations were correlated for proactive physical aggression ($r = .37, p < .001$), reactive physical aggression ($r = .25, p < .05$), proactive relational aggression ($r = .27, p < .01$), and reactive relational aggression ($r = .21, p < .05$).

Teacher Reports

Teacher report of exclusion. The Child Behavior Scale (CBS; Ladd & Profilet, 1996) was completed by participating head teachers. The CBS is a psychometrically sound measure of young children's social behavior and adjustment. The 35-item CBS is comprised six subscales, but only the Exclusion subscale (seven items; e.g., "Peers refuse to let child play," "Excluded from peers' activities") was used for this study. Teachers responded on a 3-point scale from 1 (*does not apply*) to 3 (*certainly applies*). This measure has appropriate psychometric properties including factor structure and internal consistency in past studies (Ladd & Profilet, 1996). In this study, this measure had appropriate internal consistency at Time 1 ($\alpha = .87$) and at Time 2 ($\alpha = .89$).

Teacher report of dominance. Ratings of each child's social dominance and resource control were collected from head teachers at each time point.

Teachers independently rated how socially dominant and influential each child in their class was by answering a six-item questionnaire developed and used successfully in prior studies (e.g., "S/he gets what s/he wants in class"; Hawley, 2003; Ostrov et al., 2006). The response scale (slightly revised from the past) ranged from 1 (*almost never or seldom*) to 5 (*often or almost always*). Past research has revealed acceptable internal consistency for this scale (i.e., $\alpha = .85$, Hawley, 2003; $\alpha > .87$, Ostrov et al., 2006). In this study, the teacher measure of social dominance demonstrated appropriate internal consistency at Time 1 ($\alpha = .87$) and at Time 2 ($\alpha = .85$).

Procedure

This study was approved by the university social and behavioral sciences Internal Review Board (IRB). Observations began during the fall and were conducted approximately 2 months after the children started school so that they would know each other and teachers would be good informants of their behavior. Teacher packets were always distributed when approximately half of the observation sessions were completed. Observer ratings were completed as soon as observations ended at each of the time points. Approximately 4–5 months after starting data collection for first time point (Time 1), assessments were initiated again (Time 2). Teachers received an honorarium (\$25 gift certificate) after completing teacher-report packets. All families and staff received newsletters summarizing the major findings of the study.

Results

Confirmatory Factor Analyses of Form and Functions of Aggression

The statistical analyses for this study were conducted using maximum likelihood estimation in MPlus version 3.01 (Muthén & Muthén, 1998–2004). Examination of the study variables indicated that skewness was not a problem for our analyses (skewness ranged from .15 to 1.2; Kline, 2005). The standardized root mean square residual (SRMR) and the comparative fit index (CFI) were used to evaluate model fit because other fit indices tend to be too stringent with relatively small sample sizes (Hu & Bentler, 1999). In general, a cutoff value of .08 or lower for the SRMR and a cutoff value of .95 or higher for the CFI suggest good fit with the observed data (Hu & Bentler, 1999), although lower

thresholds are generally adopted for acceptable fit (e.g., CFI = .90; Little et al., 2003; see Hu & Bentler, 1999).

The first goal of our study was to examine the fit of a model specifying latent aggression factors at Time 1. Initial efforts to replicate the model presented by Little et al. (2003) with eight latent aggression factors (i.e., physical, relational, proactive physical, proactive relational, reactive physical, reactive relational, proactive, and reactive) using observer ratings of aggression failed due to convergence problems. These problems may reflect the relatively complex model given our modest sample size. To simplify the model, manifest variable composites of proactive physical aggression, proactive relational aggression, reactive physical aggression, and reactive relational aggression were used in the final model (see Figure 1; see Fite et al., 2008). Thus, a total of four latent aggression factors were included: physical, relational, proactive, and reactive. Indicators of physical and relational aggression included random two-item parcels from the PSBS-OF measuring physical and relational aggression, respectively, as well as proactive and reactive physical and relational aggression manifest composites from the PPRA-OR (see Figure 1). The indicators of proactive aggression were PPRA-OR manifest composites of proactive physical aggression and proactive relational aggression; the indica-

tors of reactive aggression were PPRA-OR manifest composites of reactive physical aggression and reactive relational aggression. For identification purposes, equality constraints on loadings were used for all factors measured by only two indicators. The results indicated that the fit of the model specified in Figure 1 ranged from acceptable to good, SRMR = .06, CFI = .92. In addition, each indicator significantly and positively loaded on its factor(s).

The standardized path coefficient between physical and relational aggression at Time 1 indicated a moderate association between these variables (disattenuated $r = .54$, $p < .001$). These findings are consistent with research examining distinct forms and functions of aggression in childhood and adolescence (Fite et al., 2008; Little et al., 2003), although the association in this study was relatively low (.54 compared to .83 reported by Little et al., 2003). However, contrary to previous research, proactive and reactive aggression were positively associated at Time 1 (disattenuated $r = .45$, $p < .001$). Nested model comparisons were run to examine whether each form and function of aggression were distinct factors in the present sample. A model in which physical and relational aggression were collapsed into one latent factor indicated a significant reduction in model fit from the baseline model, $\Delta\chi^2(1) = 542.33$, $p < .001$. In addition, a model in

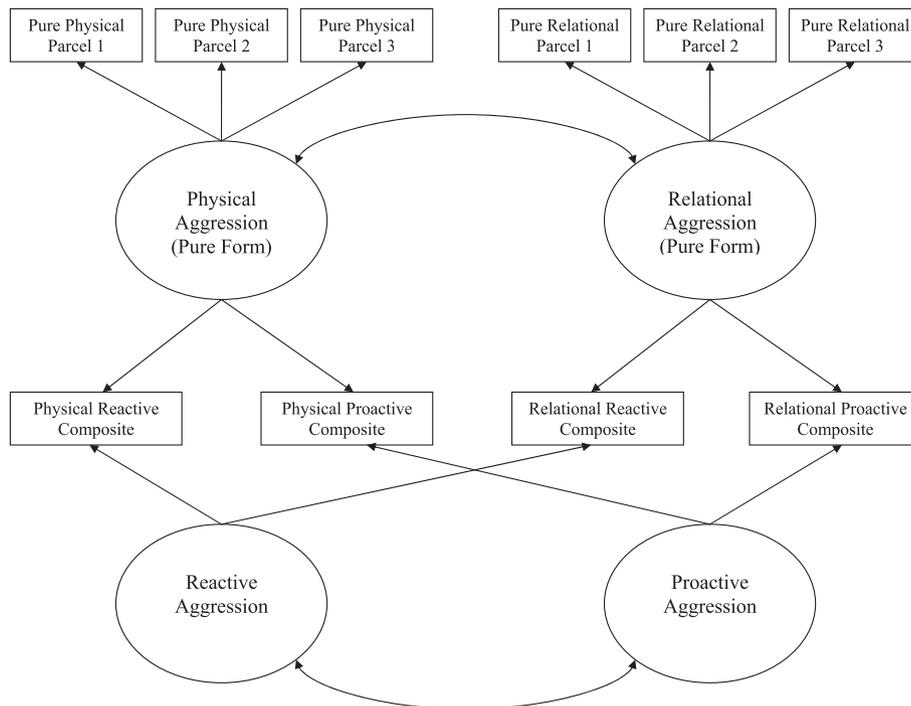


Figure 1. Model of form and function.

which proactive and reactive aggression were collapsed into one latent factor indicated a significant reduction in model fit, $\Delta\chi^2(1) = 9.94$, $p < .01$. Thus, evidence suggested that physical and relational aggression and proactive and reactive aggression were distinct forms and functions, respectively, of aggression.

Stability of Form and Functions of Aggression Over Time

The second goal of this study was to examine the stability of each form and function of aggression over time. A first step in this process was to run a confirmatory analysis assessing the fit of the model in Figure 1 at Time 2. The results indicated that the fit of the model was good, SRMR = .05, CFI = .98. In addition, each indicator significantly and positively loaded on its factor(s). A model was then run to examine the stability of each latent aggression factor. For this model specification, each form and function of aggression at Time 2 was regressed onto each form and function of aggression at Time 1. Full maximum likelihood estimation procedures were used to accommodate missing data. Residuals of parallel indicators over time were allowed to correlate, and measurement invariance across time was imposed. This model fit the data well, CFI = .94, SRMR = .07. The standardized path coefficients for the longitudinal model, presented in Table 1, indicated that both forms of aggression (i.e., physical and relational) were stable over time; in contrast, functions of aggression (i.e., proactive and reactive) were not. Nested model comparisons indicated that the stability of physical aggression was not larger than the stability of relational aggression, $\chi^2(1) = .02$, *ns*. Interestingly, proactive aggression at Time 1 was associated with increases in physical aggression over time. In addition, relational aggression was marginally ($p < .10$) associated with decreases in physical aggression and increases in proactive aggression over time.

Table 1
Standardized Path Coefficients for the Longitudinal Model

Time 1	Time 2			
	Physical	Relational	Proactive	Reactive
Physical aggression	.71***	.01	.15	-.20
Relational aggression	-.23 [†]	.61***	.63 [†]	-.06
Proactive aggression	.43*	-.26	-.10	-.06
Reactive aggression	-.10	.32	.16	.30

[†] $p < .10$. * $p < .05$. *** $p < .001$.

Predictors of Form and Function

The third goal of this study was to examine predictors of each latent aggression factor. Specifically, we examined whether gender, age, and teacher-reported social dominance and peer exclusion predicted involvement in each observer-reported form and function of aggression. The first set of analyses examined predictors of concurrent aggression whereas the second set of analyses investigated the role of these factors in change in the latent aggression factors over time. Finally, we examined alternative models in which aggression predicted increases in dominance and exclusion.

Concurrent analyses. To examine potential predictors of children's involvement in aggression, a series of structural equation models were run in which the aggression latent factors at Time 1 were regressed onto gender (1 = male, 2 = female), age, social dominance, and peer exclusion, respectively. The model fit for all models was acceptable (CFIs = .90 to .91, SRMR = .06 for all models). The results, presented in Table 2, indicated that girls were more relationally aggressive than boys. Contrary to expectations, boys were not more physically aggressive than girls, although the nonsignificant association was in the predicted direction. In addition, as predicted, older children were less likely than their peers to engage in physically aggressive conduct. Although social dominance predicted relational aggression, it was not related to physically aggressive behavior. Contrary to our hypotheses, social dominance was not significantly associated with proactive aggression, although the nonsignificant association was in the predicted direction. Finally, high levels of exclusion were marginally ($p < .10$), although not significantly, associated with children's involvement in proactive aggression.

Longitudinal analyses: Predicting increases in aggression. The second set of analyses examined whether each predictor was associated with change in the latent aggression factors over time. In each analysis, the four aggression latent factors at Time 2 were simultaneously regressed onto the four aggression latent factors at Time 1. A series of analyses in which latent factors at Time 2 were regressed onto gender (1 = male, 2 = female), age, social dominance, and exclusion, respectively, were conducted. Thus, these longitudinal analyses controlled each subtype of aggression and for levels of aggression at Time 1. The model fit for all models were acceptable (CFIs = .93 to .94, SRMR = .07 for all models). The results, presented in Table 2, indicated that

Table 2
Latent Factors Regressed Onto Time 1 Predictor Variables

Predictor	Time 1 latent factors				Time 2 latent factors			
	Forms of aggression		Functions of aggression		Forms of aggression		Functions of aggression	
	Physical	Relational	Proactive	Reactive	Physical	Relational	Proactive	Reactive
Gender	-.15	.21*	-.21	.13	.05	.09	-.44	-.18
Age	-.25*	.12	.07	.16	-.01	-.03	.07	.25
Dominance	.11	.23*	.23	.14	-.25*	-.04	.27	.14
Exclusion	.14	.03	.29 [†]	.03	.13	.37**	.16	-.12

Note. Gender (1 = male, 2 = female). Analyses with Time 2 latent factors control for Time 1 aggression.

[†] $p < .10$. * $p < .05$. ** $p < .01$.

social dominance at Time 1 was significantly associated with decreases in physical aggression over time. In addition, experiences of exclusion predicted increases in relational aggression over time. No other predictors were associated with statistically significant changes in aggression across the school year.

Longitudinal analyses: Predicting increases in dominance and exclusion. We hypothesized that social dominance and exclusion would be associated with increases in aggression over time. However, we also tested two alternative models in which the four pure forms and functions of aggression predicted increases in dominance and exclusion, respectively, over the course of the study. The results of the analyses (not shown) indicated that aggression was not associated with significant increases in either dominance or exclusion over time.

Discussion

The purpose of this study was to examine simultaneously forms (i.e., physical and relational) and functions (i.e., proactive and reactive) of aggression in early childhood. Results provided support for the measurement and analysis system allowing researchers to disentangle the forms and functions of aggression (Little et al., 2003) during early childhood. Specifically, analyses indicated good model fit, with each item loading significantly on its factor. Moreover, analyses provided support for the distinction between each form and function of aggression. These findings suggest that distinct forms and functions of aggression have emerged by early childhood. Furthermore, this study replicates previous research suggesting that modifications to the model originally proposed by Little et al. (2003) permits examination of pure forms and functions of

aggression with relatively small sample sizes (Fite et al., 2008).

Based on the theoretical perspective that development involves increased differentiation in qualities over time (Hawley & Little, 1999), we expected that the associations between forms and functions of aggression would be higher in early childhood than in older samples. Consistent with this hypothesis, proactive and reactive aggression were positively correlated in our sample. In contrast, previous work with participants in middle childhood and adolescence has found a negative correlation between functions of aggression (Fite et al., 2008; Little et al., 2003). However, in contrast to expectations, the association between physical and relational aggression was relatively low compared to studies with older samples. This suggests that physically aggressive behaviors may actually be more distinct from relational aggression in early childhood than in middle childhood or adolescence. These findings may reflect the relatively normative nature of physically aggressive behavior among children of this age (Cote et al., 2007; NICHD Early Child Care Research Network, 2004). Specifically, if most children at least occasionally engage in physical aggression, this behavior may be distinct from a tendency to engage in other forms of aggression. Alternatively, this finding may reflect the use of self-report rather than observer ratings of aggression given research suggesting that observation-based measures of aggression yield lower correlations among subtypes than self-reports (e.g., Card & Little, 2006; Polman, de Castro, Koops, van Boxtel, & Merk, 2007). Future research is needed to replicate this finding.

The second goal of this study was to examine the stability of forms and functions of aggression over time. Interestingly, results indicated that forms of aggression were stable over time whereas

functions of aggression were not. These findings, combined with the high correlation between functions of aggression, suggest that young children may consistently engage in distinct forms of aggression but alternate between different functions of aggression. In other words, young children may employ specific forms of aggression to meet a variety of needs (e.g., to attain a toy and to respond to provocation). Moreover, findings from previous research documenting the stability of combinations of forms and functions of aggression (e.g., reactive physical aggression; Ostrov & Crick, 2007) may instead reflect stability of only aggression forms (e.g., the physical form rather than reactive function component of aggression). This finding is particularly relevant for prevention and intervention work with young children, as such programs may benefit from tailoring programs based on forms while targeting both functions of aggression. In addition, future research with young children may benefit from examining intraindividual rather than interindividual variability in engagement in various functions of aggression to elucidate the contexts in which children display each function. It is important to note, however, that although the stability of reactive aggression was not significant, the estimate was moderate in size. It is possible that these nonsignificant results reflect the relatively small sample size in this study. Alternatively, the lack of stability of functions of aggression may reflect the relative difficulty of observing functions of aggression (e.g., compared to forms, functions may require a greater understanding of the intent of the aggression). Thus, these findings (particularly regarding reactive functions) should be interpreted with caution. Nonetheless, these findings suggest that researchers interested in understanding the developmental trajectories of aggression in early childhood should attend to the distinct forms of aggression as these aggressive behaviors appear to persist over time. In addition, future research should explore whether functions of aggression are less stable than forms in early childhood.

Interestingly, relational aggression was marginally associated with decreases in physical aggression over time. Although this finding should be interpreted with caution as it did not reach conventional levels of statistical significance, it is consistent with the argument offered by Björkqvist et al. (1992) that, across development, children will replace physical aggression with more covert forms of aggression. These findings suggest that many children may no longer need to employ physical forms of aggression once they have the social-

cognitive skills to adopt more subtle forms of aggression. In addition, relational aggression was marginally associated with increases in proactive aggression over time. Given that relationally aggressive behaviors are often subtle and covert, it may not be obvious to children who would like to use aggression to attain a desired goal that these might be useful techniques. However, once a child has mastered these manipulative behaviors, he or she may begin to appreciate how such conduct could be used for personal gain. In contrast, engaging in physical aggression may be an obvious choice for young children's goal-directed behavior (e.g., hit another child to gain a toy). In fact, this is consistent with the finding that proactive aggression was associated with increases in physical aggression over time.

The final goal of this study was to examine the unique predictors of each subtype of aggressive behavior. First, we expected that gender would be associated with forms of aggression. Specifically, we expected that males would be more physically aggressive whereas females would be more relationally aggressive. Consistent with our hypotheses, females were significantly more relationally aggressive than males. However, although the estimate was in the predicted direction, males were not significantly more physically aggressive than females. The lack of gender differences in "pure" physical aggression may reflect limited statistical power given our relatively small sample size and awaits replication. Overall, then, our findings are only partially consistent with previous work demonstrating that the gender differences in engagement of forms of aggression have emerged by early childhood (Crick et al., 2007; cf. Hart et al., 1998).

We also expected that there would be age differences in subtypes of aggression, with older children exhibiting more relational and proactive aggression and less physical and reactive aggression. Consistent with expectations, older children were less likely than their younger peers to engage in physical aggression. However, age was not associated with relational aggression, proactive aggression, or reactive aggression. These findings are surprising given theory and research suggesting that relatively more covert subtypes of aggression (e.g., relational aggression) and proactive aggression will increase with age whereas reactive aggression will become less frequent (e.g., Barker et al., 2006; Björkqvist et al., 1992; Cote et al., 2007; Vaillancourt et al., 2007). These results may reflect the relatively limited age range of participants in this study. For example, the developmental processes expected to

lead to changes in these subtypes of aggression (e.g., increases in emotion-regulation capacities) may occur across longer developmental periods (e.g., from early childhood into middle childhood). Future research using Little et al. (2003) measurement and analysis system should adopt longer term longitudinal designs to address this important question.

In addition, we hypothesized that social dominance would be associated with high levels of concurrent aggressive behavior (physical, relational, and proactive) and with decreases in such conduct over time. Consistent with hypotheses, dominance was associated with concurrent levels of relational aggression. In addition, dominance was related to decreases in physically aggressive behavior over time. In keeping with theory, these results suggest that aggressive behaviors may be used to achieve dominance in the peer group, but that once dominance is established such aggressive behaviors are no longer necessary (Pellegrini et al., 2007). Moreover, as expected, reactive aggression did not appear to be used as a means of achieving dominance.

Finally, we examined the association between peer exclusion and each subtype of aggression. We hypothesized that exclusion would predict aggression, and that this effect would be strongest for relational and reactive aggression. Our results provided partial support for these hypotheses; specifically, experiences of exclusion were marginally associated with concurrent levels of proactive aggression and were significantly related to increases in relational aggression over time. These findings are consistent with the hypothesis that heightened cognitive and physiological reactivity to relational stress such as exclusion is more strongly associated with relational than with physical forms of aggression (Crick, 1995; Crick et al., 2002; Murray-Close & Crick, 2007). In addition, these results suggest that children who are highly excluded by peers may fail to experience peer socialization pressures against proactive aggression.

There are a number of strengths of this study, including measures from multiple informants (i.e., observer ratings and teacher reports), sophisticated statistical analyses that allow the assessment of unique forms and functions of aggression, and a short-term longitudinal design. However, a number of limitations must be acknowledged. First, this study had a relatively small sample size. Given the complexity of the models assessing forms and functions of aggression and the small sample, our analyses provided conservative tests of hypotheses. Indeed, some of our null findings may simply reflect

low power. In fact, inspection of nonsignificant estimates revealed that some were moderate in size (e.g., the stability of reactive aggression), suggesting potential concerns regarding statistical power.

A second limitation is the use of observer ratings rather than behavioral observations for measures of aggression. Although observations of aggression provide a number of advantages over other methods of assessing aggression (Pellegrini, 2004), behavioral observations did not have enough variance in our sample for the analyses. As a result, we used observer ratings to measure aggression. These observer ratings may be superior to other common methods of assessing aggression, including teacher, parent, or self-report, because observers were highly trained to attend to and recognize instances of physical and relational aggression. However, it is important to note that this method is likely subject to some of the limitations common among measures using other reporters, including gender bias in ratings (Ostrov, Crick, & Keating, 2005). Thus, future research with larger samples may benefit from testing this model using behavioral observations.

A third limitation is the relatively short-term longitudinal design. In fact, the short time frame might explain why most findings regarding the prediction of change in aggression over time were nonsignificant. Given the relatively high stability of some subtypes of aggression over this time frame, future research should examine the unique predictors of forms and functions of aggression over longer periods of time. Long-term longitudinal studies would also allow for tests of developmental change in the correlations among subtypes of aggression (e.g., whether physical aggression becomes less distinct as children get older). Finally, future research should examine distinct forms and functions with more diverse samples to assess the generalizability of the present findings. Despite these limitations, this study provides the first test of the measurement and analysis system suggested by Little et al. (2003) in early childhood and the first test of the stability of pure subtypes of aggression. Our results provide support for the distinction between these subtypes of aggression during this developmental period. In addition, findings indicated unique concurrent and longitudinal predictors of subtypes of aggression.

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