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Temperament in early childhood and peer interactions in third grade: The role of teacher–child relationships in early elementary grades

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Abstract

Children's interactions with peers in early childhood have been consistently linked to their academic and social outcomes. Although both child and classroom characteristics have been implicated as contributors to children's success, there has been scant research linking child temperament, teacher–child relationship quality, and peer interactions in the same study. The purpose of this study is to examine children's early temperament, rated at preschool age, as a predictor of interactions with peers (i.e., aggression, relational aggression, victimization, and prosociality) in third grade while considering teacher–child relationship quality in kindergarten through second grades as a moderator and mediator of this association. The sample ($N = 1364$) was drawn from the NICHD Study of Early Child Care and Youth Development. Results from structural equation models indicated that teacher–child conflict in early elementary grades mediated links between children's temperament and later peer interactions. Findings underscore the importance of considering children's temperament traits and teacher–child relationship quality when examining the mechanisms of the development of peer interactions.

Keywords: Temperament, Teacher–child relationships, Peer interactions, Structural equation modeling

1. Introduction

Aspects of children's interactions with peers in early childhood have been consistently linked to their social and academic outcomes (Ladd et al., 1996; Ladd and Price, 1987; Rubin et al., 2006). Children with more positive peer interactions tend to enjoy school more and engage in more adaptive behaviors in school (e.g., volunteering to answer questions and working cooperatively with classmates) than children with more negative peer interactions. Through positive peer interactions, children appear more likely to gain a sense of belonging and security that promotes social and academic development (Rubin et al., 2006). Negative peer interactions (e.g., aggression and victimization), in contrast, may hinder social skill development and limit adaptive classroom engagement (Birch & Ladd, 1997). More aversive peer interactions have also been associated with greater loneliness (Coplan et al., 2007; Dunn et al., 2007), lower academic engagement and self-competence (Buhs, 2005), and lower levels of school liking (Birch and Ladd, 1997; Coplan et al., 2007). Children's relationships with teachers are another source of social support available to young children that are consistently associated with school adjustment (e.g., Hamre & Pianta, 2001) and linked to the quality of children's interactions with peers (e.g., Hughes and Chen, 2011; Mercer and DeRosier, 2008). The purpose of this study is to extend existing research examining children's early temperament as a predictor of interactions with peers in elementary school contexts by exploring the extent to which children's relationship quality with teachers in kindergarten through second grade moderates and mediates links to subsequent peer interactions.

Bioecological theory articulates multiple contexts of development (e.g., home and school), where children's consistent, bi-directional interactions (proximal processes) with people in those contexts pave the way for subsequent outcomes (Bronfenbrenner & Morris, 2006). The nature and quality of proximal processes are informed by both children's characteristics (e.g., temperament) and features of the environment (e.g., parent and teacher behavior); together, these result in adjustment or maladjustment in important developmental domains such as children's interactions with peers. However, teacher–child relationship quality as a feature of the classroom context by which child temperament and peer interactions are linked has rarely been examined (see Arbeau, Coplan, & Weeks, 2010; Griggs, Gagnon, Huelsman, Kidder-Ashley, & Ballard, 2009). This area of inquiry is critical, as children spend a significant portion of the day in classrooms once they begin formal school.

Research points to links between children's temperament and their relationships and interactions with peers and teachers. For example, certain temperament characteristics (e.g., higher anger/frustration and activity and lower inhibitory control) have been negatively associated with children's prosocial behavior, peer acceptance (Sterry et al., 2010; Szewczyk-Sokolowski et al., 2005), and social competence (Rudasill & Konold, 2008). In addition, growing evidence indicates that children's temperament predicts teacher–child relationship quality such that more shyness (Rudasill, 2011; Rydell et al., 2005) and anger (Justice, Cottone, Mashburn, & Rimm-Kaufman, 2008) are associated with poorer quality. Similarly, a constellation of temperament characteristics indicative of difficulty with social interaction (higher anger/frustration, activity, and approach and lower inhibitory control) predicted teacher–child conflict in fourth through sixth grades (Rudasill, Reio, Stipanovic, & Taylor, 2010). Effortful control (i.e., higher levels of attention focusing and inhibitory control), on the other hand, has been associated with better teacher–child relationship quality (Rudasill and Rimm-Kaufman, 2009; Valiente et al., 2008).

Some studies have used a child by environment model to examine teacher–child relationship quality as a moderator of associations between child characteristics and social outcomes (Burchinal et al., 2002; Hamre and Pianta, 2001), and two studies have been specifically focused on teacher–child relationship quality as a moderator between temperament and children's social outcomes (Arbeau et al., 2010; Griggs et al., 2009). Arbeau et al. (2010) examined links between shyness and social adjustment (i.e., loneliness, school avoidance, and peer behavior) in first grade moderated by teacher–child relationship quality. Their findings suggested that more teacher–child closeness mitigated links between shyness and being anxious or asocial with peers. Griggs et al. (2009) investigated teacher–child relationship quality as a moderator between difficult temperament and peer play behavior in preschool and found that more difficult children's risk for disrupted play was attenuated when teacher–child conflict was low. These studies suggest that high-quality teacher–child relationships may buffer children with more aversive temperaments from having negative peer interactions; the current study extends this work by examining teacher–child relationship quality in early elementary grades as a moderator between difficult temperament and peer interactions in third grade.

There is also evidence supporting indirect connections between children's temperament and peer interactions via teacher–child relationship quality. Research in this area has linked classroom behavior problems with poor teacher–child relationship quality (Baker, 2006; Farmer et al., 2007; Henricsson and Rydell, 2004), teacher–child relationship quality with children's interactions with peers (Doumen et al., 2008; Farmer et al., 2011; Howes, 2000), and longitudinal cross-lagged associations between child behavior (e.g., aggression), peer interactions, and teacher–child relationships (Leflot et al., 2011; Mercer and DeRosier, 2008). In such contexts, children with characteristics that make building positive peer relationships more difficult may also struggle to form positive teacher–child relationships, likely further hindering positive interactions with peers and increasing the likelihood of aversive interactions. Thus, another goal of the current study is to further examine the extent to which teacher–child relationship quality may mediate associations between children's temperament and peer interactions.

1.1. Temperament

Temperament is the nature of an individual's affect, behavior, and attention toward stimuli in the environment; it emerges from complex interactions between biology and environment (Shiner et al., 2012), and is multi-dimensional and developmentally dynamic (Kagan and Fox, 2006; Rothbart, 2011; Thomas and Chess, 1977). It refers to differences in reactivity and regulation representing the affective, activational, and attentional core of personality (cf. Rothbart & Bates, 2006). Reactivity refers to the intensity and dormancy of an individual's responses to the environment; children who are highly reactive have quicker, more intense responses to environmental stimuli (e.g., anger). For example, children who are higher in reactivity may become more easily frustrated and display that frustration forcefully (e.g., yelling and throwing things). They may also be overly excited about upcoming events, showing eager anticipation (e.g., approach). Regulation refers to an individual's ability to control reactions to environmental stimuli (Rothbart & Bates, 2006). Children who are highly regulated are more likely to curb negative impulses (such as hitting) in exchange for behavior that is more appropriate for social interactions (such as talking). Reactivity and regulation are both complicit in children's behavior (Rothbart & Jones, 1998). For example, a child's natural tendency to show anger/frustration (reactivity) may be exacerbated by poor inhibitory control (regulation). Rothbart and Jones (1998) note that children with a combination of high reactivity and low regulation are "undercontrolled" and are likely to struggle in an academic setting. Of particular importance when considering children's interactions with peers are temperament dimensions that may impede successful social processes such as anger/frustration, activity level, and approach (for reactivity), and inhibitory control (for regulation). The combination of high anger/frustration, activity level, and approach, and low inhibitory control has been termed "difficult temperament" (cf. Rudasill et al., 2010), and this term is similar to the original conceptualization of difficult temperament put forth by Thomas and Chess (1977), although Thomas and Chess did not include a regulatory component.

1.2. Temperament and peer interactions

Certain temperament characteristics (i.e., those indicative of high reactivity and low regulation) seem to put children at risk for the development of more negative interactions with peers (Eisenberg et al., 1995; Eisenberg et al., 1997; Walker et al., 2001). Low levels of inhibitory control and high levels of activity and anger/frustration, for example, may predispose children to more aggressive behavior (Sterry et al., 2010; Walker et al., 2001). This type of impulsive behavior and attendant aggression is typically undesirable in peer interactions and is a risk factor for social maladjustment (Gleason et al., 2005; Ladd and Burgess, 1999).

Children with temperamental qualities marked by low reactivity and moderate to high regulation (e.g., low activity level and high inhibitory control), in contrast, often engage in more social interactions and display interpersonal skills that promote socially desirable outcomes and more adaptive (e.g., prosocial) peer interactions (Corapci, 2008; Eisenberg and Fabes, 1992; Gleason et al., 2005; Rubin et al., 2002). In their investigation of reactive and regulatory temperament constructs and peer relationships, Goldsmith, Aksan, Esgender, Smider, and Vandell (2001) examined children's negative affectivity (i.e., sadness, anger, fearfulness, and shyness), positive affectivity (i.e., high activity and approach), and effortful control (i.e., inhibitory control and attentional focusing). They found that, when compared to children with lower levels of approach and effortful control, more approach-oriented children with higher levels of effortful control had more positive peer interactions (i.e., higher peer acceptance, lower peer rejection, and lower peer victimization). Overall, literature indicates that temperament characteristics indicative of lower reactivity and higher regulation may not only help children develop more positive peer interactions but also support children in developing interpersonal skills that facilitate the formation and maintenance of positive peer interactions across childhood and adolescence. Thus, we expect that children's temperament traits indicative of difficulty would be positively associated with aggression, relational aggression, and victimization in interactions with peers, and negatively associated with prosocial behavior with peers.

1.3. Teacher–child relationship quality

High-quality teacher–child relationships, marked by high closeness and low conflict, are those in which the child views the teacher as a secure base, and the teacher and child seem to be in tune with each other (Pianta, 1999). High-quality teacher–child relationships have frequently been linked to positive outcomes throughout preschool and elementary grades. Low quality teacher–child relationships, marked by low closeness and high conflict, are those where the child and teacher are discordant. Poor teacher–child relationships have been reliably associated with children's negative outcomes through elementary grades (e.g., Birch and Ladd, 1998; Hamre and Pianta, 2001; Pianta et al., 1995). Although the quality of teachers' relationships with children in early childhood is typically measured via teacher report, teacher–child relationship quality is predicated on both characteristics of the child and the teacher (O'Connor, 2010). Evidence for the role of child characteristics comes from longitudinal studies that have revealed variability between children and consistency within children in teacher–child relationship quality across teachers (O'Connor, 2010; Rudasill, 2011). Likewise, consistency within teachers' ratings of different children suggests that teacher characteristics also contribute to teacher–child relationship quality (Rudasill, Rimm-Kaufman, Justice, & Pence, 2006).

1.4. Potential links to peer interactions

Research findings consistently connect teacher–child relationship quality to children's concurrent and subsequent interactions with peers (e.g., Howes, 2000; Hughes and Chen, 2011; Mercer and DeRosier, 2008; Palermo et al., 2007; Troop-Gordon and Kopp, 2011; Wentzel, 2002). Howes (2000), for example, found that teacher–child conflict in preschool was a significant and negative predictor of teacher-rated social competence with peers in second grade. Hughes and Chen (2011) found links between teacher–child relationship quality and peer status both concurrently and longitudinally from second through fourth grades. Leflot et al. (2011) examined bi-directional associations between peer social preference and teacher support in second graders and found that nominations of social preference in the fall of second grade predicted teacher-reported support at the end of the school year. Similarly, Mercer and DeRosier (2008), in a study of peer rejection, teacher preference, and child aggression across third and fourth grades, found that higher teacher preference at the beginning of third grade predicted lower peer rejection at the end of third grade and lower peer rejection at the end of third grade predicted higher teacher preference at the beginning of fourth grade. With older students, Wentzel (2002) found that teachers' negative feedback to sixth-grade students was linked to poorer peer interactions. Collectively, these findings support the contention that teacher–child relationships have important linkages to children's interactions with peers. The potential processes that may underlie these contributions have, however, been less thoroughly explored.

1.4.1. Potential processes: moderation

Applying a child by environment model, teacher–child relationship quality can be conceptualized as providing a contextual support, buoying a child's likelihood of engaging in positive peer interactions. In this conceptualization, teacher characteristics (e.g., motivations and personality) are the primary drivers of teacher–child relationship quality, and, as such, high-quality relationships may be available for children who present more challenging behavior (Griggs et al., 2009; Hughes et al., 1999). In this vein, some recent research attention has focused on a potential "invisible hand" in the classroom in the development of children's peer interactions (e.g., Farmer et al., 2011). The notion of the invisible hand is that peer interactions in school occur within classrooms where teachers shape the overall social

ecology; teachers establish and enforce rules for interactions between children and facilitate opportunities for children to build social skills (Farmer et al., 2011). Teachers who tend to foster relationships that are low in conflict and high in closeness with their students may thus function as a source of support and resilience for children with difficult temperament. Thus, whereas difficult temperament places children at-risk for problematic peer interactions, teachers who tend to form closer, more positive relationships with children may attenuate this linkage (i.e., perform a moderating role), perhaps by providing a supportive social context for the development of more adaptive and less negative interactions (i.e., an "invisible hand" supporting more positive interactions). That is, previous experience with positive teacher–child relationships may facilitate positive peer interactions for children with difficult temperament. Szewczyk-Sokolowski et al. (2005; p. 391) posited that "relationship histories" may be most important for peer interactions of children with more difficult temperament. Indeed, emerging work suggests that high-quality teacher–child relationships may be particularly beneficial to children who are at-risk for social difficulties due to shyness (Arbeau et al., 2010) or difficult temperament (Griggs et al., 2009), and function as a source of support that may ameliorate or attenuate behavior problems across elementary grades (Maldonado-Carreño & Votruba-Drzal, 2011).

1.4.2. Potential processes: mediation

It also appears likely that previous teacher–child relationship quality may be a mechanism by which characteristics associated with difficult temperament are linked to poorer peer interactions. In this conceptualization, child characteristics are the primary drivers of teacher–child relationship quality, and the traits that cultivate poor relationships with teachers are reinforced and sustained in interactions with peers. Children with characteristics indicative of difficult temperament (such as low regulation) appear consistently more likely to have teacher–child relationships characterized by high conflict, low closeness, or both (Baker, 2006; Doumen et al., 2008; Henricsson and Rydell, 2004; Rudasill, 2011; Rudasill et al., 2010). Thus, it may be that difficult temperament negatively impacts teacher–child relationships, and these poor relationships provide suboptimal social experiences for children; in turn, these experiences inform children's interactions with others, such as peers. Over time, then, these less supportive relationships may facilitate negative patterns of interactions (Rimm-Kaufman & Pianta, 2000). On the other hand, high-quality teacher–child relationships may foster children's positive patterns of interactions. Given the idea of the invisible hand, it may be that the link from temperament to teacher–child relationship quality is one mechanism by which children with difficult temperament develop negative interaction patterns with peers (i.e., a mediating role).

1.5. The present study

In this study, we examined the potential moderating and mediating role of prior, cumulative teacher–child relationship quality (from kindergarten through second grade) on the association between early difficult temperament and peer interactions in third grade. We tested a moderating model in which we hypothesized that children with more difficult temperament, but who also had higher quality teacher–child relationships, would display better subsequent interactions with peers than similar children with lower quality teacher–child relationships. We also tested a mediating model in which we hypothesized that children with more difficult temperament would have poorer relationships with teachers and interactions with peers, and that the association between temperament and later peer interactions would be at least partly explained by teacher–child relationship quality.

1.5.1. Gender, educational background, and previous peer interactions at preschool age

Boys' and girls' peer interactions differ in important ways. Boys' peer interactions tend to occur in large social networks, whereas girls' interactions typically develop in smaller groups (Parker and Asher, 1993; Zarbatany et al., 2000). Boys and girls may also differ in the types of aggressive behaviors they tend to display. Some findings (though not all, see Salmivalli & Kaukiainen, 2004, for dissent) indicate that girls may engage in more relational aggression (behavior intended to damage relationships) than boys, whereas boys tend to engage in more overt aggression (hitting, pushing, etc.) than girls (e.g., Crick & Grotpeter, 1995). There is also evidence that girls in elementary school tend to be slightly more prosocial than boys (Eisenberg & Fabes, 1998). Taken together these factors suggest that examinations of links between temperament and peer interactions should control for potential gender effects and include gender as a moderator.

In testing links between temperament and social outcomes, it is also important to control for the primary caregiver's (typically mother's) educational background. Parents provide a number of supports for children's interactions at school (e.g., socialization of emotional mediators and emotional regulation strategies) that might be related to children's patterns of interactions (Parke & Buriel, 2006). The level of educational background, in particular, may be an indicator of how well the parents are able to support adaptive functioning in the school context (Pettit, Yu, Dodge, & Bates, 2009). Finally, it is important to account for earlier peer interactions in examinations of later peer interactions to better understand associations with intervening variables.

In the present study, peer interactions were measured in third grade because, by this grade level, children have typically established relatively consistent patterns of peer interactions and several years' experience with teacher–child relationships (Ladd, 1999). Teacher–child relationship quality was rated by kindergarten, first-grade, and second-grade teachers because research suggests that these early relationships may impact children's academic and social trajectories (e.g., Hamre and Pianta, 2001; Howes, 2000; Ladd et al., 1999; Maldonado-Carreño and Votruba-Drzal, 2011). Third-grade teachers provided reports of children's interactions with peers for four reasons: (a) this point in middle childhood is when children have established relatively consistent patterns of peer interactions (Ladd, 1999), (b) third grade immediately succeeds the timeframe during which teacher–child relationship quality was assessed, (c) using third-grade teacher reports reduces the likelihood that the same teacher reported on teacher–child relationship

quality and children's peer interactions, and (d) teachers are reliable raters of peer interactions when children are in primary grades (Ladd & Kochenderfer – Ladd, 2002).

We examined the following research questions:

a) Do difficult temperament and early teacher–child relationship quality predict teacher ratings of the quality of children's peer interactions in third grade, after controlling for gender, primary caregiver educational attainment, and peer interactions at preschool age?

b) Does early teacher–child relationship quality moderate the association between children's difficult temperament and children's peer interactions in third grade, after controlling for gender, primary caregiver educational attainment, and peer interactions at preschool age?

c) Does early teacher–child relationship quality mediate the association between children's difficult temperament and children's peer interactions in third grade, after controlling for gender, primary caregiver educational attainment, and peer interactions at preschool age?

2. Method

2.1. Participants

Participants were drawn from the National Institute for Child Health and Human Development Study of Early Child Care and Youth Development (NICHD SECCYD; Hamre and Pianta, 2001; National Institute of Child Health and Human Development, Early Child Care Research Network, 1993; National Institute of Child Health and Human Development, Early Child Care Research Network, 2002). The NICHD SECCYD began in 1991 when 8986 mothers who gave birth in hospitals at 10 sites across the United States (Little Rock, AR; Irvine, CA; Lawrence, KS; Boston, MA; Philadelphia, PA; Pittsburgh, PA; Charlottesville, VA; Morganton, NC; Seattle, WA; and Madison, WI) were recruited for participation. A total of 5416 mother–infant dyads were eligible to participate and were willing to be interviewed by phone. Eligibility criteria included the following: the mother was 18 or older, spoke English, and intended to remain in the region in which she gave birth for at least 3 years, and infants had no evident disability at birth and were not hospitalized more than 7 days after birth. Of those eligible, 3015 (56%) were conditionally randomly selected for a phone interview, and 1526 remained eligible for study participation. Ultimately, 1364 became study participants.

The NICHD SECCYD is a longitudinal study with four phases of data collection covering development from infancy to age 15 years. This study uses data from Phases II and III. In third grade, 959 teachers across the United States had 1029 study children in their classrooms. Typically only one study child was present in a classroom; however, 48 classrooms had two study children, six classrooms had three study children, two classrooms had four study children, and one classroom had five study children.

Participants for the present study (N = 1364) comprised the entire NICHD SECCYD sample, and missing data were accommodated with full information maximum likelihood estimation. The sample was composed of 704 boys and 659 girls. (Gender information was not available for one participant.) The mean number of years of mothers' education when children were born was 14.24 (SD = 2.51), and average family income when children were in third grade was $76,620 ($SD$ = $64,741). Participants were 80% White (n = 1097) and 13% Black/African American (n = 176), and 7% were Hispanic, Asian American, or American Indian (n = 91). In third grade, children were an average of 8.9 years old.

Kindergarten teachers in this study (n = 1022) were predominantly White (n = 759; 156 did not report race/ethnicity) with an average of 15.45 years (SD = 9.06 years) of teaching experience (21 did not report years of teaching experience). First-grade teachers in this study (n = 1033) were predominantly White (n = 871; 57 did not report race/ethnicity) with an average of 14.52 years (SD = 10.1 years) of teaching experience (32 did not report years of teaching experience). Second-grade teachers in this study (n = 936) were predominantly White (n = 871; 17 did not report race/ethnicity) with an average of 12.4 years (SD = 10.1 years) of teaching experience (16 did not report years of teaching experience). Third-grade teachers in this study (n = 959) were predominantly White (n = 895), with an average of 12.2 years (SD = 10.5 years) of experience teaching in public schools.

2.2. Measures

2.2.1. Difficult temperament

Children's temperament was assessed through mother report on the Children's Behavior Questionnaire (CBQ; Rothbart, Ahadi, & Hershey, 1994) when children were approximately 4 1/2 years old. Mothers reported on eight dimensions of temperament: activity level, anger/frustration, approach/anticipation, attentional focusing, fear, inhibitory control, sadness, and shyness. For this study, children's difficult temperament was assessed with four CBQ subscales: Activity Level, Anger/Frustration, Approach, and Inhibitory Control. Mothers rated their children's temperament by reporting their children's behaviors during the past 6 months using a scale from 1 (*extremely untrue*) to 7 (*extremely true*). Each scale contained 10 items that were averaged to form a mean score.

The Activity Level (α = .69 in this sample) subscale measured children's tendency to engage in gross motor activity throughout the day. Items included "Tends to run rather than walk from room to room" and "Has difficulty sitting still at dinner." The Anger/Frustration subscale (α = .76) measured the extent to which a child showed negative affect in response to behavior or goal limitations. Items included "Has temper tantrums when s/he doesn't get what s/he wants" and "Gets quite frustrated when prevented from doing something s/he wants to do." The Approach subscale (α = .65) measured children's tendency to show excitement in anticipation of upcoming events. Items included "Gets so worked up before an exciting event that s/he has trouble sitting still," and "Becomes very excited while planning for trips." The

Inhibitory Control subscale (α = .74) measured children's ability to respond readily to parent or teacher commands. Items included "Is usually able to resist temptation when told s/he is not supposed to do something" and "Has a hard time following instructions" (reversed). Although internal consistency values for Approach and Activity Level were lower than the typically acceptable range of .70 to .80, these were similar to values obtained in other studies using the CBQ (e.g., Kochanska, DeVet, Goldman, Murray, & Putnam, 1994; Putnam and Rothbart, 2006; Rothbart, 2011).

2.2.2. Teacher–child relationship quality

Teacher–child relationship quality was assessed using teachers' responses on the Student–Teacher Relationship Scale (STRS; Pianta, 2001), an instrument measuring the extent to which a teacher perceives his or her relationship with a student as conflictual and close. The 15-item version of the STRS used in the NICHD SECCYD contains eight items measuring Conflict (e.g., "Dealing with this child drains my energy") and seven items measuring Closeness (e.g., "I share an affectionate, warm relationship with this child"). Responses range from 1 (*Definitely does not apply*) to 5 (*Definitely applies*). Teachers' responses were summed for form scores for Conflict and Closeness in each grade. Internal consistency values for Conflict ratings in kindergarten, first, and second grades were .87, .85, and .86, respectively; internal consistency values for Closeness in kindergarten, first, and second grades were .87, .86, and .86, respectively. The teacher who completed the STRS for each study child was the primary teacher.
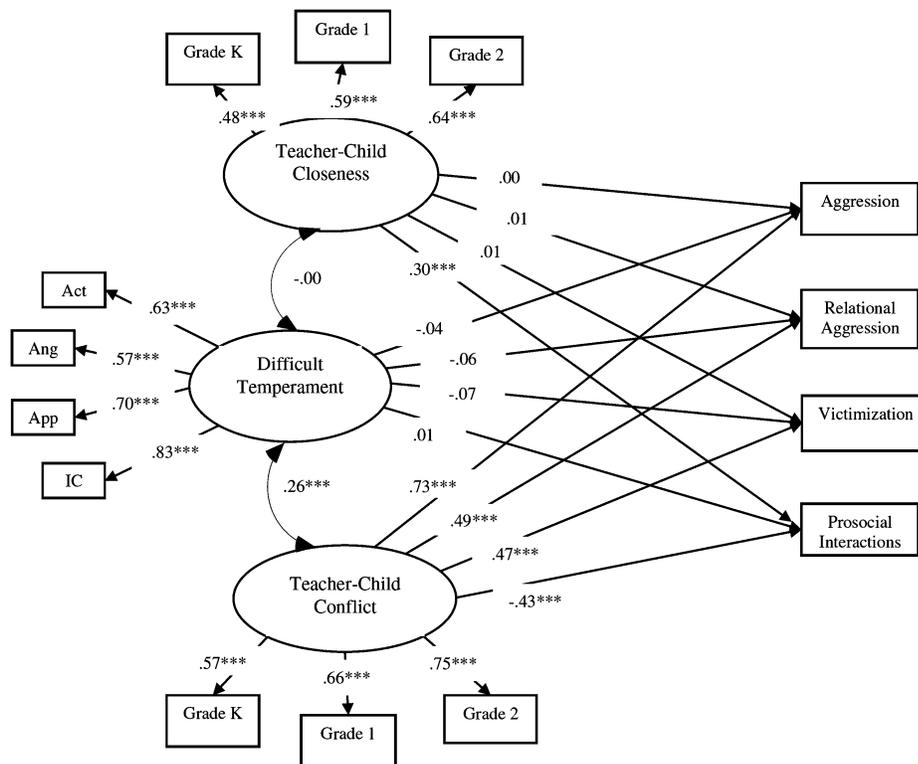
2.2.3. Peer interactions

In third grade, children's interactions with classroom peers was assessed by teachers using a 43-item questionnaire adapted by the NICHD SECCYD from the Child Behavior Scale (Ladd & Profilet, 1996), the Peer Victimization Scale (Kochenderfer & Ladd, 1996), and the Relational Aggression Scale (Crick, Bigbee, & Howes, 1996). Teachers responded using a 3-point scale where 0 = *not true*, 1 = *sometimes true*, and 2 = *often true*. Four subscales were used in the present study: Aggression, Peer Victimization, Relational Aggression, and Prosocial Interactions. The Aggression subscale (α = .81 in this sample) contained four items such as "Taunts and teases other children." Peer Victimization (i.e., victimized by peers; α = .73) contained four items such as "Is called names by peers." The Relational Aggression subscale (α = .83) contained four items such as "Threatens to stop being a peer's friend in order to hurt the peer or to get what is wanted from the peer." Finally, the Prosocial Interactions subscale (α = .82) contained five items such as "Is cooperative with peers."

The Preschool Peer Interaction composite variable was included to control for the quality of children's previous interactions with peers at age 54 months and was developed by the NICHD SECCYD. This composite variable (a = .75 in this study) was measured from observations of each study child and a friend during three structured play sessions. This composite was created from the sum of mean ratings across the three play sessions on three variables (contributing to coordinated positive interaction, prosocial behavior, and positive mood) that were scored by observers from 1 (*low*) to 5 (*very high*). Inter-rater reliability was estimated between two observers for 148 observations using Pearson correlations and repeated measures ANOVA. The Pearson correlation estimate was .76, and the repeated measures ANOVA estimate was .86, indicating acceptable levels of inter-rater reliability.

Table 1. Descriptive statistics for all study variables.

		N	*M*	*SD*	Range	Skewness	Kurtosis	% missing
1	Sex	1363	–	–	–	0.07	− 1.99	< 1
2	Mother's Education	1362	14.24	2.51	7–21	0.15	− 0.03	< 1
3	Preschool Peer Interaction	752	8.86	1.55	3.67–13.67	− 0.35	0.42	45
Difficult Temperament								
4	Activity	1025	4.79	0.76	1.6–6.9	− 0.12	0.24	25
5	Anger	1059	4.47	0.83	1.6–6.9	− 0.25	0.09	22
6	Approach	995	5.21	0.63	2.9–7.0	− 0.21	0.20	27
7	Inhibitory Control (reversed)	977	3.35	0.77	1.3–6.0	0.26	− 0.11	28
Teacher–child relationship								
7	Conflict kindergarten	1006	10.60	5.36	7–34	1.81	2.85	26
8	Closeness kindergarten	1006	34.23	5.34	15–40	− 1.08	0.70	26
9	Conflict 1st grade	1007	10.92	5.17	7–35	1.63	2.42	26
10	Closeness 1st grade	1006	33.96	5.04	12–40	− 1.12	1.31	26
11	Conflict 2nd grade	935	10.94	5.41	7–35	1.75	2.74	31
12	Closeness 2nd grade	936	33.67	5.17	8–40	− 1.02	0.91	31
Peer Interactions								
13	Aggression	980	0.33	0.42	0–2	1.58	2.05	28
14	Relational Aggression	976	0.35	0.42	0–2	1.35	1.45	28
15	Peer Victimization	979	0.14	0.28	0–2	2.64	8.30	28
16	Prosocial Interactions	978	1.48	0.45	0–2	− 0.70	− 0.27	28

Figure 1. Baseline structural model (without moderation or mediation paths): Difficult Temperament, teacher–child Conflict, teacher–child Closeness, and Peer Interaction variables shown with standardized coefficients. Covariates (i.e., Gender, Mother's Education, and Preschool Peer Interaction), disturbance terms, and model parameterizations are not shown in the model for the sake of clarity, but they are discussed in the 2 and 3 sections of the article. Act = Activity Level; Anger = Anger/Frustration; App = Approach; IC = Inhibitory Control. **$p < .01$. ***$p < .001$.

2.3. Data analysis

2.3.1. Missing data

Table 1 shows the percentage of missing data for each variable in the analyses (ranging from < 1% for demographic variables to 45% for Preschool Peer Interaction). Because we were concerned about the potential for bias due to the pattern of missing data, we conducted Little's missing completely at random (MCAR; Little, 1988) test in addition to other analyses examining the extent to which demographic variables were related to nonresponse. Little's MCAR test was statistically significant, $\chi^2(986) = 1168.69$, $p < .001$, suggesting that the data cannot be assumed to be missing completely at random. Additional statistical tests were conducted to examine differences between children with and without data from third grade. Tests of differences in demographic characteristics (i.e., gender, race/ethnicity, and mother's level of education) between children with and without third grade data revealed significantly more White students had third grade data than expected based on the racial/ethnic distribution of children in the original sample, $\chi^2(4) = 10.88$, $p = .03$. Mother's education level was statistically higher for the children with third-grade data, $F(1, 1360) = 32.17$, $p < .001$. More girls had data in third grade than expected based on the gender distribution of children in the original sample, $\chi^2(1) = 4.56$, $p = .03$. In order to account for the missing data and reduce the potential for bias, we completed all analyses using maximum likelihood estimation (described further in the Structural equation models section), which is considered a state-of-the-art technique for handling missing data and produces estimates that are less biased than those from listwise deletion or single imputation methods (Enders, 2010). In addition, demographic variables that were related to missingness (e.g., gender and mother's education level) were included in all analyses as control variables. As a result of using maximum likelihood estimation to handle missing data, all 1364 participants in this study were included in all analyses (i.e., regardless of missing responses on certain variables, all available data points for each participant were used in the analyses).

2.3.2. Structural equation models

Structural equation modeling with Mplus 7.0 statistical software (Muthén & Muthén, 1998–2010) was used to conduct all analyses. As evident in Figure 1, Difficult Temperament was a latent variable indicated by four subscale scores from the CBQ: Activity, Anger/Frustration, Approach, and Inhibitory Control (reverse-scored). In order to measure relationships between distinct types of peer interactions (e.g., prosocial vs. victimization), Peer Interaction was measured with four observed variables (Aggression, Relational Aggression, Peer Victimization, and Prosocial Interactions) rather than a latent variable. The quality of teacher–child relationships was measured using teacher ratings of both Conflict and Closeness. Conflict was constructed as a latent variable indicated by teacher ratings of Conflict in

Table 2. Bivariate correlations among all study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Sex	–															
2 Mother's Education	.04	–														
3 Preschool Peer Interaction	.02	.06	–													
Difficult Temperament																
4 Activity	–.18**	–.15**	–.01	–												
5 Anger	–.09**	–.03	–.03	.34**	–											
6 Approach	–.04	–.06	.01	.46**	.44**	–										
7 Inhibitory Control	–.18**	–.20**	–.01	.51**	.45**	.33**	–									
Teacher–child relationship																
8 Conflict kindergarten	–.13**	–.09**	–.04	.17**	.10**	.10**	.20**	–								
9 Closeness kindergarten	.14**	.10**	.07*	–.02	–.05	–.02	–.07*	–.28**	–							
10 Conflict 1st grade	–.17**	–.15**	–.04	.20**	.14**	.06	.26**	.40**	–.08*	–						
11 Closeness 1st grade	.17**	.12**	.06	.03	–.05	.04	–.09**	–.09**	.31**	–.28**	–					
12 Conflict 2nd grade	–.17**	–.16**	–.03	.17**	.13**	.06	.23**	.42**	–.14**	.46**	–.12**	–				
13 Closeness 2nd grade	.24**	.13**	.12*	–.02	–.04	.04	–.11**	–.09**	.26**	–.13**	.37**	–.34**	–			
Peer Interactions																
14 Aggression	–.19**	–.18**	–.01	.18**	.14**	.06	.22**	.37**	–.10**	.44**	–.08*	.57**	–.20**	–		
15 Relational Aggression	.09**	–.17**	.02	.07*	.07*	.02	.09*	.18**	–.02	.27**	–.04	.36**	–.07*	.66**	–	
16 Peer Victimization	–.09**	–.14**	–.06	.08*	.06	.01	.11**	.23**	–.09**	.24**	–.03	.38**	–.12**	.55**	.36**	–
17 Prosocial Interactions	.20**	.17**	.08	–.11**	–.10**	–.02	–.22**	–.23**	.21**	–.32**	.22**	–.41**	.30**	–.56**	–.38**	–.30**

* $p < .05$

** $p < .01$

kindergarten, first, and second grades. Similarly, Closeness was a latent variable indicated by teacher ratings of Closeness in kindergarten, first, and second grades. Latent variables for Conflict and Closeness were included in the same model. Three observed variables were controlled for in the model: Gender, Mother's Education, and Preschool Peer Interaction. Owing to the large size of our sample, we set our critical alpha level to .01 to avoid Type I errors.

The first step in our analyses was to test a measurement model to ensure that the latent constructs were being measured appropriately and that the model was conceptually sound with good model-to-data fit (Anderson & Gerbing, 1988). After establishing a good-fitting measurement model, we then added in regression paths to build the full structural model with teacher–child relationship quality (i.e., Conflict and Closeness) tested as both a moderator and a mediator. In the final step of our analyses, we conducted multiple group analyses to determine whether the paths in the model were similar for boys and girls.

To assess model fit, the chi-square statistic and goodness-of-fit indices were used in combination. Although the chi-square statistic is frequently used to judge model fit (good fit is indicated by a nonsignificant value), the chi-square test is extremely sensitive to large sample size, which increases the probability of rejecting the null hypothesis (Kline, 2010). Because we had a large sample of students and did not want to misinterpret small changes in chi-square as practically significant, we relied on other goodness-of-fit indices in accordance with recommendations by Hu and Bentler (1999) and Marsh, Hau, and Wen (2004). Specifically, we examined the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker–Lewis Index (TLI). RMSEA values less than .05 (Browne & Cudeck, 1993) and CFI and TLI values greater than .95 (Hu & Bentler, 1999) are recommended for evidence of good model-to-data fit. All models, with the exception of the mediation model, were conducted using maximum likelihood estimation with robust standard errors (MLR), as this estimator produces parameter estimates that are more robust to departures from normality (Muthén & Muthén, 1998–2010). The mediation model was tested using maximum likelihood estimation (ML), because the MLR estimator cannot be used when testing for indirect effects using bootstrapping procedures (described in the Results section). Both the ML and MLR estimators accommodate missing data without excluding cases via listwise deletion.

3. Results

Means and standard deviations for all observed variables are displayed in Table 1. For Difficult Temperament, children's mean scores at preschool age (approximately 4 1/2 years) on each subscale were relatively high, considering a possible range of 1 to 7: Activity (M = 4.79), Anger/Frustration (M = 4.74), Approach (M = 5.21), and Inhibitory Control (M = 4.66). Scores for Conflict and Closeness in kindergarten, first grade, and second grade indicate that teachers generally rated their relationships with students similarly across the three years. Teacher ratings of children's Peer Interactions also suggest that children in this sample displayed more positive than negative behavior. As an example, the mean value for Aggression was 0.33 (across a possible range of 0 to 2), whereas the mean for Prosocial Interactions (which had the same range) was 1.48.

Bivariate correlation coefficients are displayed in Table 2. The dimensions of Difficult Temperament were significantly related, with correlations ranging from .33 to .51 in absolute value. Teacher–child relationship quality variables were also correlated, with significant values ranging from .40 to .46 between the Conflict variables and from .26 to .37 between the Closeness variables. Conflict and Closeness in each grade had somewhat lower correlations. Teacher ratings of children's Peer Interaction variables were also correlated, with values ranging from .30 to .66 in absolute value. Correlations between each temperament dimension and the teacher–child relationship variables in kindergarten, first, and second grades ranged from an absolute value of .02 (between Closeness in kindergarten and Approach, $r = -.02$) and .26 (between Conflict in first grade and Inhibitory Control [reverse scored], $r = .26$). Correlations between each temperament dimension and the Peer Interaction variables ranged from .01 (between Victimization and Approach) and .22 (between Aggression and Inhibitory Control [reverse scored], $r = .22$, and between Prosocial Interactions and Inhibitory Control [reverse scored], $r = -.22$).

3.1. Measurement model

In the initial measurement model, correlations were estimated among Difficult Temperament, Conflict, Closeness, the four Peer Interaction variables, and the three control variables. After consulting the modification indices, a few re-specifications were made to the model if they made theoretical sense and produced a better fitting model. The error terms for the observed Conflict and Closeness measures at each time point were correlated with one another (e.g., error correlations were estimated between kindergarten Conflict and Closeness). Within the Difficult Temperament construct, we also estimated a correlated error term between Approach and Inhibitory Control, as these two manifest variables were highly similar in meaning (i.e., Inhibitory Control requires a child to suppress inappropriate Approach responses). The resulting measurement model provided good model-to-data fit: $\chi^2(77)$ = 147.18 (p < .001), CFI = .98, TLI = .97, and RMSEA = .03 (90% confidence interval [C.I.] values ranging from .019 to .032).

3.2. Structural model

After establishing a sound measurement model, we proceeded to build the full structural model. In the baseline structural model (with no moderation or mediation paths), regression paths were estimated between Difficult Temperament and each Peer Interaction variable (Figure 1). In addition, paths were estimated between Conflict and each Peer Interaction variable and between Closeness and each Peer Interaction variable. Difficult Temperament, Conflict,

Table 3. Results of multiple group analyses.

Regression path Baseline structural	Full sample (N = 1364) β (SE)	Boys (N = 704) β (SE)	Girls (N = 658) β (SE)	Wald χ² test χ² (df)
Temp → Aggression	− .04 (.03)	− .06 (.05)	− .02 (.05)	0.30 (1)
Conflict → Aggression	.73 (.04)***	.71 (.05)***	.75 (.06)***	0.12 (1)
Close → Aggression	.00 (.05)	− .03 (.06)	.05 (.08)	0.49 (1)
Temp → Prosocial	.01 (.04)	.01 (.05)	− .00 (.05)	0.02 (1)
Conflict → Prosocial	− .43 (.04)***	− .40 (.06)***	− .47 (.07)***	1.07 (1)
Close → Prosocial	.30 (.05)***	.41 (.07)***	.15 (.06)	8.25 (1)**
Temp → Victim	− .07 (.04)	− .07 (.05)	− .04 (.05)	0.31 (1)
Conflict → Victim	.47 (.05)***	.51 (.05)***	.39 (.07)***	1.15 (1)
Close → Victim	.01 (.05)	− .05 (.07)	.08 (.07)	1.51 (1)
Temp → Rel Agg	− .06 (.04)	− .10 (.05)	− .04 (.05)	0.32 (1)
Conflict → Rel Agg	.49 (.04)***	.46 (.06)***	.53 (.07)***	5.08 (1)
Close → Rel Agg	.01 (.05)	.00 (.07)	.04 (.07)	0.17 (1)

Regression path Moderation paths[a]	Full sample (N = 1364) b (SE)	Boys (N = 704) b (SE)	Girls (N = 658) b (SE)	Wald χ² test χ² (df)
TempxConflict → Prosocial	− 0.00 (0.11)	0.09 (0.23)	− 0.18 (0.29)	0.33 (1)
TempxConflict → Victim	− 0.21 (0.15)	− 0.12 (0.56)	− 0.34 (0.55)	0.04 (1)
TempxConflict → Rel Agg	− 0.11 (0.14)	− 0.21 (0.93)	0.20 (2.05)	0.02 (1)
TempxClose → Aggression	0.22 (0.15)	0.33 (0.57)	0.26 (0.18)	0.01 (1)
TempxClose → Prosocial	0.11 (0.15)	0.25 (0.80)	− 0.05 (0.19)	0.12 (1)
TempxClose → Victim	0.15 (0.09)	0.33 (0.32)	0.06 (0.16)	1.36 (1)
TempxClose → Rel Agg	0.36 (0.16)	0.28 (0.30)	0.64 (0.89)	0.10 (1)

Regression path Mediation analyses	Full sample (N = 1364) β (SE)	Boys (N = 704) β (SE)	Girls (N = 658) β (SE)	Wald χ² test χ² (df)
Temp → Conflict[b]	.26 (.03)***	.23 (.04)***	.31 (.04)***	0.20 (1)
Temp → Close[b]	− .00 (.02)	.03 (.03)	− .04 (.03)	0.49 (1)
Temp → Conflict → Aggression	.19 (.03)***	.17 (.04)***	.23 (.05)***	0.32 (1)
Temp → Conflict → Prosocial	− .11 (.02)***	− .09 (.03)***	− .15 (.04)***	1.02 (1)
Temp → Conflict → Victim	.12 (.02)***	.12 (.03)***	.12 (.03)***	0.17 (1)
Temp → Conflict → Rel Agg	.13 (.02)***	.11 (.03)***	.16 (.04)***	3.19 (1)
Temp → Close → Aggression	.00 (.00)	− .00 (.01)	− .00 (.01)	0.03 (1)
Temp → Close → Prosocial	− .00 (.01)	.01 (.03)	− .01 (.01)	0.33 (1)
Temp → Close → Victim	.00 (.00)	− .00 (.01)	− .00 (.01)	0.03 (1)
Temp → Close → Rel Agg	.00 (.00)	.00 (.01)	− .00 (.01)	0.17 (1)

Temp = Difficult Temperament; Close = Closeness; Prosocial = Prosocial Interactions; Victim = Peer Victimization; Rel Agg = Relational Aggression.
a. All regression coefficients for the moderation pathways are reported as unstandardized coefficients (*b*).
b. Although the regression paths from Temperament to Conflict and Closeness are not mediation paths, these direct effects were not added to the model until the mediation paths were tested.
** *p* < .01 ; *** *p* < .001

Closeness, and each Peer Interaction variable were regressed on Gender, Mother's Education, and Preschool Peer Interaction. Correlations were estimated among Difficult Temperament, Conflict, and Closeness. Because the baseline structural model was equivalent to the measurement model, it had the same degree of model fit.

In the baseline structural model (see Figure 1), students with more Difficult Temperament had significantly higher levels of teacher–child Conflict (*r* = .26, *p* < .001), and higher levels of teacher–child Conflict predicted more negative outcomes on all four Peer Interaction variables including increased Aggression (β = .73, *p* < .001), fewer Prosocial Interactions (β = − .43, *p* < .001), higher Peer Victimization (β = .47, *p* < .001), and more Relational Aggression (β = .49, *p* < .001). These regression coefficients represent medium to large effect sizes for relationships between Difficult Temperament and Peer Interaction variables (Kline, 1998). Difficult Temperament was not significantly associated with teacher–child Closeness (*r* = − .002, *p* = .96), and Closeness only predicted one of the four Peer Interaction variables. Specifically, students with higher ratings on teacher–child Closeness displayed more Prosocial Interactions (β = .30, *p* < .001), a medium effect (Kline, 1998). None of the direct effects from Difficult Temperament to the Peer Interaction variables was statistically significant (see full results in Figure 1 and Table 3).

Regarding the paths from Gender, Mother's Education, and Preschool Peer Interaction to the other constructs in the model, boys tended to show higher ratings on Difficult Temperament (β = − .15, *p* < .001), less Closeness with teachers (β = .31, *p* < .001), and more Conflict with teachers (β = − .22, *p* < .001) as compared to girls. Girls were more likely to display higher levels of Relational Aggression (β = .19, *p* < .001). Students with higher levels of Mother's Ed-

ucation tended to be rated lower on Difficult Temperament ($\beta = -.17$, $p < .001$), show more Closeness with teachers ($\beta = .20$, $p < .001$), and have less Conflict with teachers ($\beta = -.21$, $p < .001$). Preschool Peer Interaction was a significant predictor of only one variable in the model. Children with more positive Preschool Peer Interaction had higher levels of Closeness with teachers in elementary school ($\beta = .13$, $p = .009$).

R^2 values indicated that approximately 54% of the variance in Aggression toward peers ($R^2 = .54$), 36% of the variance in Prosocial Interactions ($R^2 = .36$), 22% of the variance in Peer Victimization ($R^2 = .22$), and 24% of the variance in Relational Aggression ($R^2 = .24$) was explained by the model.

3.2.1. Moderation paths

To test for moderation, latent variable interactions were specified between Difficult Temperament and teacher–child Conflict and between Difficult Temperament and teacher–child Closeness, and the four Peer Interaction variables were regressed on these latent interaction terms with one exception: the path from the Difficult Temperament × Conflict interaction term to Aggression was not testable. When the pathway from the Difficult Temperament × Conflict interaction term to Aggression was included in the model, the model would not converge due to extremely small residual variances for both the Difficult Temperament and Aggression variables. The only way to resolve these issues with model convergence was to remove this particular moderation path from the model. None of the seven moderation pathways that were tested reached our a priori critical value for statistical significance ($p < .01$). The Difficult Temperament × Closeness interaction term was not a significant predictor of Aggression ($b = .22$, $p = .15$), Peer Victimization ($b = .15$, $p = .10$), Prosocial Interactions ($b = .11$, $p = .45$), or Relational Aggression ($b = .36$, $p = .03$). Difficult Temperament × Conflict was not a significant predictor of Relational Aggression ($b = -.11$, $p = .44$), Peer Victimization ($b = -.21$, $p = .17$), or Prosocial Interactions ($b = -.001$, $p = .99$).

3.2.2. Mediation paths

To test for mediation, a direct effect was specified between Difficult Temperament and Conflict and between Difficult Temperament and Closeness, and an indirect effect was specified from Difficult Temperament to Conflict to the four Peer Interaction variables and from Difficult Temperament to Closeness to the four Peer Interaction variables. In line with current methodological research on mediation analyses, which has pointed to several problems with Baron and Kenny's (1986) causal steps approach to testing mediation (e.g., low statistical power), we employed resampling procedures to construct asymmetric confidence limits (MacKinnon and Fairchild, 2009; MacKinnon et al., 2007; Zhao et al., 2010). More specifically, when testing for mediation, it is important to account for the fact that the indirect effect does not follow a normal distribution because it is the product of two variables (MacKinnon & Fairchild, 2009). Therefore, bootstrapping procedures (1000 bootstrap draws) were used to calculate a 95% confidence interval for the product of the indirect effect, taking into account its non-normal distribution (Preacher & Hayes, 2008).

The direct effect from Difficult Temperament to teacher–child Conflict was statistically significant ($\beta = .26$, $p < .001$) and a medium effect size (Kline, 1998), and the model explained approximately 16% of the variance in students' Conflict with teachers ($R^2 = .16$). Student–teacher Conflict mediated associations between Difficult Temperament and all four Peer Interaction variables. Lower and upper limits were above zero for Aggression (95% C.I. ranging from .136 to .239), Relational Aggression (95% C.I. ranging from .089 to .164), and Peer Victimization (95% C.I. ranging from .084 to .159), and below zero for Prosocial Interactions (95% C.I. ranging from − .146 to − .075). Given that the direct effects from Difficult Temperament to the Peer Interaction variables were not statistically significant (reported in Figure 1 and Table 3), but each of the indirect effects was statistically significant, these results are consistent with complete mediation (MacKinnon et al., 2007). Indeed, results showed that children with higher ratings on Difficult Temperament tended to display more Conflict with teachers, and in turn, more student–teacher Conflict was associated with fewer Prosocial Interactions and higher levels of Aggression, Relational Aggression, and Peer Victimization.

The direct effect from Difficult Temperament to student–teacher Closeness was not statistically significant ($\beta = -.002$, $p < .96$), and the model explained approximately 16% of the variance in students' Closeness with teachers ($R^2 = .16$). Closeness was not a significant mediator of any of the paths from Difficult Temperament to the Peer Interaction variables: Aggression (95% C.I. ranging from − .004 to .004), Prosocial Interactions (95% C.I. ranging from − .023 to .022), Relational Aggression (95% C.I. ranging from − .004 to .004), and Peer Victimization (95% C.I. ranging from − .004 to .004).

3.3. Multiple group analyses

To determine whether the relationships in the model were similar across boys and girls, multiple group analyses were conducted, examining the baseline structural paths in the model in addition to the moderation and mediation pathways that were tested. The Wald test was used to compare parameter estimates for boys versus girls to determine if they were statistically significantly different from one another. For the baseline structural paths in the model (i.e., the 12 paths from Difficult Temperament, Conflict, and Closeness to the four Peer Interaction variables), only one statistically significant difference (i.e., $p < .01$) was found. The parameter estimate from Closeness to Prosocial Interactions was significantly higher for boys ($\beta = .41$, $p < .001$) than girls ($\beta = .15$, $p = .01$), indicating that student–teacher Closeness was a stronger predictor of Prosocial Interactions for boys, Wald $\chi^2(1) = 8.250$ ($p = .004$).

Next, the seven moderation pathways were tested (Table 3). The parameter estimates for the moderation paths did not differ significantly across boys and girls. See Table 3 for full results. Finally, the eight mediation pathways were tested in addition to the direct effects from Difficult Temperament to Conflict and Closeness (as these direct paths

were only included when testing for mediation). There were no significant gender differences in the mediation pathways or the direct effects from Difficult Temperament to Conflict and Closeness (see Table 3).

4. Discussion

In this study, we examined teacher–child relationship quality in early elementary grades (kindergarten through 2nd grade) as a potential moderator and mediator of the relationships between children's early (preschool age) difficult temperament and third grade interactions with peers. Three primary findings emerged. First, children's difficult temperament was positively associated with teacher–child conflict (but unassociated with closeness). Second, teacher–child relationship quality did not moderate linkages between difficult temperament and peer interactions. Finally, teacher–child conflict, but not closeness, mediated associations between difficult temperament and all four peer interaction variables.

Children rated as having characteristics congruent with more difficult temperament were more likely to have relationships with teachers in early elementary grades marked by higher conflict. This finding is consistent with research showing that teachers who are pressed by demanding students may be less inclined or have fewer resources to provide supportive environments for children (Dobbs and Arnold, 2009; Houts et al., 2010). For example, Houts et al. (2010) examined longitudinal twin data and were able to link children's challenging behavior at age 5 (prior to school entry) to teachers' reports of effort required to keep the child engaged and on-task in the classroom at age 12. Despite a seven-year gap between assessments of challenging behavior and teacher reports of effort, there was a robust, positive association between these variables, even after controlling for child IQ. In another study using the current sample from the NICHD SECCYD, Rudasill et al. (2010) found that difficult temperament measured at preschool age (as measured in the current study) was positively related to teacher–child conflict in upper elementary and middle school grades.

Although we expected that teacher–child relationship quality would predict children's interactions with peers, the extant literature supporting this link is less robust than that supporting the link between difficult temperament and poor peer interactions. However, emerging research suggests that teacher–child relationships are associated with children's peer interactions because teachers create the social milieu in which children learn to interact with peers (Farmer et al., 2011; Luckner and Pianta, 2011). For example, Silva et al. (2011) showed that teacher–child relationship quality mediated the concurrent association between preschool children's effortful control (i.e., attentional focusing and inhibitory control) and school attitudes. There is also further evidence, consistent with the findings from the current study and drawn from data across a similar age-range, that children's higher quality relationships with teachers might provide support for more positive peer interactions downstream (Howes, 2000; Hughes and Chen, 2011). Similarly, Mercer and DeRosier (2008) found evidence for bi-directional associations between peer interactions (i.e., peer rejection) and teacher–child relationships (i.e., teacher preference) across third and fourth grades. Congruent with this conceptualization, we found children with more teacher–child closeness in kindergarten, first, and second grades tended to be assessed by third-grade teachers as displaying more prosocial interactions. In contrast, children with more teacher–child conflict in kindergarten through second grade tended to be rated by third grade teachers as displaying more negative peer behavior (i.e., more aggression, more relational aggression, more peer victimization, and less prosocial interactions). Evidence from Leflot et al. (2011); Mercer and DeRosier (2008), in contrast, suggests that associations between teacher–child relationships and peer interactions may be bi-directional. This possibility was not tested in the present study.

Results from this study support teacher–child relationship quality as a mediator, but not a moderator, of the associations between difficult temperament and children's interactions with peers. Although we expected to find that teacher–child relationship quality would matter more for peer behavior of children with more difficult temperament, this hypothesis was based mostly on work linking these constructs, rather than studies explicitly testing for moderation. In fact, there is almost no research examining teacher–child relationship as a moderator that might attenuate links between temperament and peer interactions (see Arbeau et al., 2010; Griggs et al., 2009 for exceptions). It could be that this lack of evidence in the teacher–child relationship literature is due to a lack of significant results rather than a lack of investigation. Clearly, this area is in need of further examination.

We found support for the contention that teacher–child conflict may be a mechanism by which difficult temperament contributes to children's interactions with peers. In the present study, teacher–child conflict, but not closeness, mediated this association, suggesting that a history of teacher–child conflict is an avenue through which young children with difficult temperament constellations display poorer interactions with peers. Indeed, findings from this study and previous work (Howes, 2000; Hughes and Chen, 2011) suggest that a negative relationship with the teacher leads to more negative peer behavior and may also open the door for peers to treat children more negatively too (e.g., victimization). The mechanism behind this link is the lack of positive experiences in relationships with teachers, adults who are critical to children's early social skill development (Pianta, 1999). If children fail to have successful relationships with their teachers in early grades, they may miss out on key opportunities to learn positive social strategies for interacting with other adults and peers. At the same time, a poor teacher–child relationship history may cultivate a child's existing difficulties engaging positively with peers by creating a very visible display of conflict within an important classroom relationship (i.e., the teacher–child relationship). It is also possible that these teacher–child conflicts could, in turn, serve as models for maladaptive interactions for classroom peers as they observe interactions between the teacher and the difficult child, thus promoting victimization.

The fact that teacher–child closeness did not mediate the link between difficult temperament and peer interactions is consonant with other work in the teacher–child relationship literature where conflict is more consistently linked to outcomes than closeness (e.g., Birch and Ladd, 1998; Ewing and Taylor, 2009; Griggs et al., 2009; Hamre and Pianta, 2001; Howes, 2000). Indeed, Troop-Gordon and Kopp (2011) found that teacher–child conflict for fourth and

fifth graders in the fall predicted more physical and relational aggressive peer interactions in the spring, and the magnitude of these effects was much larger than for closeness (although closeness was negatively related to spring relational aggression). Hamre and Pianta (2001) who used the NICHD SECCYD data set (as was used here) found associations between teacher–child relationship negativity (i.e., the sum of conflict and dependency scores) in kindergarten and academic and behavioral outcomes as late as eighth grade. In addition, teacher–child conflict in kindergarten was significantly correlated with academic and behavioral outcomes in elementary and middle school grades, but closeness was not. Although findings from many studies suggest closeness contributes to children's positive outcomes (e.g., Palermo et al., 2007; Troop-Gordon and Kopp, 2011), results from the current study suggest that teachers' perceptions of negative relationships with children may have a more powerful impact on children's outcomes than positive relationships. Results also suggest that it is more conflict with teachers, rather than a lack of closeness, that places children at risk for developing negative interactions with peers.

4.1. Limitations and future directions

Although this study employed a large, national, longitudinal sample and avoided problems associated with lack of independence by gathering information at different time points from different sources, some limitations should be mentioned. First, ratings of temperament were based on parent report, and ratings of teacher–child relationship quality and peer interactions were based on teacher report; as such, they may reflect not only characteristics of the children but also characteristics of the raters. Indeed, teachers and children likely view social competence differently (Wentzel & Looney, 2007), and the current study only captures teachers' perceptions of peer interactions. Future studies should include observations of child behavior to provide more information and offset the potential problem of bias. Second, although providing some temporal evidence of causal associations between temperament and peer behavior in third grade, this study is correlational in nature and based on the assumption that teacher–child relationship quality predicts peer interactions. Thus, we are limited in conclusions we can make about causality and directionality. On a related note, there was not a comparable peer interactions measure available from the preschool epoch to control for earlier peer interactions, so we used scores from observations of dyadic interactions between the study child and a friend. Next steps in this line of research should include longitudinal examinations of associations between teacher–child relationship quality and peer interactions across early elementary grades where measures of all constructs are collected every year. Third, temperamentally shy children may also appear to be regulated (e.g., displaying low activity and high inhibitory control), yet evidence suggests that shyness is a risk factor for negative peer interactions (Gazelle et al., 2005) and teacher–child relationship quality (Rudasill & Rimm-Kaufman, 2009). Future work could extend findings presented here with examinations of shyness and peer interactions as mediated or moderated by teacher–child relationships. Finally, this sample was relatively homogeneous in terms of race/ethnicity, thus limiting generalizability. Clearly, given extant work suggesting that child race/ethnicity moderates associations between teacher–child relationship quality and outcomes (e.g., Ewing & Taylor, 2009), it is important to model these associations with data representative of non-European-American ethnic groups.

5. Conclusions

The present study adds to emerging research examining components of classroom context as moderators and mediators of associations between children's temperament and their school outcomes. The contextual component examined here was teacher–child relationship quality. Although there is ample evidence linking temperament traits and teacher–child relationships to academic and social outcomes, the findings presented here that teacher–child conflict mediated associations between difficult temperament and peer interactions, as well as other recent work by Arbeau et al. (2010); Griggs et al. (2009), suggest that more research examining moderators and mediators of these associations is warranted. In addition, this study provides further support for the notion that early teacher–child relationships play a critical role in children's social and academic trajectories. Considered in light of theoretical and empirical work pointing to early teacher–child relationships as consistent predictors of later teacher–child relationships (O'Connor, 2010; Rimm-Kaufman and Pianta, 2000; Rudasill, 2011), as well as the enduring importance of teacher–child relationships for academic and social success across elementary grades (e.g., Maldonado-Carreño & Votruba-Drzal, 2011), results from the current study fuel the need for emphasis in research and teacher education programs on the importance of this early relationship. Findings reported here also support emerging work on temperament's role in the classroom and particularly point to the value of considering individual differences in children's temperament as contributors to teacher–child relationship quality and peer interactions. There is abundant evidence linking temperament and parent–child relationships (Bates and McFadyen-Ketchum, 2000; Rothbart and Bates, 2006), mental health (Compas, Connor-Smith, & Jaser, 2004), and aggression (Eisenberg et al., 2001; Terranova et al., 2008) but much less related directly to school and positioned within a classroom context, an area of considerable promise for increasing our understanding of risk and resilience for children's academic and social success.

Our findings have implications for teachers in the classroom and school psychologists who work with children and their parents. If teachers are made aware of the significant connection that exists between children's temperament and the quality of their relationships with teachers, they may be better able to identify and support those children who are at risk for poor relationships with peers. By observing children's self-regulation and temperamental tendencies, in addition to gaining background information from parents regarding children's temperament at home, teachers can take a more preventive stance in helping at-risk children before negative peer interactions develop. Mental health professionals, including school psychologists, also have an important preventive role in identifying and in-

tervening with children who display more difficult temperament characteristics at an early age. Clinicians can provide social skills training to such children with a specific focus on how to inhibit inappropriate behaviors in favor of prosocial ones and how to react to other children who may have difficulties in self-regulation. With the efforts of both teachers and mental health specialists, children with difficult temperaments may be able to receive help before negative interaction patterns become entrenched in their relationships with teachers and peers.

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