It Takes Two to Fight: A Test of Relational Factors and a Method for Assessing Aggressive Dyads

John D. Coie
Duke University

Antonius H. N. Cillessen
University of Connecticut

Kenneth A. Dodge
Vanderbilt University

Julie A. Hubbard
University of Delaware

David Schwartz
University of Southern California

Elizabeth A. Lemerise
Western Kentucky University

Helen Bateman
Vanderbilt University

Observations of aggressive interactions in boys' laboratory play groups were used to evaluate the relative importance of relational and individual factors in accounting for aggressive acts. A classroom peer-rating method for identifying mutually aggressive dyads was validated in 11 5-session play groups, composed of 2 mutually aggressive boys and 4 randomly selected male classmates from 11 predominately African American 3rd-grade classrooms. When the social relations model was used, relationship effects accounted for equally as much of the variance in total aggression and proactive aggression as either actor or target effects. Mutually aggressive dyads displayed twice as much total aggression as randomly selected dyads. Members of mutually aggressive dyads attributed greater hostile intentions toward each other than did randomly selected dyads, which may serve to explain their greater aggression toward each other. The importance of studying relational factors, including social histories and social–cognitive processes, is discussed.

The study of human aggression has usually been dominated by a focus on individual aggressiveness, without adequate recognition of the significance of interpersonal relationships in the occurrence of aggression. This may in part be due to the exceptional stability and cross-situational consistency of individual aggressiveness. The estimates of stability calculated in Olweus's (1978) review of this literature are as high as for any other individual characteristic (r = .76 for 1-year and .60 for 10-year intervals). Huesmann, Eron, Lefkowitz, and Walder (1984) obtained a correlation of .58 for peer-rated aggression from Ages 8 to 30. Cairns and Cairns (1994) have reported comparable stability in aggressiveness for males and females. Likewise, there is now a reasonably coherent developmental account of the factors contributing to chronic aggressiveness across childhood and adolescence (e.g., Coie & Dodge, 1998; Patterson, 1993; Patterson, Reid, & Dishion, 1992).

Nonetheless, despite the importance of individual factors in the prevalence of violence and aggression in human interactions, there is reason to consider the role of relational or dyadic factors in the occurrence of aggression among individuals. Most of the homicides in the United States, for example, occur during arguments between relatives or acquaintances (Kellerman & Reay, 1986). One possible explanation for this fact is that acquaintances and relatives interact more frequently than strangers and thus have greater opportunity for misunderstandings and conflicts that would lead to aggressive acts. Closely related to this explanation is a second one—namely, that this greater frequency of social interaction can lead to expectations between individuals that serve to lower the threshold of incentive for aggressive actions by one person toward the other. For example, two individuals who have had a history of misunderstandings might be more apt to draw hostile inferences about the intentions of the other in some situations than they would in similar situations with a total stranger or with another acquaintance.
Theoretical support for viewing aggression in social interactional terms rather than solely in terms of individual responsibility for aggression comes from recent work of European social psychologists. Mummendey, Linneweber, and Lüscher (1984) argued that "theory about aggressive behavior . . . should overcome its limitation to the single individual as a self-sufficient behavior-producing unit of analysis" (p. 101); aggression should instead be understood in terms of both participating individuals who are acting in a specific social context. According to Mummendey et al., the divergence in the way an aggressive act and its causes are viewed by the actor and the recipient is evidence for an "interactional term, a characteristic of what is between the two participants" (p. 100). This idea that aggression needs to be understood as relational is central to the purposes of the present study. From the thesis put forward by Mummendey et al.—that differing perspectives on the meaning of the social context affect judgments about the justifiability of aggression as a social response—we hypothesized that individuals’ perspectives toward each other, taken from their shared history and from observations of each other in social interaction with other people, play a significant role in determining when and if an aggressive act toward the other is called for.

A second line of theorizing that has relevance to the study of aggressive relationships comes from Kornadt’s (1986) analysis of the motivational dynamics underlying individuals’ aggressive behavior. Adapting Atkinson’s (1964) more general theory of motivation to the case of aggression, Kornadt hypothesized that the motivation of a specific aggressive act is a function of an individual’s general motivation to aggress multiplied by the expectation of success in aggressing toward a specific target and the incentive to aggress against that individual. By focusing his theory of motivation on aggression toward specific individuals, Kornadt has provided a framework for incorporating relationship data into the prediction or explanation of patterns of aggressive behavior. If one assumes that the relationship history of two individuals allows them to develop expectations of each other that differ from their generalized expectations of the social world, then knowledge of these specific expectations should lead to better predictions of their aggressive behavior toward each other than could be gained from their knowledge of their generalized aggressive behavior or their generalized social expectations of other people. Applying Kornadt’s model to dyadic patterns of aggressive behavior leads to the hypothesis that mutually aggressive dyads would have reciprocally greater motivation to aggress against each other than would less mutually aggressive peers. In other words, members of mutually aggressive dyads would be more likely to have greater expectations of hostile intentions on the part of the other and higher expectations of success in their aggressive acts. In making this decision to equate motivation to aggress with the attribution by the person that the potential target of aggression has hostile intentions toward him or her, we are following DaGloria and deRidder’s (1977) conclusion that a critical factor influencing the motivation to aggress is the conclusion that noxious behavior toward the person by the target was malevolent (i.e., intentional by the target). Dodge (1986) and others (Graham & Hudley, 1994; Guerra & Slaby, 1989) have demonstrated the significance of attributions of hostile intent for aggression. Likewise, there is considerable evidence supporting the role of expectations of success on aggressive behavior (Boldizar, Perry, & Perry, 1989; Guerra, Huesmann, & Hanish, 1995; Perry, Perry, & Rasmussen, 1986).

The Kornadt (1986) model treats aggression and aggressive relationships as an undifferentiated category, as though all aggression is influenced by the same dynamic. It is possible, and even probable, that some aggressive relationships are influenced more by attributions of hostile intention, whereas others are based on expectations of success. The research on subtypes of aggressive acts suggests that proactive aggression, defined as a nonemotional, instrumental attempt to achieve a desired outcome through coercive means, such as through bullying, intimidation, or careless disregard for the well-being or possessions of another person (Dodge & Coie, 1987), is associated with expectations of success for aggressive behavior (Crick & Dodge, 1996). Reactive aggression, defined as an angry response to perceived provocation or interpersonal frustration, is more closely associated with the attribution of hostile intentions to the other (Crick & Dodge, 1996). Thus, relationships characterized more by proactive aggression might be determined more by expectations of success, whereas those characterized primarily by reactive aggression might be influenced by expectations and attributions of hostile intentions on the part of the other.

In an earlier study of aggression in children’s play groups, Dodge, Price, Coie, and Christopoulos (1990) found that some pairs of boys accounted for more aggressive episodes than others. Of the more than 5,000 aggressive events coded among boys who had previously been unaquainted, 50% of them occurred among just 20% of the dyads. This suggests that aggression is not equally likely to occur among all dyads. In an effort to understand more about the dynamics of aggression in these dyads, the researchers categorized the dyads as either mutually aggressive, with both boys initiating aggression somewhat equally, or as asymmetric, with one boy initiating most of the aggression. Aggression in the asymmetric dyads was more often proactive, whereas aggression in the mutually aggressive dyads was more often reactive. These findings suggest that there is something about the relationship of certain pairs of boys that elicits anger in each of them and leads to aggressive behavior. The findings for the asymmetric dyads suggest that characteristics of the aggressor or the victim may lead to proactive aggression, because some boys might be perceived as easy targets for domination and abuse by boys who are so inclined.

The Dodge et al. (1990) study had two important design limitations that affect our understanding of how relationships—in contrast to actor or target effects—might influence the frequency and type of aggression. The first limitation was that the play groups were formed in order to examine the role of aggression and other types of behavior in determining the social rejection of boys by their peers. For this reason, the boys were selected because of their social status, and the sample was overrepresented by rejected boys. The second limitation was that all boys were previously unaquainted in order to obtain an unbiased estimate of the relationship between behavior and newly acquired status. As a result, the boys had no prior social history with each other, and the types of relationships that existed among them were of very short duration. In addition to these design limitations, a third problem involved the data analytic procedures that did not control for interdependencies among relationships and aggressive interactions occurring within groups. We resolved this problem in the current study by using Kenny’s (1994) social relations model, which we describe later.
One of the goals of our study was to demonstrate the significance of relationship as a contributor to dyadic aggression, in contrast to actor or target effects, and to do so with samples of boys who had a much longer history of interaction with each other than did the boys in the Dodge et al. (1990) study. Although we do not deny the importance of actor or target characteristics as contributors to aggression among humans, our current study was an attempt to illustrate the way in which relationship can also be a major contributor.

In setting up the play groups in order to observe aggressive relationships, we first had to decide whether to focus on symmetric or asymmetric aggressive dyads, because placing both types of dyads in a single group would create social imbalance and would likely influence the incidence of aggressive behavior within and across the two dyads. This, in turn, would have created methodological dependencies that would confound any analyses of each type of dyad. Additionally, the time involved in conducting these quasi-experimental play groups, as well as in observing and coding the videotapes of multiple sessions, was too demanding a task for us to assemble equal numbers of groups of both types of dyads in reasonable numbers. We chose to study the mutually aggressive dyads because less is known about them than about bully-victim pairs and because we reasoned that relationship might be relatively more important for the mutually aggressive dyads. We also reasoned that mutually hostile expectations and attributions evolve out of a history of problematic interactions in which aggression is instigated by both parties. Although it is also true that the bullies may pick out a particular child for attack because this target evokes a predatory response in them, target factors such as vulnerability and actor factors such as a disposition to pick on others and to use aggression to dominate are also significant factors in asymmetric aggression. For these reasons, we identified mutually aggressive relationships among boys who were quite familiar with each other and then compared their patterns of aggression with those of classmates who did not show frequent aggression toward each other.

To set up these play groups, we first had to identify mutually aggressive dyads in the school setting so that we could be sure of their history of aggressive relationships. A second goal of the study, therefore, was to develop a measure for identifying dyads who are highly aggressive with each other in the school context, without relying on the time-consuming and laborious process of observing them. This is particularly important because very extensive time samples of behavior are required to assess aggression as an individual difference factor (Cowie & Dodge, 1988), and the older the child, the less frequently adults will be able to observe such interactions. The plan was to test a peer-rating measure similar to those used to identify children's behavioral characteristics. In this case, peers were asked to rate the aggressiveness of boys toward specific male partners, considering all the possible dyads within a school classroom. We used item-response theory (IRT; Terry, in press; Thissen & Steinberg, 1988) analyses to generate dyadic aggression scores that weight peer-rating responses according to rater characteristics.

We implemented these two goals by assembling groups of 6 boys from the same classrooms and observing patterns of aggression among them in laboratory play groups. Two boys from each class were selected as highly aggressive toward each other (mutually aggressive) on the basis of the sum of classmates' ratings of their initiation of aggression toward each other. The other 4 boys were randomly selected from the remaining boys in the classroom. Frequencies of both proactive and reactive aggression, as well as total aggression, between the mutually aggressive partners were contrasted to the mean frequencies of dyadic aggression among the 6 possible dyads that could be created among the 4 randomly selected boys. These contrasts provided a basic validation test of the peer-rating procedure. We relied on the social relations model (Kenny & LaVoie, 1984) to determine the relative proportion of proactive and reactive aggressive acts that could be accounted for by actor, target, or relationship effects. An important feature of the social relations model is that it controls for interdependency effects while allowing for the examination of actor and target effects or the interaction of actor and target within dyadic interactions. The design of this study called for group sessions across 5 successive days, thus providing the replicated observations that are required within the social relations model to separate dyadic variance from error variance.

In addition to coding incidents of aggression during the group sessions, we administered social-cognitive measures to each boy at the end of group sessions. Specific expectations about the success of an aggressive act toward each fellow group member were assessed, as well as specific attributions of hostile intent on the part of each other group member when that boy's name was inserted as the protagonist in a vignette that entailed a negative outcome under conditions of ambiguous intention by the other. The hypothesis of this study was that members of mutually aggressive dyads would have more hostile attributions of intent toward each other than would members of randomly selected dyads and, in accordance with the multiplicative component of Kornadt's (1986) model of aggression motivation, the mutually aggressive dyads would show greater bidirectional aggression than would the randomly selected pairs. We also wanted to evaluate two alternative hypotheses regarding the effect of expectations of success on the motivation of mutually aggressive boys to fight with each other. One hypothesis derived from Kornadt's general theory of aggression motivation—namely, both hostile attributions and expectations of success combine to predict frequency of dyadic aggression in mutually aggressive pairs. The second hypothesis was that hostile attribution is the main determining factor in motivating aggression in mutually aggressive dyads. The corollary to this second hypothesis, which could not be tested in the present study, was that expectation of success is the dominant motive in predicting asymmetric aggression.

Although the study of social behavior is, by definition, an attempt to understand relationships between people, the examination of behavior in terms of dyads has rarely been attempted. As Kenny and LaVoie (1984) noted in their exposition of the social relations model, dyadic research often depends on the study of one person interacting with a confederate or the designation of one member of a freely interacting pair as the subject of study. Kenny and LaVoie presented a conceptual and analytical framework for examining the relative contribution of relationship effects, as well as actor and partner effects, on the social interactions of two people. In their model, actor effects refer to the average level of a given behavior in the presence of a wide range of dyadic partners and reflect the disposition of the actor. Partner effects reflect the average level of that behavior elicited from a wide range of other people. Relationship effects, by contrast, are the unique adjust-
ments that one individual makes to another individual and reflect the behavior not accounted for by either actor or partner effects; relationship effects are also the product of systematic variance in the way two people interact with each other that is not explained by their individual behavior tendencies. We submitted the observations recorded for pairs of boys in each of the play groups to the procedures of the social relations model for estimating actor, partner, and relationship effects. The purpose of these analyses was to calculate the extent to which aggression between members of all possible dyads in the play groups seems to be determined by factors having to do with the initiator of aggression (the actor), the recipient of aggression (the partner), or the relationship between the actor and the partner (the dyad).

There is reason to hypothesize that the relative importance of actor, partner, and relationship characteristics in determining the occurrence of aggressive events will vary according to the type of aggressive act initiated. The previous finding by Dodge et al. (1990) that reactive aggression occurs most often in mutually aggressive dyads suggests that aggression prompted by angry emotions may be linked to relationship factors. In other words, the anger of the initiator may have been triggered by something the partner had just done or said. It is also possible that the immediate behavior of the partner was interpreted in terms of the dyad's previous history, and without this relationship history, anger would not have been evoked. Likewise, relationship histories may suggest to some potential bullies that certain peers are safer targets for attack than others and that proactive aggression might produce greater effects than would reactive aggression. For these reasons, separate analyses were conducted for proactive and reactive aggression, as well as for total aggression, within the framework of the social relations model. Our hypothesis was that the relationship factor would account for a greater proportion of the nonunique variance (attributable neither to error nor to variation across time) in reactive aggression than in proactive aggression.

The decision to limit this study to boys was based on two factors. One factor was the time and resources required to conduct the 11 play groups. This factor precluded doubling the sample size and conducting groups of both boys and girls. In fact, limiting the number of groups to just 11 placed serious constraints on statistical power. The second factor was that the earlier work by Dodge et al. (1990) involved boys. Because it was important to extend these findings to children who had a history of interaction with each other, we decided to begin this extension with children of the same sex as those in the earlier research. Clearly, it is important to study the significance of aggression in relationships among girls, particularly because researchers have recently documented the importance of other forms of aggression among girls that serve to undermine the relationships of the target with peers (Crick & Grotputer, 1995; Galen & Underwood, 1997).

Method

Overview

The first phase of this project began in the spring, when we collected peer dyad ratings in 11 third-grade classes of eight elementary schools. These schools served a predominately African American, low to lower middle income population. Of particular importance was a newly devised measure in which same-sex peers rated either all peers or a randomized subset of peers, depending on the size of the class. Those doing the ratings were asked to consider one dyad at a time and to rate the degree to which one designated member initiated aggression toward the other member. Teachers also completed these same ratings on all the dyads in their classrooms.

In the second phase of the project, we selected 6 boys from each of the 11 classrooms and invited them to participate in play-group sessions that met daily for one week in the summer following the third-grade year. Aggressive acts were coded from videotapes of these group sessions according to the identity of the aggressor and the target.

Participants

The 11 classrooms included a total of 268 children (47% girls and 53% boys). Their mean age was 9.3 years (SD = 0.69 years), and all but 8 girls and 3 boys were African American. The neighborhoods served by the schools comprised largely lower middle class homes in a southern urban setting. We obtained parental permission for children to complete the sociometric measures, and 77% of the girls and 82% of the boys completed the measures. We recruited the members of the summer play groups by first selecting the dyad in the class whose combined aggressiveness ratings (reciprocally from 1 child to the other) were the highest in their classroom and then randomly selecting 4 other boys from the classroom, with substitutions when parental permission was not received or when a child's schedule would not permit participation. A total of 66 boys, all African American, participated in the laboratory observational portion of the study.

Boys were given $1 for each session attended and a bonus of $1 if they attended all five sessions.

Ratings of Dyadic Aggression

Children in 11 classrooms completed a set of dyadic ratings. Boys rated dyads of boys, and girls rated dyads of girls. (We collected data for the girls as well because this was a classroom-based procedure; however, we describe the procedure for the boys only.) A list of all unique pairs of boys was generated for each classroom. There were 10–17 boys per classroom, forming between 45 and 136 unique dyads. Pilot testing had indicated that children could rate all the possible dyads when classrooms had as few as 10 or 11 boys. In classrooms with more boys, the number of male dyads exceeded the limitations of the available testing time. In those cases, each rater was given a random subset of approximately 55 of all possible dyads.

By randomizing this process, the dyads in each classroom were rated by an equal number of participants. Across the 11 classrooms, the 142 boys formed a total of 876 dyads. Each participating boy rated between 45 and 63 dyads (M = 56.2). Each of the 876 dyads was rated by 5–9 boys (M = 7.3). The participation rate by classroom ranged from 69% to 93%, with an average of 82% participation. Boys who did not participate as raters were either absent during testing or had not received parental permission.

Each rater received an individualized rating sheet. On the left side of the page the names of dyad members were printed in two columns labeled "Child A" and "Child B." Each pair of names was followed by three 5-point scales. These scales were used to rate, respectively, (a) how much Child A started fights with Child B, (b) how much Child B started fights with Child A, and (c) how much Child A and Child B played together. Ratings ranged from 1 (not at all) to 5 (very much). Raters completed the three ratings for the first dyad before moving on to the next dyad. The order of dyads was randomized across the individual raters. The order of names within dyads was randomized across the lists of all raters so that each name occurred an equal number of times in first and second position.

Teacher ratings. We asked the teachers of the 11 classrooms to complete the same dyadic ratings of aggression and social interaction as the boys in their class had completed. Each teacher received a randomized list of all possible pairs of boys in the classroom. Teachers rated each dyad on a 5-point scale (1 = not at all, 5 = very much) as to how much Child A
started fights with Child B, how much Child B started fights with Child A, and how much Child A and Child B played together. One of the 11 teachers (of a classroom with 17 boys, forming 136 dyads) was not able to participate in this part of the study. Therefore, dyadic ratings by the teacher were available for 740 of the 876 dyads.

**Scoring procedures.** To reduce the potential error variance due to idiosyncratic scale use, carelessness, or lack of information on the part of raters, we submitted the dyadic ratings to a procedure based on IRT that provides summary scores for each dyad that are best estimates of group consensus. In this procedure, peers were considered as multiple informants on the behavior ratings for each dyad, and the teacher was considered an additional informant. An inspection of the raw data indicated that children differed markedly in their use of the 5-point rating scales. For example, whereas many raters used the full range of the scale, others discriminated dyads predominately at either the high end or the low end of the scale. Similarly, teachers used the scales in idiosyncratic ways. Scale use also differed between the two criteria (aggression and social interaction).

A solution to these differences in response tendencies is provided in the IRT framework (Terry, in press; Thissen & Steinberg, 1988). When the IRT is used, it is possible to score items, persons, or objects by weighting the ratings they have received according to the unique response parameters of each individual rater. For example, an aggression rating of 2 received from a rater who uses only the low end of the scale carries a weight different than that accorded to the same rating from a rater who uses the full range of the scale. We conducted IRT scoring of all dyads by means of MULTILOG (Thissen, 1991), a software package developed for the application of IRT to Likert scale data. Data points for each dyad were the total available ratings made by classroom peers and the teacher. Because the set of raters was unique to each classroom, scoring was conducted for the rater by a dyad matrix of each classroom separately. Within each classroom, two IRT runs were conducted: one for all unidirectional aggression ratings and one for the bidirectional social interaction ratings. Each MULTILOG run produced a coefficient (range = 0–1) for the reliability of the ratings (to be interpreted as a coefficient alpha). Across the 11 classrooms, median reliability was .74 for dyadic aggression (range = .65–.78) and .73 for dyadic social interaction (range = .43–.88). MULTILOG automatically standardized dyad scores within classrooms by setting the mean to 0 and standard deviation to \( \sqrt{2}/2 \) in each run. Across all 876 dyads, scores were distributed as follows: for dyadic aggression, \( M = 0.04 \) (range = -2.08 to 5.53); for dyadic social interaction, \( M = 0.02 \) (range = -2.45 to 1.85).

**Play-Group Design**

For the second part of the study, 11 play groups of 6 African American boys each were formed (1 group per classroom). Because they came from the same classroom, the boys in each group were familiar with one another. Two of the 6 boys in each group were selected because they formed highly aggressive dyads in their classrooms. The 4 additional boys were selected randomly from the remaining boys in the classroom. Parental permission for a child to participate in the play groups was obtained for all 66 boys in the 11 groups. Three of the most mutually aggressive dyads could not be recruited for the study because of scheduling conflicts; therefore the dyads that were rated the highest in aggression were recruited from these classes.

The dyads in each classroom were rank ordered from most to least aggressive on the basis of the average of all dyadic aggression ratings received from peers. The rank ordering was used to select from each classroom the most aggressive dyad in which both members were available for play-group participation. The average aggression rating, on a scale of 1 to 5, of the 11 dyads selected as mutually aggressive was 3.03 (SD = 0.59). The average aggression rating of the remaining 865 dyads was 1.90 (SD = 0.61).

Each play group met for 5 consecutive days during 1 week of the summer. Play-group attendance was high, with only 6 absences occurring out of a possible 330 instances (66 boys \( \times \) 5 sessions). Boys were driven from their homes to the laboratory, where they participated in a 45-min, unstructured, free-play session in a room equipped with age-appropriate toys and games. At one end of the room, a video camera was positioned behind a one-way mirror. All play sessions were videotaped for later observational coding. No adults were present in the playroom during the sessions, although children were closely monitored by means of the video camera to ensure their physical safety.

**Administration of the dyadic social-information-processing interview.** Boys were interviewed following the completion of each play session. These interviews lasted approximately 15 min and were conducted privately with each child. On the second and fourth days of the play sessions, the interview questions assessed hostile attributions and outcome expectancies for aggression within dyads (Dodge & Coie, 1987).

**Assessment of hostile attributions within dyads.** Boys were read each of six vignettes describing an ambiguous provocation by a peer toward the participant. Three of these vignettes were administered following the second play session, and three were administered following the fourth play session. For each vignette, boys were asked to imagine that the peer who provoked them was a specific member of their play group. They then responded to a multiple-choice question regarding the intent that they attributed to this peer for each situation (1 = accident, 0 = hard to tell, 1 = being mean). Next, boys were asked to imagine that the peer in the vignette was another member of the play group and to respond to the same question. This procedure was repeated for all 5 members of the play group, for each of the six vignettes. For each of the 5 members of the play group, children received an attribution score, which was the average of their responses to the six attributional questions regarding that peer. The alpha coefficient assessing internal consistency was .73 across the six questions.

**Assessment of outcome expectancies for aggression within dyads.** Boys were read each of six vignettes in which they imagined aggressing against a peer. Three of these vignettes were administered following the fourth play session. For each vignette, boys were asked to imagine that the peer against whom they aggressed was a specific member of their play group. They then responded to a multiple-choice question regarding their expectation for the instrumental effectiveness of aggression against this peer in this situation (1 = definitely not effective, 2 = maybe not effective, 3 = maybe effective, 4 = definitely effective). Next, children were asked to imagine that the peer in the vignette was a different member of the play group and to respond to the same question. This procedure was repeated for all 5 members of the play group, for each of the six vignettes. For each of the 5 members of the play group, boys received an outcome expectancy score, which was the average of their responses to the six outcome expectancy questions regarding that peer. An alpha coefficient of .79 was obtained across the six questions.

Three dyadic scores were calculated in keeping with Kornadt’s (1986) expectation–value model for aggression. First, for each dyad, the hostile attribution score of Child A toward Child B was averaged with the hostile attribution score of Child B toward Child A. This was the dyadic hostile attribution score. Second, the dyadic expectation of success score was computed by averaging the expectation score for Child A to Child B with that of Child B to Child A. Third, an Expectancy \( \times \) Value product score was computed by multiplying the expectation score of Child A to Child B...
by the hostile attribution score for Child A to Child B and then averaging that with the Expectancy X Value product for Child B toward Child A. To do this, we standardized both the individual expectation and the hostile attribution scores separately across all participants. A constant term was added to each score to yield only positive numbers. These positive scores were then multiplied according to the procedure just described.

Observations of aggression. Trained observers coded the videotapes of the play-group interactions for the occurrence of aggressive acts. Observers focused on one dyad at a time, coding only the interactions between the boys in that dyad. Play-group sessions were segmented into two hundred seventy 10-s intervals (45-min sessions × 6 intervals/min). At the end of each 10-s interval, observers recorded the occurrence or nonoccurrence of reactive and/or proactive aggression initiated by 1 of 2 boys in the dyad toward the other, and they noted the identity of the initiator. We operationalized the two subtypes of aggression as follows: Reactive aggression included angry retaliatory aggressive behaviors. This category was coded when one boy responded to the other with signs of frustration, hostility (e.g., angry facial expressions, gestures, or verbalizations), and retaliatory counterattacking behavior. Proactive aggression included nonangry, goal-oriented aggressive behaviors. This category was coded when one boy teased, made fun of, or physically abused the other or used aversive means to reach an external goal (e.g., the acquisition of an object or position). Proactive aggressive behaviors were not accompanied by observable signs of anger or frustration and did not represent an immediate response to verbal or physical attack or insult from the other boy.

Two observers were trained over a period of 8 weeks to code the play-group interactions. Observers met regularly during the training period and periodically during the actual coding to review progress and discuss coding disagreements. Play-group sessions were randomly assigned to coders, so that each observer coded three of the five sessions for each play group. Approximately 18% of the sessions (10 out of 55 sessions, containing 2,700 intervals of 10 s each) were randomly selected to be coded by both observers for agreement checks. Observers did not know which sessions were used for this purpose.

Assessment of observer agreement was based on a definition of concordance that required agreement on within-interval event occurrence/nonoccurrence, subtype of aggression, and the identity of the initiating boy. Cohen's κ (Cohen, 1960) was used as the index of agreement. Agreement for the individual codes was .71 for reactive aggression and .76 for proactive aggression.

Results

There were three major goals of this study. The first was to corroborate the hypothesis developed from the Dodge et al. (1990) study suggesting that relationships account for a substantial amount of the variance in boys' aggressive interactions and that this is especially true for reactive aggression. Toward this end, we used a variance-partitioning procedure, based on principles of Kenny's (1994) social relations model, to test the relative importance of actors, targets, and relational factors in aggressive episodes. The second goal was to validate a dyadic rating method for identifying aggressive dyads in the school context by comparing the observed play-group based aggressive behavior of high mutually aggressive dyads (selected by this method) with that of randomly selected boys from the same classroom. A third goal, presuming the second one was achieved, was to begin to understand why these mutually aggressive dyads engaged in aggression toward each other more often than did randomly selected dyads. To meet these latter two goals, we conducted analyses of variance (ANOVAs) on the frequency of aggressive acts directed within a dyad, as well as on the specific expectations and hostile attributions held toward each other by members of a dyad. The ANOVAs compared mutually aggressive dyads with the comparable score averaged across all the possible dyads among the 4 randomly selected boys in each group.

Analyses of Actor, Target, and Relationship Effects

The purpose of these analyses was to test the hypothesis that relationship accounted for a significant proportion of the systematic variation in aggressive episodes. A second hypothesis was that the relational factor would play a greater role in reactive aggression than would actor or target effects but that the reverse would be true for proactive aggression. These analyses were conducted within the framework of the social relations model. The SOREMO program (Kenny, 1993) was used for this purpose. The frequencies of total aggression and of proactive and reactive aggression of each boy toward each other boy in each of the five play sessions in each of the 11 play groups constituted the dependent variables. Because there were repeated measures (frequencies of aggression in each of five play sessions), it was possible to distinguish variance that was systematic from session to session from variance that was unique to each session. Unique variance also included error variance. The systematic variance was then divided into variance due to actors, targets, and dyadic relationships. Because of the availability of repeated measures, the dyadic variance component was not confounded by error variance. We then conducted a significance test (in which groups were used as the units of analysis) to determine whether each variance component was significantly different from zero.

The results of this analysis are presented in Table 1. For all forms of aggression, 42% of the total variation in aggressive behavior was systematic variance. Eleven percent was due to actor effects (i.e., some boys were systematically more aggressive than other boys in the play sessions), 15% to the fact that some boys were more likely to be the targets of aggressive behavior than other boys, and 16% to the relationship factor. Each of these effects was statistically significant, thus confirming the hypothesis that relationship—in addition to actor and target effects—is an important determinant of aggression among school-age boys.

This analysis was repeated for each of the two subtypes of aggression. For proactive aggression, 39% of the variance was

Table 1

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systematic variance. Twelve percent was due to actor effects, 15% to target effects, and 11% to relationship effects. Again, all three effects were significant. For reactive aggression, the three factors were only marginally significant in accounting for systematic variance, probably because reactive aggression was less frequent. Relationship accounted for 16% (p < .075), which equaled the combined effects of actor (9%) and target (6%). On the face of it, relationship did appear to account for a greater proportion of systematic variance in reactive aggression than did proactive aggression, but the marginality of significance leaves this as a somewhat equivocal conclusion.7

**Validation of the Dyadic Ratings Procedure and Test of the Kornadt (1986) Motivational Model**

To test the hypothesis that peer ratings of dyadic aggression provide a valid measure of actual patterns of aggressive relationships, we conducted two types of analyses. First, peer ratings of aggression were correlated with observer ratings of aggression by dyads. Second, comparisons were made between the identified mutually aggressive dyad and the set of all possible pairs among the other 4 boys in each group. Thus, dyads were treated as the unit of analysis. In each of the 11 groups, 1 aggressive dyad had been identified. The 4 boys not involved in the aggressive dyads formed 6 nonaggressive dyads. The scores of the 11 aggressive dyads were compared with the 11 mean scores for the 6 nonaggressive dyads in each group. Dependency due to nesting of dyads within groups was controlled by selecting 1 mutually aggressive dyad and the mean of the other 6 dyads equally from each play group.3

The Pearson correlations between dyadic ratings by peers and observed frequencies of dyadic aggression in the play groups were calculated in terms of directed aggression. That is, the rating of Child X's aggression toward Child Y is a different data point than Y's aggression toward X. When the correlation was calculated across the 165 independent pairs, this correlation was .51 (p < .01; across the 330 pairs, the correlation was .51).

We conducted ANOVAs contrasting dyad types on the following scores: the aggressive dyad ratings collected in the classrooms, the play ratings collected in the classrooms, play-group proactive aggression, play-group reactive aggression, play-group total aggression, attribution of hostile intent, expectation of success, and the Expectancy × Value product score. The first two analyses tested the proposition that peers saw the mutually aggressive dyads as fighting more often with each other than the random dyads but not playing with each other more or less often. The next three analyses served to validate the peer ratings of aggression with measures of observed frequency of actual aggression. The last three analyses provided a potential basis for explaining these differences in frequency of aggression in terms of Kornadt's (1986) motivational theory of aggression. A score for each dyad for each dependent variable was computed by summing the behaviors of both members of the dyad toward each other. Table 2 displays the means, by dyad type for each of these contrasts, along with effect size estimates because the sample sizes for these analyses were so small.

The ANOVA on the dyadic aggression ratings (IRT scores) can be considered a manipulation check. A significant effect for dyad types was found, F(1, 20) = 102.96, p < .001. Aggressive dyads (M = 3.21) had higher classroom aggressive dyad ratings than did nonaggressive dyads (M = −0.17).

It was important to determine whether the difference in aggression might be due to differences in frequency of interaction; therefore, the peer ratings as to how often the dyads played with each other was one way to test this possibility. The ANOVA on the "play together" ratings (IRT scores) did not yield a significant difference between the aggressive and nonaggressive dyads. Members of aggressive dyads (M = 11) did not differ from members of nonaggressive dyads (M = 0.09) in the degree to which they interacted with one another, according to their classroom peers. This result indicates that the aggressive dyad classifications were not confounded by differences in the amount of social interaction between dyads.

The ANOVA on the total amount of aggression between dyad members in the play groups yielded a significant effect for aggressive dyad type, F(1, 20) = 5.95, p < .024. Dyads who were

<table>
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<th>Variable</th>
<th>Mutually aggressive</th>
<th>Random pairs</th>
<th>Effect size</th>
</tr>
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<td>Aggression ratings by classmates</td>
<td>3.21</td>
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<td>4.33</td>
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<td>&quot;Play together&quot; ratings by classmates</td>
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<td>0.03</td>
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<td>Total aggression in play groups*</td>
<td>86.6</td>
<td>47.90</td>
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<td>Total reactive aggression in play groups</td>
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<td>0.91</td>
</tr>
<tr>
<td>Attribution of hostile intentions</td>
<td>1.9</td>
<td>1.60</td>
<td>0.83</td>
</tr>
<tr>
<td>Expectations of success for use of aggression</td>
<td>2.3</td>
<td>2.60</td>
<td>0.84</td>
</tr>
<tr>
<td>Expectancy × Value</td>
<td>10.14</td>
<td>9.99</td>
<td>0.17</td>
</tr>
</tbody>
</table>

* Incidents per five sessions.

2 When we explored the effects of excluding individuals from groups in the SOREMO analyses, it became clear that the relative size and significance of actor, target, and relationship effects would change according to who was excluded (i.e., aggressive or nonaggressive participant). Because the relative significance of these factors can change for both reactive and proactive aggression according to group composition, caution should be taken in generalizing the current findings. It is possible that groups structured around bully–victim dyads might yield different relative effects of the three factors for both proactive and reactive aggression.

3 The problem that arises from averaging six scores is that this reduces the variance in the random dyads estimates and leads to a potential violation of the assumption of homogeneity of variance in the ANOVA. This is, in fact, what happened when the analyses were conducted. The alternative solution was to conduct the same analyses comparing the 11 mutually aggressive dyads with a randomly selected dyad from the same group. The latter solution did, however, yield results that were virtually identical to those described in Table 2, suggesting that the results of the ANOVAs in Table 2 are robust to the violation of the assumption of homogeneity and that it is reasonable to have confidence in these findings. It should be noted that the violation of the homogeneity of variance assumption is less of a problem when there are equal sample sizes (11, as was the case here) than when there are unequal sample sizes (Gravetter & Wallnau, 1996).
identified by peers in the classroom as being mutually aggressive were observed to engage in far more aggressive behavior in the play groups than were dyads who were identified by peers as relatively nonaggressive.

Significant effects for dyad type were found for both proactive and reactive aggression, as reflected in Table 2. Aggressive dyads engaged in significantly more proactive aggression in the play groups than nonaggressive dyads, \[ F(1, 20) = 5.39, p < .031, \] as well as more reactive aggression, \[ F(1, 20) = 4.59, p < .031, \] Thus, whereas proactive acts were more frequent, the ratio of reactive acts between mutually aggressive dyads and nonaggressive dyads was much greater (2.58:1) than was the ratio of proactive acts (1:63:1). In summary, the dyads identified as mutually aggressive by the classroom peer-rating method did display more aggression of all types—but particularly reactive aggression—than did the dyads who were not rated as highly aggressive toward each other. Our hypothesis was that reactive aggression would distinguish the mutually aggressive dyads from the randomly selected dyads, but dyad effects were found for both proactive and reactive forms of aggression. In terms of absolute differences, the proactive difference was greater, but this was because of the generally greater frequency of proactive aggressive acts, which usually were more often verbal and less serious than reactive acts. Thus, one way to characterize the two types of dyads is to consider the proportion of reactive and proactive aggression exhibited by each type. For mutually aggressive dyads, the rate of reactive aggression to total aggression was 27%, whereas for randomly selected dyads, the rate was 19%.

The ANOVA of the attribution of hostile intentions scores was marginally significant, \[ F(1, 20) = 3.74, p < .067. \] Boys in mutually aggressive dyads tended to be more likely to attribute hostile intentions toward each other than boys in randomly selected dyads. The effect size of 0.83 standard deviation was a large effect despite the marginality of the test of significance. Conversely, the marginally significant dyad-type effect for the expectations of success variable, \[ F(1, 20) = 3.90, p < .062, \] reflected the fact that randomly selected boys had greater expectations that they would get what they wanted from each other if they used aggression to get it than did boys in mutually aggressive dyads. As it turns out, these two scores—hostile attributions and expectations of success—were negatively correlated with each other \( r = -.37 \). For this reason, the test of Kornadt’s (1986) Expectancy \times Value model for specific aggression was not significant, \[ F(1, 20) = 0.16, p < .69. \] The effect of the two product terms was to cancel each other. These results suggest that the higher rate of aggression in the mutually aggressive dyads is primarily due to their greater levels of mutual distrust and attribution of hostile intention to each other.

**Discussion**

Sometimes what is taken as a given in folk wisdom about human behavior is either overlooked in psychological research or is slow to be evaluated. The frequent admonition by mothers and teachers that it “takes two to fight” seems to be something that aggression researchers need to take more seriously. Although the significance of individual difference factors in determining aggressive activity cannot be denied, the results of these analyses using the social relations model suggest that relational factors account for at least as much of the variance in boys’ aggressive interactions as either actor or target characteristics. The relative proportions accounted for by these three factors will likely vary as a function of the composition of the sample, and we cannot claim that our 11 groups are representative of the general phenomenon. Instead, it is important to have demonstrated the significance of relationship effects under more rigorous conditions than were used earlier by Dodge et al. (1990), who first suggested the importance of dyadic factors.

The overwhelming focus of most research on children’s aggression has been on social–cognitive, emotional control, and executive function characteristics of individuals designated as highly aggressive—that is, the initiators (actors) of aggression. The exception to this rule is the recent literature on bully–victim relations, which provides recognition that some children are more consistently the target of aggressive acts (Kupersmidt, Patterson, & Eekholt, 1989; Perry, Kusel, & Perry, 1988).

Perry et al. (1986) introduced the idea that some aggressive children have inordinately high expectations of the social effectiveness of aggressive acts, and although this variable also seems to place primary emphasis on the social–cognitive processes of aggressors, it is a short step from this conclusion to the recognition that some children who are targets of aggression are perceived to be easier “marks” than other children (Schwartz, Dodge, & Coie, 1993). Clearly, the bully–victim phenomenon, as articulated by Olweus (1978) and other investigators, exemplifies the relational factor in children’s aggression. Olweus, for example, argued that most bullying takes place within the context of specific dyads.

In the present study, we focused on mutually aggressive dyads rather than on bully–victim relationships, partly because little mention has been made of this phenomenon of mutually aggressive dyads. The high rates of violence among adolescents who are acquaintances suggest that mutually aggressive dyads may account for a significant portion of this youthful violence; in interviews, participants in such episodes often state that the precipitating circumstances involved jealousy and reaction to perceived insult (Christoffel, 1990).

These comments resonate with Mummendey et al.’s (1984) idea that studying the relationship between two individuals, rather than what is internal to one person, aids our understanding of the origins of some forms of aggression. This is particularly true for aggressive exchanges that are precipitated by anger on the part of one or both parties to an aggressive exchange. In the earlier study by Dodge et al. (1990), there was evidence that reactive aggression, which is defined by the presence of anger, more often occurred in mutually aggressive dyads than in asymmetrically aggressive dyads. The reason for expecting greater reactive aggression among dyads who have a history of mutual aggression is that anger and suspicion are carried forward in the relationship by the way in which each member interprets the remarks or gestures of the other. This prejudicial reading of one person’s behavior by the other provides what Mummendey and her colleagues referred to as the justifiability of an aggressive response. For these reasons it is plausible to suggest that some of the social–cognitive processes that have been used to explain individual aggression (Crick & Dodge, 1996) may also be dyadic in nature. For example, the tendency to make hostile attributions regarding the intent of the other may be a dyadic process (Hymel, 1986; Perry, Williard, & Perry, 1990). Such attributions may more often be made by some individuals about specific other individuals as a consequence of
their relational history. Conversely, these same dyads may be less likely to attempt nonhostile solutions to disagreements or conflicts because each one anticipates aggressive behavior by the other. If this scenario holds true for some dyads, then solutions to reducing aggression in contexts such as schools may need to include a focus on dyads as well as on strategies designed to reduce individual aggressiveness.

All of these hypotheses require additional research for their confirmation, but research of this sort depends on the availability of methods for identifying mutually aggressive dyads. The results of the second part of this study suggest that it is possible to use classroom peers as a valid source of information for this purpose. Mutually aggressive dyads identified in the classroom by peer ratings displayed twice as many aggressive acts toward each other as did a set of randomly selected dyads from the same classroom. Similar differences were obtained for both proactive and reactive aggressive acts, but as was the case in the Dodge et al. (1990) study, the ratio of reactive aggressive acts between mutually aggressive dyads and comparison dyads was greater than that of proactive acts, confirming the view that mutually aggressive dyads involve reciprocal anger. It is important to note that these dyadic effects were not simply a consequence of greater play or social interaction between members of these dyads, because the peer ratings suggested that this is not the case.

One potential explanation for the preceding results comes from Kornadt’s (1986) theory of the motivation for aggressive acts toward specific individuals. This theory incorporates much of what has just been said about the history of a relationship and the way it can lead to attributions of hostile intent on the part of the other. The dyadic analyses of attributions of hostile intention support the hypothesis that some dyads are marked by frequent mutually directed aggression because of the heightened suspicion that each individual has of the other. The Kornadt Expectancy × Value formula did not yield significant differences in specific motivation to aggress for the two types of dyads. This was a consequence of the fact that random dyads had greater expectations of successful aggression toward each other than did the mutually aggressive dyads. This finding is provocative because several studies have demonstrated that aggressive individuals generally expect more successful outcomes for their aggression than do nonaggressive individuals (e.g., Perry et al., 1986). Our finding does not contradict the findings of Perry et al. (1986) and others (e.g., Deluty, 1983; Hart, Ladd, & Burleson, 1990) because those studies involved generalized expectations rather than expectations of specific targets, which is the case in the present study. Thus, it is conceivable that highly aggressive boys may expect aggression to be successful with other boys in general, but they may recognize that it is much less successful when it is directed toward another aggressive boy with whom they have a history of frequent aggressive encounters. It is possible that the expectations of success among the mutually aggressive dyad members were tempered by an interactional history of resistance and retaliation, making each of them less optimistic about the positive consequences of aggression toward the other.

We must explain the greater levels of aggression in the mutually aggressive dyads by something other than the unweighted product of expectation of success and attribution of hostile intent. One possibility is that Kornadt (1988) is correct in assuming that both of these constructs are important in explaining specific aggression motivation but that each has differing importance according to the nature of the relationship. It is possible that in some relationships, such as asymmetric aggressive ones, expectation of success plays a much more important role than value factors in justifying the act of aggression. In the case of dyads in which high rates of aggression are exchanged, the primary motivation seems to involve value that is based on the assumption that the other has malevolent intentions. For this reason these relationships may be characterized by unusually higher rates of reactive aggression.

Our tests of dyadic variance were relatively conservative given that the group was the unit of analysis and 11 groups did not provide many degrees of freedom, but the effect sizes reflected in Table 2 suggest that the results were fairly robust. The current findings, however, apply to male African Americans only, and it would be important to extend the applicability of these findings. Given that much of what is known about social information processing and aggression has been replicated across African American and White samples, it is reasonable to expect that these results may also have generalizability. The logistical complexity of putting such groups together and the labor intensity of the coding of dyadic interactions might deter other researchers from expanding on these results, and that would be unfortunate. It is clear that there is much to be learned about human aggression from the study of dyads. The differential proportions of proactive and reactive aggression relating to the dyad factor, for example, provide further evidence of the discriminant validity of these two subtypes of aggression. Reactive aggression is highly dyadic, probably because of the escalation of anger involved and the possible role of mutual suspicion.

As we have noted previously, there are clear limitations to the generalizability of these results. The time-consuming nature of this research paradigm and the need to treat groups as the unit of analysis resulted in a study with a very small sample size. Thus, the sample was restricted by sex, ethnicity, and age, as well as by the socioeconomic characteristics of the schools that were sampled. It is likely that most of these factors influence the relative size of actor, target, and relationship effects on aggression. The same is true of the decision to study mutually aggressive dyads rather than asymmetric dyads. The latter are certainly a worthy focus of future investigations of this kind.

Although the results of this study do not invalidate the current emphasis on individual difference factors in the development of human aggression, they do suggest that greater attention should be given to relational factors. Aggression is a social phenomenon. It is reflective of social histories between and among individuals and groups, and it must be studied in this light. The present study not only provides empirical justification for a greater emphasis on aggressive relationships but offers a method for identifying pairs of children who exemplify these relationships.

References


