Reactive and Proactive Aggression in Childhood and Adolescence: Precursors, Outcomes, Processes, Experiences, and Measurement

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ABSTRACT This paper reviews and critiques the growing literature on the distinction between reactive and proactive aggression in children and adolescents. Empirical findings suggest that the subtypes of aggression are (a) preceded by different familial precursors, (b) associated with different behavioral outcomes, (c) driven by different social–cognitive and emotional processes, and (d) related to different social experiences. Because measurement difficulties have been a prominent concern in the study of reactive and proactive aggression, a discussion of various assessment approaches is included. Suggestions are made for future research directions, including a greater use of observational and laboratory-based methods, more longitudinal designs, and a greater focus on the careful assessment of the subtypes of aggression.

Johnny and Marcus are on the playground at recess. Johnny is shooting baskets, but Marcus really wants Johnny's basketball so that he can start a game with his friends. Marcus comes up behind Johnny, pushes and trips him, and grabs the ball from his hands when he falls. Johnny gets up, sputtering and red-faced, and lunges at Marcus. Johnny pins Marcus to the ground and hits him hard, completely forgetting about the basketball that rolls away.

Although it is common for many children to engage in these sorts of aggressive behaviors occasionally, a few children are chronically and highly aggressive. In fact, aggression in children accounts for 25% of all special services in schools and half of all child referrals for

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psychological services (Nelson & Finch, 2000). Furthermore, as they grow into the teenage years, aggressive adolescents in the United States commit the majority of all crimes (Snyder & Sickmund, 1999). Thus, aggression in childhood and adolescence is a serious and pervasive problem.

Aggressive behavior can take different forms. It may be physical, such as the pushing, tripping, and hitting described in the vignette above. It may also include verbal insults, name-calling, and taunting. More recently, definitions of childhood aggression have expanded to include behaviors such as damaging peers' relationships or reputations (e.g., Crick & Grotpeter, 1995). In all of these instances, however, aggression can be distinguished from more competent behaviors such as assertiveness: Aggressive children intend to hurt their peers, whereas assertive children do not.

Aggressive behavior can also serve different functions, and the distinction between the reactive and proactive functions of aggressive behavior is the focus of this review. Reactive aggression is defensive, retaliatory, and in response to real or perceived provocation. Proactive aggression, on the other hand, is displayed to reach a goal, whether that goal involves material or territorial gain or social dominance. Essentially, researchers have distinguished aggression that is driven by anger, defense, and retaliation from aggression that is cool, deliberate, and purposefully goal-directed. In the above vignette, Marcus's goal-oriented aggression would be labeled proactive, whereas Johnny's retaliatory aggression would be labeled reactive.

The importance of the distinction is currently hotly debated among researchers. Whereas some suggest that this distinction is key to understanding childhood aggression (e.g., Vitaro & Brendgen, 2005), others question whether the distinction has utility (e.g., Bushman & Anderson, 2001). Researchers originally hypothesized that distinct groups of aggressive children existed, with one group displaying primarily reactive aggression and the other group displaying primarily proactive aggression (Dodge, 1991). However, most studies to date suggest that the two subtypes of aggression tend to co-occur, with most aggressive children displaying some degree of both reactive and proactive aggression. In other words, the subtypes of aggression are most accurately conceptualized as continuous dimensions that exist to varying degrees in each child, rather than as categories into which children are exclusively placed.

Even though separate groups of children are not found, the distinction between reactive and proactive aggression may still be quite useful. The purpose of this review is to summarize literature suggesting that reactive and proactive aggression originate in different familial precursors, lead to different behavioral outcomes, are propelled by different social–cognitive and emotional processes, and are associated with different social experiences. Furthering our understanding of these distinct precursors, outcomes, processes, and experiences may ultimately lead to the development of more effective treatment packages that fully address both the reactive and proactive functions that childhood aggression serves.

FAMILIAL PRECURSORS TO AND ADOLESCENT OUTCOMES OF REACTIVE AND PROACTIVE AGGRESSION

This section begins by reviewing studies linking reactive and proactive aggression during childhood with negative outcomes in adolescence, including delinquency, psychopathy, and dating violence. Two studies with concurrent designs support a positive relation between delinquency and the proactive subtype of aggression (Atkins & Stoff, 1993; Raine et al., 2006). Raine and colleagues also found a positive relation between proactive aggression and psychopathy, providing the first empirical support for this theorized link in adolescents.

Three other studies by Vitaro, Tremblay, and colleagues demonstrated the relation between proactive aggression and delinquency even more convincingly through longitudinal designs. In the first two studies (Vitaro, Brendgen, & Tremblay, 2002; Vitaro, Gendreau, Tremblay, & Oligny, 1998), samples of French Canadian boys and girls were followed for 3 years (from age 12 to 15 in one study and from age 10 to 13 in the other study). The subtypes of aggression were assessed at the beginning of the studies, and adolescents self-reported on delinquency at the end of the studies. In both studies, proactive aggression, but not reactive aggression, positively predicted delinquency 3 years later.

In the third study, Brendgen, Vitaro, Tremblay, and Lavoie (2001) conducted an elegant investigation of differential prediction from the subtypes of aggression to delinquency and dating violence. They followed yet another sample of French Canadian male adolescents

from age 13 to 17, with reactive and proactive aggression assessed at age 13. At ages 16 and 17, they collected measures of delinquency and dating violence. Results revealed that earlier proactive aggression predicted later delinquency and that earlier reactive aggression predicted later dating violence. Even more interesting were findings regarding moderators of these relations. Parental supervision at age 15 moderated the relation between proactive aggression and delinquency, such that boys with less parental monitoring had a stronger positive relation between earlier proactive aggression and later delinquency. In contrast, maternal caregiving at age 15 moderated the relation between reactive aggression and dating violence, such that boys with less caregiving had a stronger positive relation between earlier reactive aggression and later dating violence.

These results paint a picture of the different contexts in which reactive and proactive aggression are manifest as children develop toward adulthood, in terms of both parenting deficits and the interpersonal context of aggressive acts. In particular, earlier proactive aggression predicted later aggressive acts toward strangers (assault, stealing), and lack of parental monitoring may have provided adolescents with the opportunity to make this transition to truly delinquent behavior. In contrast, earlier reactive aggression predicted later aggression toward close relationship partners, and this progression was particularly likely for those adolescents who did not have warmth and closeness modeled for them in their relationships with their mothers.

These findings regarding differential parenting deficits fit with two other studies on the role of familial precursors of the subtypes of aggression. In a study by Raine et al. (2006), parental substance abuse at age 7 predicted proactive but not reactive aggression at age 16. In a study by Dodge, Lochman, Harnish, Bates, and Pettit (1997), parents' physical abuse of children in kindergarten predicted reactive aggression in third grade, but not proactive aggression. Both of these findings fit cleanly with Brendgen and colleagues' work reported above. More specifically, lack of maternal caregiving and physical abuse may be indexing similar phenomena, in that they both suggest child mistreatment along the continuum of abuse and neglect. Similarly, parental substance abuse and lack of parental monitoring may be related constructs, in that parents with substance abuse problems may have more difficulty and less inclination to monitor the whereabouts and companions of their children.

Finally, a recent and groundbreaking study by Brendgen, Vitaro, Boivin, Dionne, and Perusse (2006) suggested that reactive and proactive aggression are influenced by different environmental factors. These researchers collected teacher ratings of reactive and proactive aggression from a sample of 6-year-old French Canadian twin pairs. Their findings revealed that, whereas 76% of the genetic factors influencing the subtypes of aggression were the same, only 12% of the environmental factors were the same. Thus, reactive and proactive aggression appear to result from largely separate environmental influences. The longitudinal work reported above may provide clues about those differing environmental factors, with physical abuse and lack of maternal caregiving influencing reactive aggression, and parental substance abuse and lack of parental monitoring playing a role in proactive aggression.

Taken together, these studies provide a strong foundation to begin to understand the pathways from familial precursors to reactive and proactive aggression in childhood and eventually to different forms of violence in later adolescence and adulthood. Nevertheless, there is still much to learn. Are other familial variables important in the prediction of the subtypes of aggression? Two constructs that come to mind are lack of parental assistance with emotion regulation in early childhood and parental encouragement of aggressive behavior in middle childhood. Does earlier proactive aggression predict both later interpersonal aggression, such as stranger assault, and later nonpersonal aggression, such as covert stealing? Does earlier reactive aggression predict later aggression toward other close family and friends besides dating partners, including the abuse of one's own children in adulthood? Only through more time- and labor-intensive longitudinal studies will questions such as these begin to be answered. Although much is known about pathways from general childhood aggression to adult criminality, less is known about the role the subtypes of aggression play in this developmental trajectory.

SOCIAL–COGNITIVE AND EMOTIONAL PROCESSES DRIVING REACTIVE VERSUS PROACTIVE AGGRESSION

Beyond the precursors to and outcomes of reactive and proactive aggression, researchers have uncovered a number of social–cognitive and emotional processes that differentially relate to reactive versus

proactive aggression. These unique associations suggest that, when children display reactive aggression, this behavior is likely preceded and accompanied by particular social cognitions and emotions that guide the behavior. In contrast, the display of proactive aggression is likely propelled by quite different mechanisms.

Social–Cognitive Processes

Crick and Dodge (1994) identified steps that children take as they process social information. These steps include encoding and interpreting social cues, generating potential solutions to problems, evaluating one's self-efficacy to enact such solutions as well as the likelihood that the solutions will result in positive outcomes, and the clarification of one's goals in the social situation. Crick and Dodge (1994) conceptualized these steps not as independent or hierarchical but as linked in a repeating cycle that unwinds over the course of social interaction, with each step influencing the others. Convergent research across diverse samples (e.g., elementary-, middle-, and high-school children and adolescents in several countries; low-socioeconomic-status [SES] African American boys; Dutch behavior-disordered boys; incarcerated adolescents) demonstrates that these steps of information processing have differential utility in predicting children's reactive aggression on the one hand and proactive aggression on the other.

There is strong evidence that reactive aggression, but not proactive aggression, is positively related to the tendency to attribute hostile intent to peers in ambiguously provocative situations (Crick & Dodge, 1996; De Castro, Merk, Koops, Verrman, & Bosch, 2005; Dodge & Coie, 1987; Kempes, Matthys, Maassen, van Goozen, & van Engeland, 2006; Nas, Orobio de Castro, & Koops, 2005; Schippell, Vasey, Cravens-Brown, & Bretvald, 2003; Schwartz et al., 1998). Children who view their peers' ambiguous actions as purposefully antagonistic are likely to feel provoked more often and so feel justified in responding with aggressive retaliation. In other words, reactive aggressive children perceive more frequent hostility in others and respond in turn.

In some respects, hostile attributional biases are best considered social cognitive errors. Indeed, children who display reactive aggression only overattribute hostile intent in ambiguously provocative situations, not in overtly hostile or clearly benign ones (see Crick &

Dodge, 1994). On the other hand, children who experience harsh parenting or peer rejection are more likely than their peers to develop this hostile attributional style (see Crick & Dodge, 1994). From this perspective, hostile attributional biases can be considered realistic or legitimate in that they develop out of repeated experiences of mistreatment.

The second social–cognitive process linked to reactive aggression is difficulty encoding social cues. In a set of studies by Dodge et al. (1997), this was examined by presenting video vignettes and later assessing children's abilities to recall the relevant details. Reactive aggressive children recalled fewer of the details, and inattentiveness of this type might sometimes lead them to miss benign social cues when present. The finding replicated well within two quite diverse samples (third-grade school children and adolescents with violent behavior problems), but further replication seems useful to further determine how robust this correlate of reactive aggression is.

Finally, several converging studies suggest that reactive aggression is more positively associated than proactive aggression with the generation of aggressive responses to social conflicts (De Castro et al., 2005; Dodge & Coie, 1987; Dodge et al., 1997). Reactive aggression may result when children do not take the time to generate and evaluate multiple competing solutions to a social problem, instead going with the first (aggressive) idea that pops into their head. Furthermore, some children simply lack experience with nonaggressive ways to handle peer conflicts, and they may view each of these conflicts as a provocation that requires defense.

Three other social–cognitive processes appear more closely linked to proactive aggression. First, two studies have shown that proactive aggression, but not reactive aggression, was positively related to reported levels of self-efficacy in enacting aggressive behaviors (Crick & Dodge, 1996; Dodge et al., 1997). That is, when children feel more competent and confident in their aggressive prowess, they are more likely to use aggression to reach desired goals. Like many other behaviors, aggression may be most successfully executed in a calm and purposeful manner by those who believe that they are good at it.

Second, a wealth of evidence indicates that proactive aggression is positively associated with the expectation that aggressive behavior will result in positive outcomes and not in negative outcomes; reactive aggression does not exhibit these properties (Arsenio, Gold, & Adams, 2004; Crick & Dodge, 1996; Dodge et al., 1997; Hubbard,

Dodge, Cillessen, Coie, & Schwartz, 2001; Schwartz et al., 1998; Smithmyer, Hubbard, & Simons, 2000). Interestingly, this research has shown links to a diverse range of positive outcomes, from the belief that aggression will result in material or territorial gain to the belief that it will lead to respect and liking by others (Smithmyer et al., 2000) and even to the belief that it will make one feel happier (Arsenio et al., 2004). In sum, proactive aggression is associated with the belief that aggression will work to achieve designed personal ends.

Third, one study provides support for the idea that only proactive aggression, and not reactive aggression, is positively related to prioritizing instrumental goals over social goals in peer interaction (Crick & Dodge, 1996). When children care more about getting their own way than they care about making or keeping friends, then it follows that they would be willing to aggress to achieve instrumental goals, such as gaining access to toys or establishing social dominance in a group of peers. The lack of concern with social goals makes aggression easier because, for most children, one of the primary deterrents to aggressive behavior is worry about the impact that it will have on their peers' evaluation of them. Thus, the finding is quite intuitive and deserves further replication.

Are these social cognitive processes properties of individuals or properties of dyads? To begin to address this question, Hubbard et al. (2001) conducted a study in which 11 groups of six lower-class, African American boys participated in playgroup sessions for 5 consecutive days. Reactive and proactive aggression toward each other member of the playgroup was observationally coded. Additionally, children completed interviews to assess their dyadic social cognitions, in terms of their thoughts about each of the other members of the playgroup (e.g., would an ambiguous provocation from Tommy be attributed differently than one from Joey? Would aggression directed toward Johnny result in different outcomes than aggression directed toward Bobby?). Children's reactive and proactive aggression, as well as their hostile attributional biases and outcome expectations, varied across dyadic relationships. That is to say, children's aggression and social cognitions were not just the result of their own general tendencies (actor effects) or the tendency of their partners to elicit certain behaviors and social cognitions from others (partner effects). Rather, children's aggression and social cognition varied depending on the specific dyadic relationship in question.

Moreover, hostile attributional biases toward a particular peer were related to observations of reactive aggression toward that peer, even after controlling for actor and partner effects (Hubbard et al., 2001). Thus, the tendency to attribute hostile intent to a particular peer was related to the likelihood of aggressing reactively, but not proactively, toward that specific peer. This same level of dyadic specificity was not found for the relation between proactive aggression and positive outcome expectations for aggression, suggesting that this relation is driven more by actor effects and partner effects than by the specific dyadic relationship in question. Overall, the findings suggest that the dyadic nature of aggression has not been given sufficient weight in previous theoretical and empirical work: Reactive aggression, in particular, may be more based in dyadic interaction than has previously been widely acknowledged.

Emotional and Physiological Processes

Until the past 10 to 15 years, researchers did not pay much attention to emotion when striving to understand children's aggression. Instead, the field relied upon the social-information-processing (SIP) model described above. More recently, there has been a dramatic shift toward examining the emotional processes that underlie children's aggressive behavior. This shift has occurred in the wake of an increased focus on the importance of emotion regulation in children's development more generally (Cole, Martin, & Dennis, 2004). The inclusion of emotional mechanisms in research and theory on the underpinnings of reactive and proactive aggression will likely deepen our understanding of the complex combination of processes that result in high levels of aggressive behavior for some children.

Although theorists conceptualize reactive aggression as emotionally driven, they view proactive aggression as quite unemotional. Furthermore, the emotion that is most often invoked when characterizing reactive aggression is anger. The hypothesis that reactive but not proactive aggression is related to difficulties with anger and its regulation has garnered support across a number of studies (De Castro et al., 2005; Dodge & Coie, 1987; Little, Brauner, Jones, Nock, & Hawley, 2003; Little, Jones, Henrich, & Hawley, 2003; McAuliffe, Hubbard, Rubin, Morrow, & Dearing, 2007; Price & Dodge, 1989; Raine et al., 2006). The samples used in these studies were diverse and included elementary-school children, low-SES

African American boys, German adolescents, and antisocial adolescents.

However, in all of these studies, anger was assessed in a trait-like way through self report, peer report, or hypothetical vignettes. None of the studies included laboratory-based observational measures of children's anger or measures of the physiological arousal that likely accompanies anger. This is particularly important because episodes of reactive aggression are thought to be characterized by high levels of physiological arousal, whereas episodes of proactive aggression are consistent with a profile of low physiological arousal (Dodge, 1991; Vitaro & Brendgen, 2005). Yet we have preciously little data along these lines.

In fact, only one study of the associations between the subtypes of aggression and physiological arousal has been published to date. In this large-scale study (Hubbard et al., 2002), teacher ratings of reactive and proactive aggression were gathered on 272 second-grade children. These children then participated in a laboratory procedure in which they lost a board game to a peer confederate who cheated. Physiological data on children's skin conductance reactivity (SCR) and observational data on children's anger expression were collected during each turn of the game. Findings revealed that reactive aggression, but not proactive aggression, was positively related to SCR and observed anger expression. Moreover, these relations held not only when SCR and anger expression were aggregated across the game, but also in terms of rate of increase over the time span of the game. That is to say, children higher in teacher-rated reactive aggression had steeper increases in their SCR and anger expression over the course of the game, whereas these increases were not related to proactive aggression.

Hubbard et al. (2002) also examined relations between observed anger and SCR. Higher levels of teacher-rated reactive aggression were associated with stronger turn-by-turn relations between children's SCR and their observed anger, although these relations did not vary by children's level of proactive aggression (Hubbard et al., 2004). These findings point to the importance of understanding more about the moment-by-moment connection between children's physiological reactivity and tendencies toward reactive aggression. That is, some children may have a harder time keeping their physiological arousal from manifesting itself in observable anger (i.e., they have not mastered the display rules for dissembling their angry feelings), and these difficulties may be related to reactive aggression.

This Hubbard et al. (2002, 2004) project was an important starting point in understanding the role of physiological factors in anger arousal and aggression likelihood. Still, more work is clearly needed in several areas. This study did not address the question of whether proactive aggression is characterized by lack of physiological arousal and anger. Moreover, in this study, teacher ratings of classroom-based reactive aggression were related to physiological arousal and observed anger, but peer-provoked aggression itself was not elicited or measured. More information is needed about whether children's physiological and emotional profiles differ *in the moment* when they are engaging in episodes of reactive versus proactive aggression, and laboratory procedures of the present type are critical to such questions.

Our laboratory has recently pilot-tested procedures designed to answer several of the questions that could not be addressed in the Hubbard et al. (2002, 2004) study (Hubbard et al., 2008). Specifically, new laboratory-based measures of reactive and proactive aggression were developed, with accompanying measures of physiological arousal and anger expression. The sample for this pilot work consisted of 36 fourth- and fifth-grade boys and girls from diverse racial/ethnic groups. The results were highly informative and will be described here.

In each of three laboratory tasks, participants prepared computer art pictures while they believed that a virtual peer was preparing his or her own picture in another room. During two reactive aggression tasks (one each for low and high provocation), the participant sent his or her picture to the virtual peer, who criticized it and spoiled it. The participant then had an opportunity to comment on the virtual peer's picture and spoil it if he or she chose to do so.

During the proactive aggression picture exchange, the virtual peer was not provocative, instead praising and not spoiling the child's picture. To create motivation toward proactive aggression, children in this task were led to believe that spoiling the virtual peer's picture would render it more likely that he or she would later win an attractive prize. Thus, the reactive tasks involved peer provocation but no instrumental gain from aggression, whereas the proactive task involved no peer provocation but clear instrumental gain from aggression. During each task, the following measures were collected: (a) behavioral aggression (i.e., the extent to which the child spoiled the peer's picture), (b) observationally coded verbal aggression,

(c) physiological arousal measures of SCR and heart rate (HR), and (d) observationally coded angry facial expressions and angry verbal intonations.

A first hypothesis was that children's aggression would relate positively to their anger expression during the reactive tasks, but not the proactive task. Support for this hypothesis was found. In the low-provocation reactive task, verbal anger was positively correlated with behavioral reactive aggression ($r = .34$, $p = .05$) and with verbal reactive aggression ($r = .52$, $p = .001$). Similarly, in the high-provocation reactive task, verbal anger was correlated with behavioral reactive aggression ($r = .31$, $p = .07$) and with verbal reactive aggression ($r = .79$, $p = .0001$). In contrast, no significant relations between anger and aggression emerged for the proactive task. These findings provide further support for the idea that reactive aggression is driven by anger and initial evidence that proactive aggression is not so driven.

A second hypothesis was that children's aggression would relate positively to their physiological arousal (SCR, HR) during the reactive tasks, but that these relations would be negative during the proactive task. Strong support emerged for this hypothesis, as can be seen in Table 1. The higher children's SCR and HR were in the reactive tasks, the more likely they were to engage in behavioral and verbal aggression during those tasks (with five of eight correlations significant or marginal). Conversely, the lower children's SCR and HR were in the proactive task, the more likely they were to engage in behavioral and verbal aggression during that task (with three of four correlations significant).

These results suggest not only that elevated physiological arousal is a primary mechanism driving reactive aggression, but that proactive aggression is actually marked by a notable absence of physiological arousal. Children with the lowest levels of physiological arousal during the proactive task were the most likely to aggress against the virtual peer in an attempt to improve their chances of winning a desired prize. These data provide the first empirical support of theory suggesting that proactive aggression is literally "cold-blooded," in that it is displayed when children are particularly calm and unaroused. Our results appear consistent with data showing that heart rate is a *negative* predictor of aggression when not provoked but a *positive* predictor when provocation is involved (see Lorber, 2004, for a review). Aggressing when not provoked is quite consistent with proactive aggression, whereas aggressing when pro-

Table 1
Relations Among Measures of Reactive and Proactive Aggression and Measures of Physiological Arousal During Laboratory Tasks

	Low-Provocation Reactive Task		High-Provocation Reactive Task		Proactive Task	
	SCR	HR	SCR	HR	SCR	HR
Behavioral reactive aggression	.19	.01	.24	.33*	—	—
Verbal reactive aggression	.37*	.46**	.28†	.35*	—	—
Behavioral proactive aggression	—	—	—	—	−.31†	.08
Verbal proactive aggression	—	—	—	—	−.58**	−.35*

Note. SCR: skin conductance reactivity; HR: heart rate; —: proactive aggression was not assessed during the two reactive tasks and reactive aggression was not assessed during the proactive task.
†p - .10. *$p < .05$. **$p < .01$.

voked is more clearly related to reactive aggression. Thus, it appears critical to specify the function of aggression involved in studies of this type.

SOCIAL EXPERIENCES ASSOCIATED WITH REACTIVE AND PROACTIVE AGGRESSION

Reactive and proactive aggression may also be distinguished in terms of the social experiences involved. Along these lines, a very consistent pattern to emerge is that reactive aggression, but not proactive aggression, is positively related to the social experience of peer rejection (Boivin, Dodge, & Coie, 1995; Dodge et al., 1997, 2003; Morrow, Hubbard, McAuliffe, Rubin, & Dearing, 2006; Poulin & Boivin, 2000; Price & Dodge, 1989; Roach & Gross, 2003; Waschbusch, Willoughby, & Pelham, 1998) and peer victimization (Camodeca & Goossens, 2005; Lamarche et al., 2006; Pellegrini, Bartini, & Brooks, 1999; Poulin & Boivin, 2000; Salmivalli & Helteenvuori, 2007; Salmivalli & Nieminen, 2002; Schwartz et al., 1998). Most of the samples used in these studies involved unselected samples ranging in age from early elementary school to early adolescence as well as multiple nationalities (e.g., America, Canada, the Netherlands, and Finland). Peer rejection was most often assessed via peer nominations of liking and disliking, although two studies used well-validated teacher-report measures. Peer victimization was measured through peer, self-, and teacher reports using a variety of well-validated measures.

From a theoretical perspective, children may aggress reactively *because* they have been rejected and mistreated by their peers, or they may be disliked and victimized *because* they aggress reactively. These cyclical relations may unfold repeatedly over both short time periods (e.g., a single interaction) and longer time periods (e.g., several years). Work on the longitudinal relations between peer rejection and generalized aggression supports such bidirectional relations (Miller-Johnson, Coie, Maumary-Gremaud, Bierman, & Conduct Problems Prevention Research Group, 2002). Yet data on subtypes of aggression is sparse. Dodge et al. (2003) found that peer rejection in kindergarten predicted reactive but not proactive aggression in third grade, but no studies have assessed both the subtypes of aggression and peer rejection/victimization at both earlier and later time points. This sort of design is needed to carefully untangle the direction of temporal relations among these constructs.

ASSESSMENT OF REACTIVE AND PROACTIVE AGGRESSION IN CHILDREN

The sections above generally focused on findings rather than measurement considerations. Nevertheless, measurement considerations are very important to the conclusions that can be drawn, and the present section considers such issues. We review common measures, critique them, and present recommendations for the improved assessment of the two aggression subtypes.

The Questionnaire Developed by Dodge and Coie (1987)

The majority of studies in the literature have assessed reactive and proactive aggression using a six-item questionnaire developed by Dodge and Coie (1987). The scale was originally developed as a teacher-rating form and has been most consistently used as such (Arsenio et al., 2004; Brendgen et al., 2001, 2006; Camodeca & Goossens, 2005; Crick & Dodge, 1996; Day, Bream, & Pal, 1992; De Castro et al., 2005; Dodge & Coie, 1987; Dodge et al., 1997, 2003; Hubbard et al., 2002; Lamarche et al., 2006; Nas et al., 2005; Pellegrini et al., 1999; Poulin & Boivin, 2000; Price & Dodge, 1989; Roach & Gross, 2003; Vitaro et al., 1998, 2002; Waschbusch et al., 1998). In two studies of incarcerated adolescents, ratings from correctional facility staff were used in place of teacher ratings (Nas et al., 2005; Smithmyer et al., 2000). Finally, two studies used the scale as part of an aggregated latent modeling approach. In these studies, teachers and parents reported on the reactive and proactive aggression of the child using the Dodge and Coie scale and a scale developed by Brown, Atkins, Osborne, and Milnamow (1996), and peer nominations were also collected and combined with the other measures (McAuliffe et al., 2007; Morrow et al., 2006).

The Dodge and Coie (1987) scale includes three items indexing reactive aggression: (a) ''When this child has been teased or threatened, he/she gets angry easily and strikes back,'' (b) ''This child claims that other children are to blame in a fight and feels like they started the trouble,'' and (c) ''When a peer accidentally hurts this child, such as by bumping into him/her, this child assumes that the peer meant to do it, and then overreacts with anger or fighting.'' Three other items index proactive aggression: (d) ''This child gets other children to gang up on a peer that he/she does not like,'' (e) ''This child uses physical force, or threatens to use force, in order

to dominate other children," and (f) "This child threatens or bullies other children in order to get his/her own way."

In many ways, the psychometric properties of the scale are strong. In the original paper in which the scale was developed, intrascale correlations and coefficient alphas were high, suggesting strong internal consistency. More impressive were data regarding convergent validity. Observational data on children's reactive and proactive aggression in playgroups over 5 consecutive days were collected in addition to teacher ratings of the subtypes of aggression on these six items. Teacher ratings of reactive aggression correlated positively with directly observed reactive aggression, even after teacher ratings of proactive aggression were partialled out. Similar and complementary findings also held for proactive aggression. Also, correlations between teacher ratings of each aggression subtype with observed behaviors of the other subtype were nonsignificant.

However, discriminant validity was weaker. In particular, in the development of the scale, items were retained that had factor loadings of greater than .40 on both the reactive and proactive subscales. In addition, in the original study, the eigenvalue of the proactive factor was only .74. In subsequent studies, confirmatory factor analyses have been a bit equivocal regarding the two-factor structure, though the majority of studies are supportive (Fite, Colder, & Pelham, 2006 [parent report]; Poulin & Boivin, 2000 [teacher and parent report]; Smithmyer et al., 2000 [correctional facility staff report]). Regardless, one well-designed study failed to replicate this two-factor structure (Roach & Gross, 2003 [teacher report]).

Furthermore, there are some concerns about the wording of the six items of the Dodge and Coie (1987) scale. One item (#2) does not actually refer to aggressive behavior, but rather to children's thoughts and attributions about aggressive episodes. Of more concern, several items (#1, #2, and #3) explicitly mention anger and/or hostile attribution biases. This wording is particularly troublesome when it is then shown that the reactive aggression scale predicts these process-related outcomes (e.g., the hostile attribution bias); such a positive relationship might be expected solely on the basis of scale content. Third, although the theoretical distinction between reactive and proactive aggression is entirely based on function (provocation-driven or goal-driven), one item (#4) does not describe the aggressive behavior's function clearly.

These issues are concerning because so much of the literature on reactive and proactive aggression in children, including many of the

studies from our laboratory, are based on the use of this particular questionnaire. The findings that have emerged from these studies have made a great deal of theoretical and intuitive sense. Nevertheless, faith in these findings will be greatly enhanced when they are replicated with other measures with stronger psychometric properties and more straightforward wording.

Other Questionnaire Measures of Reactive and Proactive Aggression

The next measure to emerge was a teacher rating form by Brown et al. (1996). The psychometric properties of this scale were somewhat improved over the Dodge and Coie (1987) scale. Even so, the questionnaire suffered from many of the same difficulties with item wording. In spite of the improved psychometrics, this scale never "caught on" with researchers, who continued to rely on the Dodge and Coie scale. In fact, only three studies reviewed in this paper utilized this measure in their assessment of the subtypes of aggression (McAuliffe et al., 2007; Morrow et al., 2006; Schippell et al., 2003). Several new scales have emerged more recently, however.

Kempes et al. (2006) recently developed a parent-rating measure of the subtypes of aggression. Eleven items were retained in the final scale, with six items assessing reactive aggression and five items assessing proactive aggression. Strong factor analysis results were reported, and these results were replicated across two samples of over 200 children each. Nevertheless, no information was provided on internal consistency or relations to other measures of the subtypes of aggression. Furthermore, similar to the Dodge and Coie (1987) scale, some of the items are not well worded. For example, one item, "My child gets angry quickly if he/she does not get his/her own way," does not describe aggressive behavior, though it does describe anger.

Next, two new peer-report measures of reactive and proactive aggression have recently emerged. The first measure, developed by Salmivalli and colleagues (Salmivalli & Helteenvuori, 2007; Salmivalli & Nieminen, 2002), consists of three peer nominations each for reactive and proactive aggression. Internal consistency estimates for the two subscales were strong when the measure was given to a large sample of Finnish fourth through sixth graders. However, results of a principal-components factor analysis were less impressive. In

particular, the eigenvalue of the reactive factor was less than 1, and three of the six items had factor loadings of greater than .40 on the alternate subscale. Again, wording issues may be somewhat to blame for less than perfect psychometric properties. For example, the item "does nasty things to others" fails to specify the function of the aggressive behavior (i.e., whether instrumental or emotional).

A second peer-report measure was recently developed by Prinstein and Cillessen (2003). These authors did not provide any information on the psychometric properties of the measure. Nevertheless, it is described briefly here because of the innovative nature and potential utility of the assessment procedure. Three peer nominations were obtained, one each for overt aggression, relational aggression ("uses their friendships as a way of being mean"), and reputational aggression ("does things to damage someone's social reputation"). When participants named a peer as aggressive on one of the three items, they were then asked to indicate whether they believed the peer behaved aggressively "mostly when they have been hurt, angered, or upset" (reactive aggression), "to get what they want" (proactive instrumental aggression), or "just to be mean and hostile to others" (proactive bullying aggression). Thus, there is the potential here for assessing reactive and proactive aggression across diverse content domains.

Finally, self-report measures may be of use for adolescent populations, and two such measures have been developed. The first measure was developed by Raine et al. (2006). It includes 11 items indexing reactive aggression and 12 items indexing proactive aggression. Internal consistency estimates for each subscale were strong, the authors provided compelling evidence that a two-factor model fit the data better than a one-factor model, and they replicated these results across two samples of 16-year-olds. However, inspection of the items again suggests concerns. Many of the items describe anger rather than aggression (e.g., "Reacted angrily when provoked by others," "Gotten angry when frustrated," "Become angry or mad when you don't get your way"). This confusion of anger and aggression is an issue that has plagued researchers of childhood aggression for decades. It is critical to remember that all angry feelings do not lead to aggressive actions, that anger is an emotion and aggression is a behavior, and that these two constructs require separate and careful assessment.

The second adolescent self-report measure was developed by Little and colleagues (Little, Brauner, et al., 2003; Little, Jones,

et al., 2003) and includes 36 items. This measure assesses two forms (overt and relational) and two functions (reactive and proactive) of aggression. Six items assess overt aggression, with no reference to function (e.g., "I'm the kind of person who hits, kicks, or punches others"). The six stem items are then repeated with the phrase "to get what I want" tacked on to the end (i.e., proactive aggression) and then with the phrase "when I'm hurt by someone" tacked on to the end (i.e., relational aggression). These items were very carefully worded and seem to capture the core motivates involved. To create scores for reactive aggression, the reactive alternative of each item is regressed onto its overt aggression alternative and residual scores are created. Thus, scores reflect tendencies to be aggressive for a particular motivational reason (reactive or proactive).

Little and colleagues (Little, Brauner, et al., 2003; Little, Jones, et al., 2003) collected data from two large samples of 5th- through 10th-grade German adolescents. In both samples, a model with two forms and two functions of aggression fit the data better than other models, and internal consistency estimates were good. Furthermore, results were replicated across different ages and genders. A problem, though, is that self-report methods cannot be reliably used among younger children. Among younger children, teacher and/or parent reports have been successful in differentiating reactive and proactive aggression in relation to other measures (Boivin et al., 1995; Dodge & Coie, 1987; Hubbard et al., 2001; Price & Dodge, 1989). Still, the notable strengths of the scale developed by Little and colleagues is notable. For this reason, the development of new teacher-, parent-, and even peer-report measures of reactive and proactive aggression that follow the format developed by Little and colleagues will be an important next step for the field.

Observational or Laboratory-Based Approaches to Assessment

Several of the studies reviewed in this paper assessed the subtypes of aggression observationally or through laboratory-based methods. In one study (Price & Dodge, 1989), observations of the subtypes of aggression were conducted during free-play periods at school. In several other studies, children's reactive and proactive aggression within playgroups was observationally coded (Boivin et al., 1995; Dodge & Coie, 1987; Hubbard et al., 2001; Schwartz et al., 1998). Although these playgroups were conducted in the laboratory, the

aggression observed was naturally occurring, in that children engaged in free play during the group sessions.

Other studies have used more structured peer-to-peer procedures for eliciting and assessing reactive and proactive aggression. This includes the Hubbard et al. (2008) task in which provocation or incentives are offered and then the child is given the opportunity to spoil the peer's picture, a method described in more detail above. Atkins and Stoff (1993) developed a comparable procedure in which participants played a computer-based pinball game against a virtual peer. Children could "tilt" the opponent's game board to increase their chances of winning the game, and this was used as a measure of proactive aggression. Furthermore, they had the opportunity to administer aversive white noise to the opponent following provocation, and this was considered a measure of reactive aggression.

Many of the findings discussed throughout this review have been demonstrated in studies using observational and laboratory-based measures as well as questionnaire-based measures. For example, reactive aggression has been shown to be positively related to hostile attributional biases, anger, and physiological arousal in both observational and questionnaire-based studies. Similarly, proactive aggression has demonstrated a relationship to positive outcome expectancies for aggression, and to delinquency, in both types of studies. Convergence of this type is particularly gratifying given the concerns raised about the questionnaire measures that have been most used to date. Regardless, multimethod replications should continue to be used in the field.

CONCLUSIONS

Much remains to be done to further our understanding of reactive and proactive aggression in children and adolescence. More time- and labor-intensive observational and laboratory-based investigations of the subtypes of aggression are needed, particularly to provide a deeper understanding of the physiological and emotional underpinnings of the subtypes of aggression. More longitudinal studies are needed as well. Such longitudinal studies are critical in enhancing our knowledge of the familial precursors to, long-term behavioral outcomes of, and social experiences associated with each aggression subtypes as it develops over time. Further, as should be clear from the review, psychometrically strong and theoretically

derived measures of reactive and proactive aggression in children and adolescents are essential.

Yet, even with all that remains to be done, there is reason to be encouraged by all that has been learned thus far. It seems clear that reactive and proactive aggression are preceded by different familial precursors, lead to different behavior outcomes, are driven by different social–cognitive and emotional processes, and are associated with different social experiences. In all of these ways, this review provides compelling evidence that the distinction between reactive and proactive aggression is important, useful, and very deserving of further research attention.

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