

## A longitudinal study of relational and physical aggression in preschool

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### Abstract

To understand the development of relational aggression during early childhood, 91 girls and boys ( $M$  age=39.0;  $SD=7.6$  months) and their teachers participated in an 18-month longitudinal study. Children were observed for relational and physical aggression during free play in four time periods. Individually administered interviews were conducted to provide peer reports of relational and physical aggression. Teachers completed measures of relational and physical aggression and peer rejection. Findings support the psychometric properties of the observational methods for use during early childhood. Results suggest that girls are more relationally aggressive than male peers and boys are more physically aggressive than female peers. Moreover, children primarily direct their aggressive behavior at same-sex peers. Finally, relational aggression was found to be moderately stable during early childhood and was associated with future peer rejection problems. Results are discussed in terms of the importance of developing methods to investigate behavior patterns for understanding the early development of and future social–psychological risks that may be associated with relational aggression.

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### 1. Introduction

Due to its deleterious effects on children's development, peer-directed aggression has been one of the most widely studied adjustment problems in the past several decades. Although hundreds of studies, books, and journals have been dedicated to the topic, past investigations of aggressive behavior have been limited in two crucial ways: (1) aggressive boys have received most of the empirical attention, whereas aggressive girls have often been excluded from relevant studies; and (2) forms of aggression that are salient to boys have been emphasized (e.g., physical aggression) whereas forms that are salient to girls have been neglected (e.g., relational aggression; Bjorkqvist & Niemela, 1992; Crick & Grotpeter, 1995; Robins, 1986). Compounding these limitations, current prevailing theories of the development of aggression depict the behavioral problems of girls as virtually nonexistent until the onset of adolescence (Keenan & Shaw, 1997; Silverthorn & Frick, 1999). Due to these empirical and theoretical shortcomings, we currently know much less about aggressive girls than aggressive boys, and we particularly lack knowledge of *young* girls' behavior

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problems. Given the negative risk status typically associated with aggression and given the numerous advantages afforded by early intervention (Bloomquist & Schnell, 2002), this lack of knowledge is significant.

In one attempt to “suspend our acceptance of the mythology of more benign childhoods for girls” (Zahn-Waxler, 1993, p. 84), a relational form of aggression has been recently identified that has been shown to be more characteristic of girls than the physical forms that have captured the majority of previous empirical and theoretical efforts (for a review see Crick et al., 1999). In contrast to physical aggression, in which physical damage or the threat of physical damage serves as the means of harm, relational aggression includes behaviors in which damage to relationships or the threat of damage to relationships serves as the vehicle of harm (Crick & Grotpeter, 1995). Relational aggression includes both direct and indirect acts such as threatening to end a friendship unless the friend complies with a request, using social exclusion or the “silent treatment” as retaliatory behaviors, and spreading false rumors to encourage peers to reject a classmate.

One fundamental question that remains unanswered in studies of relational aggression concerns the early developmental course of relational aggression for boys versus girls. This information is crucial for the generation of theories regarding the etiology of relationally aggressive behavior patterns. Unfortunately, however, investigators interested in these issues have been limited by a lack of reliable and valid observational methods for assessing relational aggression. Researchers have primarily relied upon teacher and peer assessment tools that, although quite useful for addressing a number of empirical questions, may also be subject to a variety of significant biases (e.g., they may be influenced by explicit or implicit stereotypes about males and females, see Pellegrini, 2001b; Susser & Keating, 1990). Recently, however, a naturalistic observational approach for assessing relational aggression among preschoolers has been developed that appears both reliable (e.g., inter-rater reliability of .82) and valid (e.g., observed relational aggression scores and teacher-based scores are associated  $r = .54$ ; Ostrov & Keating, 2004).

### *1.1. Observations of relational aggression*

Our first goal for the present study was to evaluate further the psychometric properties of the observational approach developed by Ostrov and Keating (2004) by employing it in the first prospective study of relational and physical aggression in young children. Specifically, we examined the predictive validity of children’s observationally based relational aggression scores derived from this scheme as well as correspondence with other informants (i.e., teachers and peers), and the association between relational aggression and physical aggression. This information is necessary for establishing the appropriateness and generalizability of the Ostrov and Keating approach for use with a variety of different types of samples and in prospective investigations.

After establishing the favorable psychometric properties of the Ostrov and Keating observational scheme for the present sample, the second goal of this research was to use the scheme to evaluate sex differences in relational and physical aggression during early childhood. Some but not all recent studies have demonstrated that, in sharp contrast to current theories and empirical investigations of aggression that largely depict girls as lacking in behavioral problems prior to adolescence, a significant proportion of girls can be identified as highly aggressive as early as the preschool years if relational aggression is assessed in addition to physical aggression (e.g., Bonica, Yershova, Arnold, Fisher, & Zeljo, 2003; Crick, Casas, & Mosher, 1997; McNeilly-Choque, Hart, Robinson, Nelson, & Olsen, 1996; Ostrov & Keating, 2004). In addition to studies conducted in the United States, cross-cultural research has demonstrated the particular importance of relational aggression for identifying preschool age aggressive girls in other countries including Russia, China, and Australia (see studies by Hart and co-workers, such as Hart, Nelson, Robinson, Olsen, & McNeilly-Choque, 1998; Russell, Hart, Robinson, & Olsen, 2003). Studies of middle childhood have yielded similar results. For example, in one study, 4.2% of the participating girls were identified as aggressive when only physical aggression was taken into account whereas 21.6% were classified as aggressive when both relational and physical aggression were considered (Crick & Grotpeter, 1995). In this instance, a focus solely on physical aggression would have failed to identify over 80% of aggressive girls but would have failed to identify only 7% of the aggressive boys. These studies provide robust evidence to counter the stereotypical view that girls, in general, are not aggressive and that *young* girls do not exhibit or experience behavioral problems.

### *1.2. Sex differences in relational and physical aggression*

Although it is relatively clear that the study of relational aggression adds significantly to our ability to identify and understand aggressive females, less clarity has been achieved regarding sex differences in children’s propensity to use

relational aggression. Mixed findings particularly abound for studies of early childhood. Specifically, studies in which teacher reports of relational aggression have been utilized have tended to show that preschool-age girls are more relationally aggressive than preschool age boys (cf. Hart et al., 1998), whereas studies that have relied on peer reports have often failed to find significant sex differences (e.g., Bonica et al., 2003; Sebanc, 2003; for a review see Crick, Ostrov, & Kawabata, *in press-a*). In the one study to utilize a reliable and valid naturalistic observational approach, preschool girls were shown to be significantly more relationally aggressive than preschool boys (Ostrov & Keating, 2004). These discrepant findings may be due to a number of factors including reporter bias (for teacher and peer reports; for further discussion of this issue see Pellegrini, 1996, 2001b) or possible changes in sex differences during the preschool years that have not been taken into account in existing studies due to their cross-sectional designs. These issues were addressed in the current study through the use of an assessment method (i.e., naturalistic observation) that is less prone to bias than those employed in the majority of most previous studies (i.e., teacher and peer reports) and through the use of a longitudinal design in which preschoolers were followed for approximately 18 months. We tested the association between physical and relational aggression and based on past findings (e.g., Bonica et al., 2003; Crick et al., 1997; Ostrov & Keating, 2004) we predicted that these constructs would be only slightly associated at each time point using observational methods that are based on information from multiple independent observers. We also predicted that observational assessments would be moderately associated with teacher report methods. We hypothesized that preschool age girls would be significantly more relationally aggressive than preschool age boys. We further predicted, in keeping with the gender-segregated nature of early childhood play settings (Maccoby, 1998) and past findings (Ostrov & Keating, 2004) that relational aggression would be more frequently directed to female peers than to male peers.

### 1.3. Stability of aggression subtypes

Our third objective was to provide the first examination of the stability of relational aggression in early childhood. Existing evidence indicates that individual differences in physical aggression may be relatively stable beginning at about two years of age (e.g., Fagot, 1984; Rose, Rose, & Feldman, 1989; Zahn-Waxler, Iannotti, Cummings, & Denham, 1990). This stability tends to persist into childhood (Cairns, Cairns, Neckerman, Ferguson, & Gariepy, 1989; Coie & Dodge, 1998; Huesmann, Eron, Lefkowitz, & Walder, 1984; Olweus, 1979; Pulkkinen, 1992; Yoshikawa, 1994) and is most apparent from early childhood to third grade for a small group of extremely aggressive children (NICHD ECCRN, 2004). Thus, children who exhibit relatively high levels of physically aggressive behavior during the early preschool years are at risk for continued behavior problems, a trajectory that has been shown to be associated with a host of serious developmental difficulties. Studies of relational aggression indicate a relatively high degree of stability for individual differences for older children (i.e., 9–12 year olds; Cillessen & Mayeux, 2004; Crick, 1996; Crick, Ostrov, and Werner, *in pressb*; Tomada & Schneider, 1997; Zimmer-Gembeck, Geiger, & Crick, 2005); however, no research has yet been conducted on the stability of relational aggression among young children using naturalistic observations.<sup>1</sup> Given the importance of early detection of aggressive behavior patterns in the prevention and treatment of future, as well as concurrent, adjustment difficulties (Levy-Shiff & Hoffman, 1989; Wasik, 1987), this lack of information has significant negative implications for our ability to adequately identify young children at risk. Given initial evidence regarding the greater prevalence of relational aggression among preschool girls (Ostrov & Keating, 2004), this lack of knowledge about the stability of relational aggression during the preschool period has likely had the greatest impact on our understanding of and our ability to appropriately serve young females. In this investigation, we predicted that individual differences in relational, as well as physical, aggression would be relatively stable during the preschool years.

### 1.4. Peer rejection and aggression subtypes

Our fourth and final objective for this study was to examine the concurrent and future associations among relational aggression, physical aggression, and peer rejection during early childhood. Evidence is mounting that relational aggression is associated with social–psychological adjustment problems including social maladjustment, internalizing problems, and externalizing difficulties (for a review see Crick et al., 1999). This association has been demonstrated for

<sup>1</sup> Preliminary data with a small preschool sample indicated that relational aggression scores obtained in a semi-structured task were significantly predictive of future naturalistically observed relationally aggressive behavior (Ostrov et al., 2004).

preschoolers (e.g., Crick et al., 1997; McNeilly-Choque et al., 1996; Ostrov, Woods, Jansen, Casas, & Crick, 2004), for children in middle childhood (e.g., Blachman & Hinshaw, 2002; Crick, 1996, 1997; Crick et al., in press-a, b; Rys & Bear, 1997; Zalecki & Hinshaw, 2004), for adolescents (e.g., MacDonald & O’Laughlin, 1997; Prinstein, Boergers, & Vernberg, 2001), and for adults (e.g., Linder, Crick, & Collins, 2002; Werner & Crick, 1999). Further, this relation has been shown to hold for non-U.S. as well as U.S. samples including Italian, Russian, Chinese, and German samples (e.g., Hart et al., 1998; Tomada & Schneider, 1997; for a review see Crick et al., 1999). Although longitudinal studies are few in number, available evidence indicates that relational aggression predicts future as well as concurrent social–psychological adjustment difficulties (Crick, 1996; Crick et al., in press-a, b; Werner & Crick, 2004; Zimmer-Gembeck et al., 2005). For example, relational aggression in third grade significantly predicts negative changes in peer rejection (i.e., becoming more rejected) three years later in sixth grade, even after controlling statistically for physical aggression, peer status, and prosocial behavior (Zimmer-Gembeck et al., 2005). Taken together, findings from these studies generally demonstrate that relationally aggressive behavior patterns may place children at risk for serious future difficulties. Further, they indicate that a singular focus on physical aggression may seriously hamper our comprehensive understanding of these difficulties.

Thus far, prospective studies of relational aggression and adjustment have focused exclusively on children in middle childhood and early adolescence. Consequently, the utility of assessing relational aggression for identifying young children “at risk” for future social–psychological problems is currently unknown. We addressed this gap in the present research. Specifically, we hypothesized that relational aggression would significantly predict future peer rejection for preschool-age boys and girls. Although future associations have been evaluated for school age children (e.g., Crick, 1996; Crick et al., in press-a, b; Zimmer-Gembeck et al., 2005), studies of preschoolers have been limited to concurrent associations (e.g., Crick, Casas, & Mosher, 1997). In this research we hypothesized that relational aggression would provide information about future peer rejection primarily for preschool-age girls.

To address these objectives, we followed prospectively a sample of preschool age children for approximately one and a half years. Assessments of aggression and peer rejection were conducted at four time periods for each child (i.e., beginning of school year 1, end of school year 1, beginning of school year 2, and end of school year 2).

## 2. Method

### 2.1. Participants

A total of 91 children (52 girls; 39 boys) between the ages of 30 and 52 months ( $M = 39.0$ ;  $SD = 7.6$ ) who were recruited from two nationally accredited university affiliated preschools in a large Midwestern city participated in this research. Written parental consent and verbal child assent were required for each child’s participation. During the first round of recruitment, the overall consent rate between the two sites was 73%. All subsequent recruitment occurred under blanket consent procedures and therefore was 100%. Demographic data on the socioeconomic status and ethnicity of participants was collected at a single time point from one site when the consent rate reached 100%. Given the nature of the sample, these figures are representative of both sites and all data collection time points. Sixty-five percent of participants were European American, 21% were Asian American, 10% were African American, and 4% were of other ethnicity. Twenty-nine percent of children’s families were known to be living 150% below the federal poverty level. Twenty-three percent of children were learning English as a second language.

Children were recruited in two cohorts (Cohort 1,  $n = 37$ ; Cohort 2,  $n = 54$ ). There were no differences in demographic information or other characteristics relevant to the present study between the cohorts, which were recruited from the same schools and classrooms one year apart. For all analyses the two cohorts were combined and treated as one sample.

### 2.2. Procedures

Each child was evaluated twice over the course of two consecutive school years (i.e., four time points). The first assessment was conducted during the fall semester, the second during the spring semester, the third during the following fall, and the fourth took place during the following spring. Assessments occurred approximately 4–6 months apart. During each of the four time periods (Time 1, 2, 3, and 4) children’s relational and physical aggression and peer rejection were assessed using naturalistic observations (assessment of aggression), individually administered child interviews (assessment of aggression), and teacher-reported rating scales (assessment of children’s aggression and peer rejection). Each assessment method is described in further detail in subsequent sections of the method.

Typically, children remained in the same classroom throughout each school year. At the start of time 3, children typically transitioned to a new classroom and/or a new teacher. At site 2, in keeping with school policy that strongly discouraged direct research contact with participants, children only participated in the observational and teacher report components and did not receive an individual interview. Each participating school received an honorarium to be used within the school for academic and/or staff development purposes.

### 2.3. Measures

#### 2.3.1. Observations of relational and physical aggression

Prior to data collection at each time point, observers spent considerable time in each participating classroom and on the playground to facilitate children's acclimation to their presence (Pellegrini, 1996). Many of the observations in the classrooms were conducted from a visually shielded observation booth attached to the room in order to diminish children's reactivity to the presence of the observers. However, observers also conducted observations in the classroom in order to hear and see the full peer interactions. When observers were in the presence of the children, in the classroom and always on the playground, observers used a "minimally responsive manner" (Pellegrini, 1996) and were specifically trained in controlling their movements, body language and nonverbal behavior to further diminish possible reactivity. Assessments of reactivity (frequency of looks, comments, questions to the observer) noted by observers when in the presence of children were low to nonexistent over the course of the study (less than 5% of the time; Atlas & Pepler, 1998). Order of children observed was determined randomly within each day of observation and no child was observed more than one time per day. Naturalistic observations were collected during each assessment period by a total of six trained graduate students/professional staff and 18 undergraduates. The majority of observers changed at each time period and rotated through different classrooms throughout the observation period. Both male and female graduate and undergraduate observers participated at each assessment period.

Naturalistic observations of children's relational and physical aggression were conducted during free-play using an adaptation of procedures developed by Ostrov and Keating (2004). Using a focal child approach, each child was observed for 10 continuous minutes per assessment by a trained observer who was located in an unobtrusive position that was close enough to hear children's conversations. Over an eight-week period, each child was observed eight times (a total of 80 min per child per time point). In sum, 320 min of observation (5.33 h) was collected for each focal child at each time period, which equates to a total of 29,120 min (485.33 h) of observation time for the present sample across the study. As in prior research, the manner in which the observations were collected was not amendable to kappa coefficient indices of reliability because observers did not specifically record intervals when the behaviors of interest were not present. The use of Intra-Class Correlations (ICC) has been suggested for such cases (Bartko, 1976; McGraw & Wong, 1996) and has been used in past studies (e.g., Goldstein, Arnold, Rosenberg, Stowe, & Ortiz, 2001; NICHD ECCRN, 2004; Ostrov & Keating, 2004; Ostrov et al., 2004). Evidence for favorable interrater reliability of this observational measure has been demonstrated in past research (i.e., ICCs of .75 for physical aggression, and .82 for relational aggression; Ostrov & Keating, 2004).

In the present investigation, training consisted of readings, discussions and coding of videotapes of children's aggressive behavior from past studies (Ostrov & Keating, 2004; Ostrov et al., 2004). Observers were required to reach an acceptable level of inter-rater reliability with the videotapes (ICCs > .80), pass a written multiple choice/matching exam (with discussion for any incorrect responses), and conduct several live practice reliability observations in the classroom and on the playground with the trainer. Assessments of reliability were conducted throughout the study to avoid observer drift problems (see Pellegrini, 1996).

During every 10-min measurement interval, observers assessed the focal child's display of the following behaviors (including a full description of what occurred and the sex of all children involved) in each incident: a) physical aggression (e.g., hitting, shoving, pulling, taking objects); and b) relational aggression (e.g., excluding from an activity, using friendship withdrawal as a threat; covering ears to signal ignoring). Separate behaviors were recorded based on temporal breaks in the interactions during the observation. Observers, for purposes of a different study, collected several additional social behaviors (e.g., prosocial behavior, play behavior, victimization) not reported here. Each child was observed on eight separate occasions and behaviors noted during observations were summed to yield total behavior scores for each time period. The average number of instances of relational aggression and physical aggression per ten-minute session was calculated for each child at each time point. Observations were also summed separately by the sex of the recipient peer (i.e., relational aggression to a male or to a female peer). Interrater reliability was assessed

at each time point on 10–15% of observations, spread across each eight-week observation period. Interrater reliability was assessed by using two observers recording behavior on the focal child at the same time. The observers stood as far apart as possible and did not discuss their observations. Each child was observed for reliability and each observer was tested for reliability across the entire study. Reliability was acceptable at each time point for relational aggression (ICCs ranged from .77 to .91) and for physical aggression (ICCs ranged from .86 to .92).

### 2.3.2. Peer assessment of aggression

Trained research assistants (graduate students or professional staff members) interviewed children individually for approximately 15 min in a quiet room/area in the preschool. Children provided verbal assent to participate prior to beginning the interviews. During the interviews, a peer report measure of children's relational and physical aggression was administered in addition to several other measures that were part of a larger project. At the close of the interview, children were thanked for their participation and escorted back to their classrooms.

An amended version of a previously developed peer-nomination instrument was used to assess peer reports of children's use of relational and physical aggression (Preschool Social Behavior Scale-Peer Form; PSBS-P, Crick et al., 1997). This modified instrument consisted of 3 items, one depicting the use of physical aggression, a second for relational aggression, and a third for prosocial behavior. The prosocial items served as positively-toned filler items for the present study. In the original version of the measure, children are asked to nominate up to three of their peers who fit the behavioral description presented in each item. Preschoolers' responses to the PSBS-P items have been shown to be reliable with Cronbach's alphas greater than .70 for both the relational and physical aggression scales. Factor analyses have also confirmed the existence of distinct factors for relational and physical aggression (Crick et al., 1997).

The measure was modified from a nomination to a rating format in the present investigation based on research suggesting that rating approaches may be more reliable (i.e., higher test–retest reliability) than nomination procedures with young children, as rating procedures require that each respondent provides data on all peers in the classroom (Asher & Dodge, 1996; Asher & Hymel, 1986; Asher, Singleton, Tinsley, & Hymel, 1979; Hymel, 1983; Olson & Lifgren, 1988). In addition, there is empirical evidence suggesting that the relation between sociometric nomination and rating methods is quite strong (see Bukowski & Hoza, 1989).

During each interview, children began with several practice items, designed to help children learn the response format for the peer-rating items. Specifically, children were presented with three age-appropriate pictures of food or toys (a teddy bear, hammer, and camera; shown in past studies to generate a range of responses; Bauer, 1993). Children were asked to consider each item, one at a time, and indicate acceptance of it. For example, the interviewer first held up a small teddy bear and asked, "Do you like to play with the teddy bear, yes or no?" If children responded affirmatively, they were further prompted with a follow-up question, "yes — a little or yes—a lot?" Children were taught to sort the items into three boxes labeled with appropriate pictures, "no" with a frown face (0), "yes — a little" with a picture of a neutral face (scored 1), or "yes — a lot" with a picture of a smiling face (scored 2).

Once children were familiar with the format of the ratings, they were asked to correctly identify each neutral expression, head and shoulder photo of their classmates (a method that has been commonly employed to elicit peer reports of social behavior and adjustment from young children, see Asher & Dodge, 1996; Asher et al., 1979; Denham et al., 2000; Hart et al., 2000; Hymel, 1983; Olson & Lifgren, 1988). Once children correctly identified each of their classmates, interviewers began to administer the ratings. Interviewers presented children with a photo of each classmate, one at a time, and asked if the child in the photo was physically aggressive (i.e., "Does Bobby hit, push or pinch other kids, yes or no?"), relationally aggressive (i.e., "Do you ever hear Suzie say, 'You can't come to my birthday party, you can't play', yes or no?"), and prosocial (i.e., "Does Pat share and help other kids, yes or no?"). If children responded affirmatively, they were further prompted with a follow-up question, "yes — a little or yes — a lot?" Children then placed the photos into appropriately labeled boxes, (i.e., a box with a red stop-sign indicating "no" and scored 0, a box with a yellow sign indicating "yes — a little bit" and scored 1, and a box with a green sign indicating "yes — a lot" scored 2).<sup>2</sup> The average rating that each child received from his/her peers for each item on the PSBS-P instrument was calculated and then standardized within each classroom at each time point.

<sup>2</sup> Traffic light colors were used here in order to avoid pairing a high amount of aggressive behavior with a smiling face. To make sure that the children understood the change in response colors we first used toy cars and a traffic light to demonstrate the differences between the colors and their associated meaning in the rating task (e.g., "green means I can move my car a lot, yellow means I can only move my car a little bit, red means stop, no go.").

### 2.3.3. Teacher ratings

Teachers completed several social behavior and peer rejection measures for each of their participating students at each time point. Only those measures assessing aggression and peer rejection were used in the present investigation. Both written and verbal instructions for completing these instruments were given to teachers. Once completed, teachers were thanked and given an honorarium for their participation.

### 2.3.4. Teacher ratings of aggression

The Preschool Social Behavior Scale-Teacher Form (PSBS-TF) developed in prior studies was used to assess teacher reports of children's aggression and prosocial behavior (Crick et al., 1997; Crick, Casas, & Ku, 1999). This instrument consists of 16 items, six of which assess relational aggression (e.g., "This child tries to get others to dislike a peer," "This child tells a peer they won't be invited to their birthday party unless s/he does what the child wants"); six of which assess physical aggression (e.g., "This child kicks or hits others"); and four of which assess prosocial behavior (e.g., "This child is helpful to peers"). The prosocial items were included in this instrument for ethical and methodological reasons (e.g., to avoid asking teachers negative questions only; to avoid negative response sets) and served as positively-toned filler items in the present research. Teachers rated the degree to which children exhibited relational and physical aggression against their peers using a 5-point rating scale (1=never or almost never true to 5=always or almost always true).

Evidence supports the favorable psychometric properties of the PSBS-TF (e.g., Bonica et al., 2003; Crick et al., 1997; Hart et al., 1998; Ostrov & Keating, 2004). Specifically, teachers' responses to this measure have been shown to be reliable, with Cronbach's alpha above .90 for both the relational and physical aggression scales. Also, factor analyses have confirmed the existence of distinct factors for relational and physical forms of aggression for several preschool samples. Similarly, in the present investigation, all sub-scales of this measure were reliable with Cronbach's alphas > .70.

### 2.3.5. Teacher ratings of peer rejection

Teacher reports of children's peer rejection using the two-item peer rejection scale from the previously described PSBS-TF were used to assess children's rejection by peers (Crick et al., 1997; Crick et al., 1999). Teachers indicated the degree to which children were (1) rejected by same-sex peers (e.g., "This child is rejected by same-sex peers") and (2) rejected by opposite-sex peers (e.g., "This child is rejected by opposite-sex peers") using the same five-point response format described for the PSBS-TF behavioral items. Favorable psychometric properties for this subscale have been demonstrated in prior research (e.g., Ostrov et al., 2004). In the present study, alphas were above .70 at all time points.

## 3. Results

In order to examine the study objectives, analyses were conducted to: a) evaluate the association between relational and physical aggression for each informant; b) examine the psychometric properties of the observational scheme used in this study; c) evaluate sex differences in relational aggression during early childhood; d) examine the stability of relational aggression in early childhood; and e) examine the associations among relational aggression, physical aggression, and future peer rejection during early childhood.

### 3.1. Association between relational and physical aggression

Correlation coefficients were computed in order to examine the concurrent associations between relational and physical aggression for each informant. For girls, the correlations between *observed* physical and relational aggression were not significant at any of the four time points ( $r$ 's ranged from .02 to .14). For boys, these correlations were significant at time 1 ( $r = .39, p < .01$ ) and time 2 ( $r = .61, p < .001$ ) but not at time 3 ( $r = -.05, ns$ ) or time 4 ( $r = .26, ns$ ).

For girls, *teacher reports* of physical and relational aggression were significantly correlated at time 1 ( $r = .68, p < .001$ ), time 2 ( $r = .36, p < .01$ ), time 3 ( $r = .43, p < .01$ ) and time 4 ( $r = .45, p < .001$ ). For boys this association was also significant at time 1 ( $r = .61, p < .001$ ), time 2 ( $r = .58, p < .001$ ), time 3 ( $r = .58, p < .001$ ), and time 4 ( $r = .69, p < .001$ ).

For girls, *peer reports* of physical and relational aggression were not significantly associated with one another at time 1 ( $r = .13, ns$ ), time 2 ( $r = .14, ns$ ), and time 3 ( $r = .27, ns$ ) but were significantly correlated at time 4 ( $r = .67, p < .01$ ). For boys, *peer reports* of physical and relational aggression were significantly associated at time 1 ( $r = .68, p < .01$ ) but were not at time 2 ( $r = .28, ns$ ), time 3 ( $r = .58, ns$ ), and time 4 ( $r = .59, ns$ ).

### 3.2. Psychometric properties of the observational measure of aggression

#### 3.2.1. Concurrent validity

We examined the concurrent validity of the observational scheme used in this study by conducting correlational analyses between observations of aggression and the teachers' ratings of relational and physical aggression (see Table 1). In general, for girls at each time point, observed relational aggression were significantly correlated with teacher-rated relational aggression with the exception that this association was not significant at time 2 ( $p < .06$ ). For boys, observers and teachers agreed significantly in their assessment of relational aggression at time 2. For girls' physical aggression observers' and teachers' assessments were significantly correlated at all time points except the last. For boys' physical aggression, observers and teachers agreed at all time points. At all time periods, correlations between peer reports of aggression and those of other informants did not significantly converge for either form of aggression (see Table 1). Thus, peer reports were not considered further in subsequent analyses.

#### 3.2.2. Predictive validity

To explore the predictive validity of the observation scheme the association between observed aggression and future teacher reports was evaluated. For girls, observed relational aggression at time 1 did not significantly predict teacher reports of relational aggression at time 4,  $r = .26, p < .08$ . For girls, time 2 ( $r = .36, p < .05$ ) and time 3 ( $r = .42, p < .01$ ) observed relational aggression significantly predicted teacher reported relational aggression at the end of the study (time 4). For boys, observed relational aggression at time 1 ( $r = -.09, ns$ ), 2 ( $r = .18, ns$ ), and 3 ( $r = .05, ns$ ) did not predict teacher reports of relational aggression at time 4.

For girls, time 3 ( $r = .53, p < .001$ ) observed physical aggression significantly predicted time 4 teacher reports of physical aggression whereas time 1 ( $r = .15, ns$ ) and time 2 ( $r = .19, ns$ ) observations did not. For boys, time 1 ( $r = .32, p < .05$ ), time 2 ( $r = .35, p < .01$ ), and time 3 ( $r = .45, p < .01$ ) observed physical aggression significantly predicted time 4 teacher reports of physical aggression.

### 3.3. Sex differences in aggression

To address our second objective, a series of repeated measures ANCOVAs using the children's observed aggression as the dependent variable were conducted. Age (in months) served as our covariate because of the relatively large range

Table 1  
Interrater agreement of relational and physical aggression for boys and girls across four time points

Raters	Boys		Girls	
	Physical	Relational	Physical	Relational
<i>Peer and teacher<sup>a</sup></i>				
Time 1	.44	.02	.47*	.10
Time 2	.32	.29	.69*	.14
Time 3	.76*	.06	.17	-.43
Time 4	-.05	-.51	.17	-.31
<i>Peer and observer<sup>b</sup></i>				
Time 1	.79***	.35	.30	.10
Time 2	-.05	.11	.67***	.30
Time 3	.28	.51	.37	-.09
Time 4	-.16	.05	.18	.01
<i>Observer and teacher<sup>c</sup></i>				
Time 1	.44**	.21	.55***	.55***
Time 2	.35*	.44**	.51***	.27
Time 3	.50***	.24	.56***	.44**
Time 4	.44**	.13	.13	.41**

<sup>a</sup>Sample sizes ( $n$ 's) ranged from 7 – 25; <sup>b</sup>sample sizes ( $n$ 's) ranged from 8 – 25; <sup>c</sup>sample sizes ( $n$ 's) ranged from 34 – 52.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

of ages of the children in our sample. Given our a priori predictions and the relative independence of the two forms of aggression, we analyzed relational and physical aggression in separate models.

### 3.3.1. Relational aggression

Mean (and *SD*) scores for relational aggression are presented in the upper portion of [Table 2](#) for boys and girls and sex of peer recipients of aggression. A 2 (Focal child sex: boys and girls) × 2 (Peer recipient sex: male and female peers) × 4 (Time points) ANCOVA was conducted with the last 2 variables serving as within-participant factors and relational aggression serving as the dependent variable. Child's age in months at time 1 served as the covariate and thus the reported means are adjusted. A main effect for focal child sex emerged,  $F(1, 86) = 5.92, p < .05, \eta^2 = .06$ . Girls ( $M = .12; SD = .01$ ) were more relationally aggressive than boys ( $M = .08; SD = .02$ ). A significant peer recipient sex × focal child sex interaction was obtained,  $F(1, 86) = 13.22, p < .001, \eta^2 = .13$ . Simple effects tests revealed that girls were more relationally aggressive to female peers than were boys,  $F(1, 86) = 11.74, p < .001, \eta^2 = .12$  (see [Table 2](#)). No other significant effects emerged.

### 3.3.2. Physical aggression

The mean (and *SD*) physical aggression scores are presented in the lower portion of [Table 2](#) by time period and focal child sex. A 2 (Focal child sex: boys and girls) × 2 (Peer recipient child sex: male and female peers) × 4 (Time points) ANCOVA with repeated measures on the last 2 factors was conducted on observed physical aggression scores. Age (in months) at the first time point served as the covariate. A main effect for focal child sex was revealed,  $F(1, 85) = 22.05, p < .001, \eta^2 = .20$ . Specifically, boys ( $M = .18; SD = .02$ ) were more physically aggressive than girls ( $M = .07; SD = .02$ ).

A time × focal child sex interaction emerged,  $F(3, 86) = 2.65, p < .05, \eta^2 = .03$ . Simple effect tests revealed that boys were more physically aggressive than girls at time 1,  $F(1, 87) = 14.13, p < .001, \eta^2 = .14$ , at time 2,  $F(1, 87) = 17.10, p < .001, \eta^2 = .16$ , and at time 3,  $F(1, 88) = 7.97, p < .001, \eta^2 = .08$ . At time 4, boys were not significantly more physically aggressive than girls,  $F(1, 88) = 3.14, p < .08, \eta^2 = .03$ . (see means in [Table 2](#)). A peer recipient sex × focal child sex interaction was revealed,  $F(1, 86) = 25.39, p < .001, \eta^2 = .25$ . Simple effects tests revealed that boys ( $M = .95; SD = .10$ ) were more physically aggressive to male peers than were girls ( $M = .22; SD = .09$ ),  $F(1, 86) = 30.81, p < .001, \eta^2 = .26$ . No other significant effects emerged.

We next examined the extent to which aggressive girls would have been unidentified if relational aggression had not been assessed in the current study. Specifically, we identified extreme groups of aggressive girls (i.e., those who were physically aggressive only, relationally aggressive only, and physically plus relationally aggressive) using a criterion of one standard deviation above the sample mean, a commonly used criterion in previous research (e.g., [Crick, 1997](#); [Crick & Grotpeter, 1995](#)). The findings indicate that without the inclusion of relational aggression we would have failed to identify 42% ( $n = 5$ ) of the more highly aggressive girls at time 1, 36% ( $n = 4$ ) of the more highly aggressive girls at time 2, 50% ( $n = 5$ ) of the more highly aggressive girls at time 3, and 46% ( $n = 6$ ) of the more highly aggressive girls at time 4.

Table 2  
Descriptive statistics for aggression subtypes

Peer recipient sex	Relational aggression				
	Girls		Boys		
	Mean	<i>SD</i>	Mean	<i>SD</i>	
Male	1.05	.21	1.28	.24	
Female	2.12	.25	.83	.28	
Time	Physical aggression				
	Girls		Boys		
	Mean	<i>SD</i>	Mean	<i>SD</i>	
1	.15	.05	.45	.15	
2	.11	.04	.35	.05	
3	.19	.05	.41	.19	
4	.14	.03	.22	.14	

Note. Means are adjusted (age at time 1 served as the covariate). Means for relational aggression are composites across time.

### 3.4. Stability of aggression

To address our third objective, examination of the stability of relational and physical aggression across the four time points, a series of bivariate correlations were computed using observed and teacher reports of aggression at times 1 and 4 (computed separately by focal child sex).

#### 3.4.1. Relational aggression

For girls, observed relational aggression was stable from time 1 to 4,  $r = .39, p < .01$ . Teachers' ratings of girls' relational aggression were not significantly associated, from time 1 to 4,  $r = .28, p < .07$ . For boys, observed relational aggression was not stable across the study,  $r = .07, ns$ . In addition, teachers' ratings of boys' relational aggression was not significantly stable across the study,  $r = .22, ns$ .

#### 3.4.2. Physical aggression

For girls, observed physical aggression was stable from time 1 to time 4,  $r = .42, p < .01$ . For girls, teacher reported physical aggression was not stable from time 1 to 4,  $r = .17, ns$ . For boys, observed physical aggression was not significantly stable from time 1 to 4,  $r = .24, ns$ . For boys, teacher reported physical aggression was stable across the study,  $r = .46, p < .01$ .

### 3.5. Association between aggression and peer rejection

To address the fourth objective, we examined the association between relational and physical aggression and peer rejection using a composite (average across time) measure of teacher reported peer rejection. Teacher reports were used here because the peer reports were not as reliable at each of the time points and teachers have been shown to be accurate informants concerning sociometric status during early childhood (see Wu, Hart, Draper, & Olsen, 2001). An average score was calculated based on each child's score on the peer rejection items of the PSBS-TF at times 2, 3, and 4. This procedure yielded an acceptable internal consistency alpha for this composite ( $\alpha = .77$ ). Teachers' ratings of time 1 rejection were not included because the main question was concerned with the prediction of *future* peer rejection. Given our a priori predictions, analyses were conducted separately for girls and boys.

#### 3.5.1. Relational aggression

For girls, observed relational aggression at time 1 significantly predicted future teacher reported peer rejection,  $r = .25, p < .05$ . For boys, observed relational aggression at time 1 did not significantly predict future peer rejection,  $r = .24, p < .07$ .

#### 3.5.2. Physical aggression

For girls, observed physical aggression at time 1 did not predict future peer rejection,  $r = .12, ns$ . For boys, observed physical aggression at time 1 did significantly predict future teacher reported peer rejection,  $r = .46, p < .01$ .

#### 3.5.3. Unique association between relational aggression and peer rejection

Finally, to test the effects of relational aggression at time 1 in predicting peer rejection above and beyond the effects of physical aggression at time 1, a hierarchical multiple regression was computed with age entered at step 1, observed physical aggression at time 1 entered at step 2, and observed relational aggression at time 1 entered at step 3. Teacher reported peer rejection at time 4 served as the dependent variable because time 4 peer rejection is a more conservative estimate of future peer rejection. In keeping with prior analyses and our a priori predictions, the equations were computed separately for girls and boys. The model results approached significance only for girls,  $\Delta F(1, 47) = 3.75, p < .06, \Delta r^2 = .07$ , indicating that it might be fruitful to investigate relational aggression ( $\beta = .29$ ) as potentially accounting for variance in the prediction of future peer rejection for girls even after controlling for age and physical aggression.

## 4. Discussion

This research significantly extends our knowledge of aggression by providing the first prospective look at relational aggression during early childhood. Findings indicated general support for our hypotheses. First, findings from this study

provided additional evidence for the reliability and concurrent validity of the observational scheme utilized (from Ostrov & Keating, 2004) and, more importantly, provided the first evidence for the favorable predictive validity of this scheme (this was particularly true for relational aggression for girls and physical aggression for boys). This observational scheme had never been used before with participants as young as 2-1/2 years of age and the present results indicate that observers can reliably observe both physical and relational aggression among very young preschoolers.

To date, findings regarding sex differences in relational aggression during early childhood have been mixed with some studies demonstrating that girls are more relationally aggressive than boys and other studies finding no sex differences (for a review see Crick, Ostrov, Appleyard, Jansen, & Casas, 2004). Typically, obtained sex differences have varied as a function of informant type. The most consistent sex differences have been obtained with observational methods, (McNeilly-Choque et al., 1996; Ostrov & Keating, 2004; Ostrov et al., 2004; cf. McEvoy et al., 2003), an assessment approach that is less likely to be influenced by gender stereotypes and other types of informant biases than teacher- or peer-report methods. As a result, observational methods are commonly considered to be the “gold standard” for objective measurement of social behavior. This study indicates agreement across the informants but suggests that peer informants may not be as valid as observer or even teacher reports of young children’s aggressive behavior. Future research is needed to clarify the utility of these methods. The present results add to the small, yet growing, body of evidence that girls are indeed significantly more relationally aggressive with peers than boys when relatively objective assessments are employed.

Findings regarding sex differences also indicated that girls were more relationally aggressive with female peers than were boys whereas boys were more physically aggressive to male peers than were girls. These findings are not surprising given the gender-segregated nature of the early childhood play milieu and are consistent with sexual selection theory (Maccoby, 1998; Ostrov & Keating, 2004; Pellegrini & Long, 2003). That is, given that young girls are more likely to be relationally aggressive than boys in general and also given that young girls’ social interaction partners are most likely to be girls, it stands to reason that girls would be more likely than boys to target their relationally aggressive behaviors toward other girls. Similarly, given that boys are more likely to be physically aggressive during the preschool years relative to girls and that preschool boys’ interaction partners are most likely to be boys, it is not surprising that boys would be more likely than girls to target their physically aggressive acts toward other boys. Although rarely pursued in past studies, the present results highlight the importance of assessing the sex of the aggressor as well as that of the target in future research, which often can only be studied using systematic observations (Pellegrini, 2001a). Such information may be particularly informative for understanding the nature and development of bully-victim dyads and interactions. These findings further suggest that relationally aggressive behaviors directed at male peers and physically aggressive behaviors directed at female peers are gender atypical during early childhood and may be associated with greater adjustment problems. This point should be addressed in future research.

Evaluation of the utility of physical versus relational aggression for identifying aggressive girls showed that we would have failed to identify between 36% and 50% of aggressive young girls (depending on the assessment period) if we had not included assessments of relational aggression in this study. These results are consistent with those obtained for older, elementary-school children (e.g., Crick & Grotpeter, 1995) and they add to existing studies by pointing out the significance of the study of relational aggression for identifying aggressive girls at much younger ages.

The present findings provide the first evidence that individual differences in observed and teacher-rated relational aggression are moderately stable across an 18-month time period in early childhood. These findings are impressive given that different independent observers and teachers contributed data at these different time periods. Interestingly, the stability of relational aggression in this sample was obtained for girls, but not for boys. This suggests that relationally aggressive behavior patterns may begin to crystallize at relatively young ages for girls. If so, it may be particularly important for the healthy development of females for prevention and intervention efforts targeting relational aggression to be initiated during early childhood. Future studies are needed that evaluate when (or if) individual differences in boys’ relational aggression becomes stable over time and also whether individual differences in girls’ relationally aggressive behaviors, apparent during preschool, remain stable during the early school years (e.g., during the transition to kindergarten). In contrast to relational aggression, findings for individual differences in physical aggression, depending on the rater, indicated that both girls and boys demonstrated some stability in these behaviors during the preschool years.

The future social–psychological risk associated with young children’s engagement in relational versus physical aggression was examined for the first time in the present research. Results showed that observed relational aggression at the beginning of the study predicted peer rejection 1-1/2 years later for girls and tended to for boys. In contrast, observed physical aggression at the beginning of the study predicted peer rejection 1-1/2 years later for boys, but not

for girls. Further, the findings suggest relational aggression should be further examined as a predictor of future peer rejection above and beyond physical aggression for girls. This is the first evidence that study of relational aggression may be particularly important for understanding social–psychological risk for young girls whereas physical aggression tells most of the story for young boys, findings that are consistent with prospective results obtained with older children (e.g., Crick, 1996; Crick et al., *in press-a, b*) and concurrent results obtained with young children (Crick et al., 1997). Future studies are needed that expand the range of social–psychological adjustment outcomes assessed during early childhood in keeping with research conducted with older children showing that relational aggression is associated with a multitude of adjustment problems including ADHD (e.g., Blachman & Hinshaw, 2002; Zalecki & Hinshaw, 2004), borderline personality disorder features (e.g., Crick, Murray-Close, & Woods, 2006), disruptive, oppositional behavior (Hipwell, Loeber, Stouthamer-Loeber, Keenan, White, & Krone, 2002; Prinstein et al., 2001) and internalizing problems (Murray-Close, Ostrov, & Crick, *in press*). In addition, future theory and research is needed to explore if there are specific and unique adjustment outcomes for relational aggression. Future research is also needed to explore the processes by which relational aggression leads to psychopathology. It will also be important to investigate what level of relational aggression is considered harmful across development and what other developmental processes (e.g., theory of mind, delay of gratification, impulsivity) may mediate or moderate these effects. Finally, the present findings further indicate the important role that physical aggression plays in the lives of young children, particularly boys (see Campbell, Shaw, & Gilliom, 2000; NICHD ECCRN, 2004). Clearly, it will be important to assess both relational and physical subtypes of aggression in future studies targeting the developmental outcomes of early childhood aggression (for ideas consistent with this see NICHD ECCRN, 2004). Given the recent literature on bistrategic children (i.e., children that use both prosocial and coercive behaviors, see Hawley, 2003) future research should evaluate the moderating role that prosocial behavior may play in the association between relational aggression and peer rejection and other social–psychological adjustment problems.

#### 4.1. *Limitations*

Despite the innovative and time intensive nature of our research design, several limitations exist. First, our sample size, although large relative to past observational studies (e.g., McEvoy et al., 2003; Ostrov & Keating, 2004), may have been insufficient for testing various effects. Future research with larger samples will be needed to replicate and extend the present longitudinal findings. In addition, despite having multiple informants (i.e., teacher, peer, and observer), we do not have any indication of how the participants in our study behaved at home with children in the neighborhood, with their siblings or parents. Recent studies have documented the importance of the sibling (Stauffer and DeHart, 2005) and friendship (Burr, Ostrov, Jansen, Cullerton-Sen, & Crick, 2005; Johnson & Foster, 2005; Sebanc, 2003) relationship for the development of relational aggression during early childhood. Clearly, additional research is needed to explore the role of relational aggression within these additional close relationship contexts. Third, our findings with this university-based sample may not generalize to children from low SES backgrounds. However, in contrast to the physical aggression literature (see Dubow & Ippolito, 1994) past research has provided evidence that children from higher SES backgrounds and presumably some social–cognitive advantages (e.g., language capacity) may be at greater risk for displaying relationally aggressive behavior (see Bonica et al., 2003; McNeilly-Choque et al., 1996). Therefore, it is important to continue to study the role of SES in future studies during early childhood. Fourth, the age range in the present study was large and did not permit a more specific investigation of the potential qualitative differences between a 3-year-old and a 5-year-olds display of relational aggression. Future research should include a more restricted age range to overcome this issue. A final limitation is that our study, although longitudinal in nature, may not have started prior to the onset of the relationally aggressive behavior; future research will be needed to explore the specific timing and/or onset of these behaviors during toddlerhood. Moreover, in the present study we do not report on the children's development beyond age 5 and more information is needed to understand how relational and physical aggression exhibited during early childhood are predictive of academic and social functioning during the important transition into kindergarten (Rimm-Kaufman, Pianta, & Cox, 2000).

#### 4.2. *Conclusion*

In conclusion, based on over 29,000 min of observation on 91 preschoolers we have documented that relational aggression between peers may be reliably and validly observed in early childhood free play contexts. This study helps

to clarify past mixed findings in the developmental literature, by documenting sex differences in relationally aggressive behavior using a relatively objective assessment tool (naturalistic observations). Additional replication of these sex differences are needed using multiple informants and methods across time. Future research is needed to explore how older preschoolers may model and reinforce relationally aggressive behaviors for younger children in multi-age preschool classrooms and in home contexts (i.e., siblings). In the first test of stability during the early childhood period, relational aggression was found to be stable for girls. Relational aggression in peer relationships tended to be predictive of future peer rejection even when controlling for the effects of physical aggression, but only for girls. Developmental researchers must continue to study the role of relational aggression during early childhood, paying particular attention to the mechanisms of action and possible developmental antecedents of relational aggression for young children.

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