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Longitudinal trends and year-to-year fluctuations in student–teacher conflict and closeness: Associations with aggressive behavior problems[☆]

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ABSTRACT

Longitudinal research suggests that student–teacher relationships characterized by elevated (or increasing) conflict and low (or decreasing) closeness promote heightened aggression in elementary school. However, prior research has not explored fluctuations in the quality of student–teacher relationships across school years, which may also impact students. This study applied a new methodology to determine whether year-to-year fluctuations in student–teacher conflict or closeness also predicted increased student aggression. 154 children were followed from Head Start preschools through elementary school. Early elementary teachers (kindergarten through third grade) rated the quality of conflict and closeness with students. Fifth grade teachers rated student aggression. Regression analyses revealed that year-to-year fluctuations in student–teacher conflict, along with mean levels of student–teacher conflict, each made unique contributions to fifth grade aggression, controlling for baseline aggression. In addition, for students with low aggression at kindergarten entry, year-to-year fluctuations in student–teacher closeness predicted increased aggression. Possible mechanisms accounting for the detrimental effects of fluctuations in student–teacher relationship quality are discussed, along with implications for practice.

1. Introduction

Children from socio-economically disadvantaged backgrounds often enter kindergarten without the self-regulation skills they need to successfully navigate the social and behavioral demands of school, increasing risk for aggressive behavior problems and long-term underachievement (La Paro & Pianta, 2000; Macmillan, McMorris, & Kruttschnitt, 2004). During the initial years in elementary school, the relationships these children establish with teachers may be especially influential, affecting the course of aggressive behaviors (Hughes, Cavell, & Jackson, 1999; Maldonado-Carreño & Votruba-Drzal, 2011). From a conceptual standpoint, conflictual relationships with teachers may evoke and reinforce oppositional, hostile reactions, thus amplifying aggression (Hamre & Pianta, 2001; Ladd & Burgess, 2001; Pianta & Stuhlman, 2004). In contrast, close relationships with elementary teachers may promote feelings of emotional security and support the development of self-regulation skills, fostering aggression control (Baker, Grant, &

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Morlock, 2008; Hughes et al., 1999). To test these associations, prior research has explored longitudinal trends in student–teacher relationships, studying mean levels of closeness or conflict experienced over time and trajectories characterized by increases or decreases in closeness or conflict across grade levels (O'Connor, Dearing, & Collins, 2011; Spilt, Hughes, Wu, & Kwok, 2012).

The current study applied a new methodology designed to complement the exploration of longitudinal trends (means and slopes) in student–teacher relationship quality by examining developmental fluctuations that individuals experience from year-to-year (Ram & Gerstorf, 2009). These fluctuations represent the degree to which an individual's experience each year deviates from their general pattern predicted by longitudinal trends. As children get a new teacher every year, student–teacher relationship quality is only moderately stable across the elementary years (Jerome, Hamre, & Pianta, 2009; Ladd & Burgess, 1999). Longitudinal trends (means and slopes) are designed to “smooth out” year-to-year fluctuations to detect more general patterns over time. This study explored the hypothesis that year-to-year fluctuations in teacher socialization support increase risk for aggressive behavior, in ways that add beyond the effects of mean levels or trajectories of conflict and closeness. The following review includes the conceptual rationale and existing evidence that support this focus on fluctuations, followed by a description of the methodological approach.

1.1. Why fluctuations in student–teacher relationship quality might affect aggression

Elementary school children typically experience different teachers each school year and therefore establish new relationships with teachers annually. Year-to-year correlations reflect moderate stability in student–teacher relationship quality (Jerome et al., 2009; Ladd & Burgess, 1999), with some children experiencing considerable variability across different teachers and school years (O'Connor & McCartney, 2007). The impact of this variability on child adjustment is unknown.

Evidence from a number of other areas suggests that experiencing instability in core developmental supports is stressful for children and undermines adaptive social-emotional development. For example, prior research has linked instability in areas of family structure, family income, caregiving, and residence with impaired child social-emotional adjustment (for reviews, see Hill, Morris, Gennetian, Wolf, & Tubbs, 2013; Sandstrom & Huerta, 2013). Conceptually, instability (or inconsistency) in caregiver-child conflict or closeness might place children at particular risk for increases in aggressive behaviors. For example, social learning theory suggests that high rates of parent-child conflict, low levels of parent-child closeness, and inconsistency in parental discipline (within and between parents) are all linked with elevated child aggression (Campbell, Shaw, & Gilliom, 2000; Carrasco, Holgado-Tello, & Serrano, 2015; Dwairy, 2008; Stormshak, Bierman, McMahon, Lengua, & the Conduct Problems Prevention Research Group [CPRG], 2000). Researchers postulate that when parents respond inconsistently to aggression, occasionally giving in to aggressive demands, it creates a variable reinforcement schedule that promotes future aggression (Dishion & Patterson, 2006). Researchers have also suggested that parental unpredictability distresses children, who may engage in aggressive behaviors in order to elicit predictable (even if negative) responses (Wahler & Dumas, 1986). Year-to-year fluctuations in teacher-child conflict may likewise create unpredictability for children, reflecting inconsistencies in behavioral expectations, reprimands, and consequences for aggression.

From the perspective of attachment models, student–teacher closeness facilitates self-regulatory development by enhancing felt security and positive internalized working models of the self (Lynch & Cicchetti, 1992). Inconsistency in the provision of parental sensitive support undermines secure attachment and is associated with elevated emotional distress and behavioral acting out (Dwairy, 2008; Stormshak et al., 2000). Conceptualized within an attachment framework, the loss of a supportive teacher and adaptation to a non-supportive or unpredictable teacher might elicit feelings of insecurity, helplessness, and emotional dysregulation, reducing the child's ability to trust future teachers even when they are supportive.

In summary, from the perspectives of both social learning theory and attachment models, children should benefit emotionally and behaviorally when they experience greater stability and predictability in student–teacher relationships. In contrast, higher levels of year-to-year fluctuations in student–teacher conflict or closeness might increase emotional and behavioral dysregulation, amplifying aggression. The existing evidence base, reviewed briefly below, documents links between student–teacher relationship quality and aggression. It is possible that year-to-year fluctuations contribute to child aggressive behavior, in addition to the overall quality of student–teacher relationship, but these fluctuations have not yet been examined.

1.2. Longitudinal studies linking student–teacher relationship quality with aggression

Prior research has shown concurrent associations between the quality of a child's relationship with his or her teacher and social-emotional functioning in that classroom during the same school year (Baker, 2006; Pianta & Stuhlman, 2004). Other research has found associations between the child's closeness and conflict with an early elementary teacher and behavioral outcomes in the following school year (Howes, 2000; Hughes et al., 1999; Silver, Measelle, Armstrong, & Essex, 2005). There are also long term effects of early student–teacher relationship quality; for example, student–teacher conflict in kindergarten predicts disciplinary infractions, including aggressive behavior problems when children are in eighth grade (Hamre & Pianta, 2001).

Elementary school children typically experience different teachers each school year and therefore establish new relationships with teachers annually. Longitudinal studies reveal moderate stability in the quality of student–teacher relationships, with early relational difficulties at the transition to kindergarten predicting relationship difficulties with teachers throughout the elementary years (Jerome et al., 2009; Ladd & Burgess, 1999). However, the quality of relationships with teachers can be quite variable for some children (O'Connor & McCartney, 2007), raising questions about the impact of variability in student–teacher relationship quality across multiple school years.

In an initial study spanning two years, Ladd and Burgess (2001) found that aggressive children who experienced two years of conflict in their relationships with teachers (kindergarten and first grade) were more likely to engage in problematic behaviors than

at-risk children who experienced conflict only one year. Looking across the elementary school years, Maldonado-Carreño and Votruba-Drzal (2011) demonstrated that mean levels of student–teacher closeness and conflict (averaged over multiple elementary years) were associated with mean levels of aggressive behavior problems, rated by either teachers or parents. In addition, year to year improvements in student–teacher relationship quality predicted corresponding reductions in teacher-rated externalizing problems. Modeling latent factors of student–teacher relationship quality from kindergarten through second grade, Rudasill, Niehaus, Buhs, and White (2013) found that student–teacher conflict predicted child aggression in third grade. Each of these studies used a different methodology to examine longitudinal effects, producing findings that suggest that student aggressive behavior is responsive to student–teacher relationship quality, and affected in a sequential or cumulative fashion by the average quality of closeness or conflict experienced. Taken together, these studies suggest that children's aggressive behaviors are influenced sequentially and cumulatively by the experiences they have with different teachers, but they leave open questions about the impact of year-to-year variations in relationship quality.

1.3. Representing variability in relationships over time

For the most part, the existing research base has focused on continuity in student–teacher relationships and how mean levels or cumulative years of exposure are associated with behavioral development. In addition, a few studies have examined changes in student–teacher relationships from year to year using person-centered methods.

1.3.1. Inter-individual variability

Person-centered approaches have been used to identify subgroups of children who show different trajectories of student–teacher relationships over time (Jerome et al., 2009; O'Connor et al., 2011; O'Connor & McCartney, 2007; Spilt et al., 2012). The specific trajectories that emerge across these studies vary as a function of sample and methodological differences, but general patterns can be discerned. In all studies, the majority of children follow a trajectory reflecting stable, positive student–teacher relationship quality. A minority of children follow a trajectory of stable poor or worsening student–teacher relationship quality. Other groups start low and improve over time, or start high and decline over time. O'Connor et al. (2011) examined the impact of different trajectories on student behavior problems and found that, compared to children who had stable, positive student–teacher relationships across the elementary school years, children who experienced any period of low support (e.g., those in trajectories of high-decreasing support, low-increasing support, or stable low support) were more likely to exhibit externalizing behavior problems. The trajectory studies suggest that some children experience increasing or decreasing student–teacher relationship quality over the course of elementary school. In a follow-up study examining student–teacher closeness and conflict separately, O'Connor, Collins, and Supplee (2012) found that children who experienced changes in the level of conflict with elementary teachers (increasing and/or decreasing) showed greater externalizing behaviors in fifth grade compared to children who experienced consistently low conflict with teachers; but changes in closeness was not related to externalizing behaviors. The findings of O'Connor and colleagues suggest that even one or two years of poor-quality student–teacher relationships may increase risk for aggressive behavior problems.

1.3.2. Intra-individual variability

Person-centered approaches focus on identifying sub-groups within the sample that show distinct patterns of change over time (between individuals or *inter*-individual variability). In addition, individuals may vary in terms of the amount of change they experience in student–teacher relationship quality from year to year (within individual or *intra*-individual variability). For example, consider a student who experiences moderate closeness with teachers across the early elementary years whereas another student experiences two years of high closeness intermixed with two years of low closeness. The mean levels of closeness would be similar for these two students, but the first experienced relatively stable and predictable student–teacher relationships, whereas the second experienced highly variable relationship quality. This intra-individual variability represents inconsistencies or discontinuities in a child's support systems and may therefore negatively affect their adjustment.

Prior research has captured intra-individual variability using the intra-individual standard deviation (see Ram & Gerstorf, 2009). Specifically, researchers have argued that there is meaningful variation within individuals across time that is not accounted for by growth curves. This variation is reflected in residuals or differences between the predicted value from the growth curve and the actual value for an individual at each time point (see Fig. 1). Children with greater fluctuations in the level of conflict or closeness with teachers would have larger residual differences since the actual values of the relationship quality are further from the predicted trajectory. Several researchers have used this methodological approach to examine intra-individual variability in developmental research, including associations between intra-individual variability and behavioral outcomes (see Marceau, Ram, & Susman, 2015; Molloy, Ram, & Gest, 2011). In one study examining the emotional support teachers provide in the classroom, Curby, Brock, and Hamre (2013) found that emotional support consistency (defined as the opposite of intra-individual variability) positively predicted social competence, above and beyond the mean level of emotional support. Although the degree of emotional support teachers provide to students in the classroom is important for social-emotional development, the quality of the individual student's relationship with a teacher distinctly predicts behavioral outcomes (Lee & Bierman, 2015), but researchers have yet to examine year-to-year fluctuations in relationship quality with this methodological approach.

1.4. Does student–teacher relationship quality differentially affect aggressive children?

It is possible that the impact of student–teacher relationships (and variability in those relationships) may vary as a function of

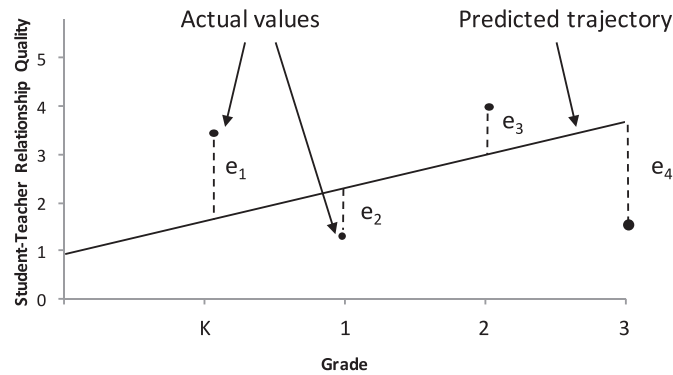


Fig. 1. Intra-individual residuals.

Note: e1–e4 are the residuals or differences between the actual values and the predicted trajectory at each time point.

initial student risk levels. Children with early behavioral risks generally experience low levels of closeness and high levels of conflict with teachers (Houts, Caspi, Pianta, Arseneault, & Moffitt, 2010; Howes, Phillipsen, & Peisner-Feinberg, 2000; Spilt et al., 2012). For example, Spilt et al. (2012) found that children with early behavioral risks were less likely than low-risk children to experience normative student–teacher relationship trajectories, and more likely to experience the high-stable and increasing conflict trajectory that was associated with underachievement. Prior research suggests that aggressive children are particularly likely to engage their teachers in conflictual relationships (Jerome et al., 2009; Ladd & Burgess, 1999). In turn, teachers who report high levels of conflict with students often feel angry and resentful, and display non-optimal behavior management strategies, including heightened levels of reprimands, criticism, and punishment (Brendgen, Wanner, & Vitaro, 2006; Ladd & Burgess, 2001). Not surprisingly, teachers report feeling less warmth and affection for aggressive children compared to their well-behaved peers, along with greater detachment and emotional distance (Gest, Welsh, & Domitrovich, 2005). In addition, teachers report feeling heightened levels of tension, animosity, and conflict in their relationships with aggressive and disruptive students (Henricsson & Rydell, 2004; Ladd & Burgess, 1999).

Children demonstrating elevated levels of early aggression may benefit more from the support provided by teachers, or they may experience greater impairments from conflictual relationships with teachers than children who are less vulnerable behaviorally (Hamre & Pianta, 2001; Ladd & Burgess, 2001). Longitudinal studies have found that aggressive children who experience two years of conflictual relationships with teachers (kindergarten and first grade) are more likely to engage in problematic behaviors than at-risk children who experience conflict in only one school year (Ladd & Burgess, 2001; Rudasill et al., 2013).

However, teachers who feel warm and affectionate toward aggressive children may enhance child feelings of emotional security and reduce defensive reactivity and hostile attributions, thereby fostering more self-regulated behavior and more positive social-cognitive processing (Hamre & Pianta, 2001). Teachers who feel close to children with externalizing behavior problems and are able to stay out of conflict with them may also attend positively to their adaptive behaviors, enhancing social-emotional and self-regulatory skill development with positive expectations, modeling, and reinforcement (Baker et al., 2008). Researchers have speculated that experiences of close student–teacher relationships foster the internalization of positive attitudes toward self and school in young children, motivating subsequent learning efforts and behavioral self-control (Lynch & Cicchetti, 1992). Empirical studies have documented links between close student–teacher relationships and reduced emotional and behavioral adjustment problems among aggressive elementary students (Buysse, Verschueren, Doumen, Van Damme, & Maes, 2008; Meehan, Hughes, & Cavell, 2003). For example, aggressive children who experience supportive student–teacher relationships one year in early elementary school show reduced aggression in the subsequent year (Hughes et al., 1999) and through third grade (Silver et al., 2005).

Since aggressive children are more likely to experience greater conflict and lower closeness with teachers, year-to-year fluctuations may represent opportunities to experience positive or less conflictual relationships with some teachers during some school years (Macmillan et al., 2004). At-risk students who experience variability and the opportunity to form close relationships with some teachers may develop more prosocial and emotion regulation skills to inhibit aggressive behavior (Lynch & Cicchetti, 1992). Conversely, children with aggressive behavior problems may be most in need of stable, predictable, supportive, and non-conflictual student–teacher relationships to build the self-control and behavioral regulation skills they lack (Brendgen et al., 2006), and year-to-year fluctuations may adversely impact aggressive children more than children with lower levels of aggression. Understanding the impact of student–teacher relationship quality and year-to-year fluctuations on the behavioral adjustment of aggressive students is particularly important, given the risk these children face for poor student–teacher relationships and school maladjustment (Brendgen et al., 2006; Henricsson & Rydell, 2004).

1.5. The present study

The current study used longitudinal data to address three research questions regarding children's experiences of student–teacher conflict and closeness during the first four years of elementary school (kindergarten through third grade). First, to what extent did longitudinal trends (means, slopes) reflecting student–teacher conflict and closeness affect aggression at the end of elementary school (fifth grade), controlling for baseline aggression? Second, to what extent did year-to-year fluctuations in student–teacher conflict and

closeness add to the prediction of fifth grade aggression, beyond the effects of means and slopes? Third, did levels of aggression at school entry serve as a moderator, changing the impact of student–teacher relationships (means, slopes, and year-to-year fluctuations) on later aggression?

It was hypothesized that mean levels of student–teacher relationship quality from kindergarten through grade three would predict child aggression in grade five, controlling for pre-kindergarten aggression, with higher conflict and lower closeness associated with increased aggression, based on prior research that has examined student–teacher relationship quality and aggressive behavior concurrently and longitudinally (e.g., Baker, 2006; Hamre & Pianta, 2001; Silver et al., 2005). It was also hypothesized that slopes reflecting change over time (increasing conflict, decreasing closeness) would predict child aggression in fifth grade, following previous research examining trajectories of student–teacher relationship quality and behavior problems (Maldonado-Carreño & Votruba-Drzal, 2011; O'Connor et al., 2011). In addition, it was anticipated that fluctuations in student–teacher relationship quality would predict additional variance in child aggression, beyond the contributions of mean levels and slopes. Based on social learning theory and attachment models, it was hypothesized that year-to-year fluctuations in student–teacher relationship quality would be associated with greater aggressive behavior in fifth grade. Finally, it was hypothesized that children entering school with heightened aggression would benefit more from generally positive relationships with teachers, with a high mean/increasing slope for closeness and a low mean/decreasing slope for conflict predicting lower aggression in fifth grade. In addition to these hypotheses, we also explored the possibility that year-to-year fluctuations may be beneficial for early aggressive youth who are more likely to experience poor relationships with teachers (Lynch & Cicchetti, 1992), or may be impacted more by the stress associated with fluctuations (Brendgen et al., 2006). This final analysis was exploratory, given the lack of prior research or theory to guide predictions.

2. Method

2.1. Participants

Participants were 4-year-old children (Total $N = 154$, 15% Hispanic, 28% African-American, 57% European-American; 57% girls) recruited from 22 Head Start classrooms in three counties in Pennsylvania, who served as part of the “usual practice” comparison group for a preventive intervention study. None of these children received the intervention. There were originally 164 children in this “usual practice” group, but 10 were excluded because they had ratings of student–teacher relationship quality at only one time point, so their growth could not be modeled using the available data. At the time of baseline assessment, children were, on average 4.59 years old ($SD = 0.31$, range = 4.11–5.81). Participating Head Start families were low-income, with an average income-to-needs ratio of 0.87, and parent education levels that were generally high school or less (92%).

At the beginning of two successive school years, brochures describing the research project were distributed to parents of all 4-year-old children. During home visits, the study was described and informed consent was obtained. Of the eligible sample, 86% elected to participate in the study and completed initial assessments. Children were then followed longitudinally, as they transitioned from the original 22 Head Start classrooms into 111 kindergarten classrooms, 118 first grade classrooms, 121 s grade classrooms, 114 third grade classrooms, and 113 fifth grade classrooms.

2.2. Data collection procedures

Data collection occurred annually in the spring of each year, pre-kindergarten through third grade, with outcome data collected in fifth grade. Each year, a research assistant met with teachers to deliver and explain the rating scales and to obtain their informed consent to participate as raters. Teachers then completed the ratings on their own time, and returned them to the project within two weeks. Ratings of student–teacher relationship quality were collected from pre-kindergarten through third grade, and different teachers completed ratings for students at each time point. Ratings of child aggressive behavior were collected in pre-kindergarten and fifth grade. Teachers were compensated financially.

2.3. Measures

2.3.1. Student–teacher relationships

A short form of the Student–Teacher Relationship Scale (STRS; Pianta, 2001) was used. An exploratory factor analysis identified two factors, which matches the factor structure of prior studies using a shortened version of the STRS (Drugli & Hjemdal, 2013; Tsigilis & Gregoriadis, 2008) and the factors correspond with the conflict and closeness subscales. Teachers rated the degree of tension and animosity in their relationship with each student on the 8-item conflict scale (e.g., “This child and I always seem to be struggling with each other,” “Dealing with this child drains my energy,” “This child feels that I treat him/her unfairly;” $\alpha = 0.91–0.95$ across the school years assessed). Teachers rated the degree to which they experienced a positive, warm relationship with each student on the 8-item closeness scale (e.g., “I share an affectionate, warm relationship with this child,” “This child openly shares his/her feelings and experiences with me,” “It is easy to be in tune with what this child is feeling;” $\alpha = 0.86–0.92$). Each item was rated on a 5-point Likert scale ranging from “Definitely does not apply” to “Definitely does apply,” and the average item score for each subscale was used in analyses. The STRS has been extensively used in rating children's relationships with teachers internationally. It is associated with children's behaviors and academic functioning concurrently and longitudinally (e.g., Baker, 2006; Hamre & Pianta, 2001; O'Connor & McCartney, 2007) and has demonstrated construct validity (Doumen et al., 2009).

2.3.2. Aggressive behavior

In pre-kindergarten and fifth grade, teachers completed the 7-item Authority Acceptance scale from the Teacher Observation of Child Adaptation – Revised (TOCA – R; Werthamer-Larsson, Kellam, & Wheeler, 1991) describing overt aggression and disruptive behavior (e.g., “yells at others,” “hits, pushes, or shoves,” “breaks things on purpose”). All items were rated on a 6-point Likert scale, with response options ranging from “almost never” to “almost always,” and averaged to form an aggression score ($\alpha = 0.90\text{--}0.93$). The Authority Acceptance scale of the TOCA-R is a commonly used measure of behavior problems in the classroom. Elementary teacher ratings demonstrate predictive validity for a range of behavior problems into high school (e.g., Petras, Chilcoat, Leaf, Ialongo, & Kellam, 2004; Racz et al., 2013). The pre-kindergarten aggression rating represented aggression risk prior to school entry.

2.4. Plan of analysis

In the preliminary step of analysis, descriptive statistics were conducted for all study variables. Then, data analyses were conducted in three phases to address the study aims. The first aim was to examine how longitudinal trends (means and slopes) in student–teacher relationship quality predicted aggression in fifth grade. To describe student–teacher relationships over time, unconditional growth models were fit to the data using SAS 9.3 Proc Mixed (Ram, Rabbitt, Stollery, & Nesselrode, 2005), with conflict and closeness modeled separately. Multilevel models nested ratings of student–teacher relationship quality within child over time. Model covariates included child age, gender, race, and relationship (closeness or conflict) with the pre-kindergarten teacher. The mean level (average student–teacher relationship quality across the four time points) and slope that characterized each child's exposure to conflict and closeness from kindergarten to third grade were obtained from these analyses and then used in regressions predicting aggression in fifth grade.

The second aim was to explore stability and variability in the quality of student–teacher relationships across early elementary school, and examine whether these year-to-year fluctuations in student–teacher relationship quality predicted fifth grade aggression above and beyond the effects of longitudinal trends (means and slopes) in relationship quality. The unconditional growth models from the first aim provided the longitudinal trajectories of student–teacher closeness and conflict for each individual across the four time points (kindergarten through third grade). However, the actual ratings for each student's relationships with teachers in different school years do not necessarily follow the predicted longitudinal trajectory, and there is a residual difference between the actual student–teacher relationship rating at a given time point from this longitudinal trajectory (see Fig. 1). These residuals across the school years were averaged for each student and the standard deviation was used as an indicator of intra-individual variability in student–teacher conflict and closeness (following Marceau et al., 2015; Ram et al., 2005). In the case of student–teacher relationship quality across time, the multilevel model of change is represented with an equation such as:

$$\text{Student – teacher relationship quality}_{it} = \beta_{0i} + \beta_{1i}(\text{grade}_{it}) + e_{it}$$

with Student–teacher relationship quality_{it} representing student *i*'s conflict or closeness with the teacher at time *t*, β_{0i} and β_{1i} representing person-specific coefficients of conflict or closeness in kindergarten (time 0) (β_{0i}) and the slope of the change across time, which is each school year/grade (β_{1i}). There are a set of residuals (e_{it}) at each time point (kindergarten through third grade) for each individual, quantifying the difference between the predicted value from the growth curve and the actual value. Fig. 1 illustrates one individual's actual values of student–teacher relationship quality, which differ from the predicted linear trajectory at each time point and the residuals are the difference scores (e_1, e_2 , etc.). Mathematically, intra-individual variability is calculated as the standard deviation of these residual scores:

$$\text{Intra – individual variability}_i = \sqrt{\sigma^2} = \sqrt{\frac{1}{T-1} \sum_{t=1}^T (e_{it} - \bar{e}_i)^2}$$

with *T* indicating the number of time points with student–teacher relationship quality data for each individual.

Building off the regressions from the first aim, intra-individual variability in student–teacher relationship quality was added as a predictor to the hierarchical regression models to examine the unique associations between year-to-year fluctuations and fifth grade aggression, controlling for the longitudinal trends (mean and slope) of student–teacher relationship quality and pre-kindergarten child characteristics.

The third aim was to examine moderation effects of early aggression on the association between student–teacher relationship quality and fifth grade aggression. Three interaction terms were created with pre-kindergarten aggressive behaviors and the mean level, slope of the trajectory, and the year-to-year fluctuations of each student's conflict with teachers across the four school years. Three interactions terms were also created with pre-kindergarten aggressive behaviors and the mean, slope, and fluctuations of closeness. These interaction terms were added to the hierarchical regression analyses, after the main effects of the first and second aims. Regression analyses controlled for child sex, age, race, and pre-kindergarten aggression.

3. Results

3.1. Descriptive analyses

Means and standard deviations for all variables are presented in Table 1; correlations are presented in Table 2. In general, student–teacher conflict showed moderate stability (average year-to-year $r = 0.54$); student–teacher closeness ratings showed mild stability from kindergarten through third grade (average year-to-year $r = 0.37$). Within each year, student–teacher conflict and

Table 1
Means, standard deviations, and ranges for all variables.

	STRS Conflict			STRS Closeness		
	N	Mean (SD)	Range	N	Mean (SD)	Range
Kindergarten	151	1.85 (0.93)	1.00–4.75	151	4.13 (0.63)	1.88–5.00
1st grade	152	1.81 (0.91)	1.00–4.75	152	4.16 (0.64)	2.25–5.00
2nd grade	146	2.00 (1.06)	1.00–4.75	146	3.92 (0.76)	1.63–5.00
3rd grade	138	1.94 (0.97)	1.00–4.25	138	3.89 (0.82)	1.38–5.00

	Aggression		
	N	Mean (SD)	Range
Pre-Kindergarten	154	2.17 (1.02)	1.00–5.00
5th grade	131	1.79 (0.83)	1.00–4.86

Table 2
Correlations among variables within and across time.

	1	2	3	4	5	6	7	8	9	10
1. K conflict	–									
2. 1st gr. conflict	.53**	–								
3. 2nd gr. conflict	.46**	.52**	–							
4. 3rd gr. conflict	.47**	.34**	.56**	–						
5. K closeness	–.39**	–.35**	–.23**	–.26**	–					
6. 1st gr. closeness	–.32**	–.38**	–.31*	–.21*	.43**	–				
7. 2nd gr. closeness	–.22**	–.27**	–.47**	–.34**	.18*	.30**	–			
8. 3rd gr. closeness	–.10	–.07	–.13	–.41**	.34**	0.27**	.37**	–		
9. Pre-K aggress.	.38**	.25**	.28**	.27**	–.23**	–.13	–.14	–.02	–	
10. 5th gr. aggress.	.39**	.32**	.50**	.52**	–.14	–.29**	–.17	–.25**	.24**	–

* $p < .05$.
** $p < .01$.

closeness were inversely correlated, as expected, average $r = -0.41$.

3.2. Fitting growth curves

Most of children (89% of the sample) had complete student–teacher relationship ratings for all four time points (kindergarten through third grade), and the others were missing ratings at one or two times. Multilevel models are able to model trajectories for children with at least two time points, which was the case for this entire sample. The intraclass correlation (ICC) for student–teacher conflict was 0.49, indicating that about half (49%) of the variation in conflict over time was accounted for by the student and 51% reflected the contributions of year-to-year fluctuations in student–teacher conflict over time (intra-individual variability). In a separate model, the ICC for student–teacher closeness was 0.28, indicating that 28% of the variation in closeness over time was accounted for by the student. Thus, 72% was due to year-to-year fluctuations (intra-individual variability) in closeness over time. Parallel to the correlations, these analyses reflect mild to moderate stability over time in student–teacher closeness and conflict, but also reflect considerable fluctuations from year to year.

For both conflict and closeness, linear and quadratic models were fit but quadratic terms were not significant (conflict $\gamma_{20} = -0.002, p = .948$; closeness $\gamma_{20} = -0.02, p = .432$) so only linear trajectories were retained. As shown in Table 3, the linear model for the sample showed marginally-significant increases in student–teacher conflict ($\gamma_{10} = 0.05, p = .081$) and significant decreases in student–teacher closeness ($\gamma_{10} = -0.10, p < .001$) over time from kindergarten through third grade.

3.3. Intra-individual variability in relationship quality

Plots of the raw data for individual student relationships with teachers are presented in the top section of Fig. 2 and show individual fluctuations in relationship quality across the early elementary school years. The individual linear trajectories for each student that emerged from the linear growth curve model are presented in the middle section of Fig. 2 (plots c and d), illustrating how the linear model “smooths out” year-to-year fluctuations in children’s experiences. To represent the degree of year-to-year fluctuations individual children experienced, residual differences were calculated for each student as the difference between their actual student–teacher relationship ratings of conflict or closeness each year (top row) relative to the predicted values based on these linear trajectories (middle row) (Ram et al., 2005). These residuals for each student are plotted in the bottom section of Fig. 2 (plots e and f).

This study calculated the intra-individual variability in student–teacher relationship quality for each student and the variability in

Table 3
Results from multilevel models for student–teacher relationships from kindergarten through third grade.

	STRS Conflict		STRS Closeness	
	B	SE	B	SE
<i>Fixed effects estimates</i>				
Intercept, γ_{00}	1.13*	.16**	2.77*	.31
Grade level, γ_{10}	.05†	.03	-.10*	.02
<i>Control variables</i>				
<hr/>				
<i>Random effects estimates</i>				
Variance intercept, $\sigma_{\mu 0}^2$	.28*	.08	.06†	.04
Variance grade level, $\sigma_{\mu 1}^2$	.02	.02	.02†	.01
Covariance intercept, grade level, $\sigma_{\mu 0\mu 1}$	.00	.03	.00	.02
Residual variance, σ_c^2	.45*	.04	.33*	.03

Note. Analyses controlled for child age, sex, race, and pre-kindergarten student–teacher relationship.

* $p < .05$.

** $p < .01$.

† $p < .10$.

each participant's student–teacher conflict and closeness was significantly correlated with the mean level and trajectory slope of their conflict and closeness, respectively, across kindergarten through third grade (see Table 4). Students who experienced higher mean levels of conflict with their teachers were more likely to experience greater year-to-year fluctuations ($r = 0.58, p < .001$) and students with greater increases in conflict over time also experienced greater fluctuations in conflict ($r = 0.35, p < .001$). Conversely, students who experienced lower mean levels of closeness with their teachers were more likely to experience greater fluctuations over the course of the early elementary years, relative to students who experienced high mean levels ($r = -0.40, p < .001$). Students with decreasing closeness also experienced greater fluctuations in the closeness of their relationships with teachers over time ($r = -0.25, p < .001$).

3.4. Predicting fifth grade child aggression

3.4.1. Student–teacher conflict

Regressions were conducted to examine associations between student–teacher conflict (mean levels, slope of trajectory, and fluctuations from kindergarten through third grade) and child aggressive behavior in fifth grade, controlling for pre-kindergarten (baseline) aggression, using SPSS 23. In the first step of these regressions, demographic controls (child age, sex, and race) and pre-kindergarten aggression were entered. In the second step, the mean level of conflict and slope of the linear trajectory were entered, followed by year-to-year fluctuations (step 3). Next, interaction terms were entered, reflecting the interaction between pre-kindergarten child aggression and mean levels of conflict as well as pre-kindergarten child aggression and the trajectory slope (step 4). Finally, the interaction between pre-kindergarten child aggression and fluctuations in conflict was included (step 5). These interaction terms tested whether initial levels of student aggression moderated the association between changes in student–teacher conflict and fifth grade aggression. Each step of the hierarchical regression included the predictors from previous steps.

There was some missing data in fifth grade. At this final assessment point, 23 children were missing from the sample (85% retention) and these children did not differ from the 131 who were retained on any of the initial pre-kindergarten measures (child age, sex, race, aggression, student–teacher closeness or conflict). Multiple imputation was used to address the missing values for fifth grade aggression (SPSS 23); 20 datasets were imputed (Graham, Olchowski, & Gilreath, 2007) and the following regression analyses were conducted on these imputed datasets and results pooled.

Results from each step of the hierarchical regressions are presented in Table 5, with coefficient estimates representing the relative significance of variables produced in each successive step, as described previously. Controlling for demographic variables and pre-kindergarten aggression, the mean level of student–teacher conflict that students experienced in the early elementary years predicted their fifth grade aggression ($\beta = 0.41, p < .001$) but the slope of the conflict trajectory was not a significant predictor ($\beta = 0.14, p = .104$). In addition, year-to-year fluctuations in conflict significantly predicted fifth grade aggression ($\beta = 0.18, p = .044$) above and beyond the effects of the mean level of early elementary student–teacher conflict experienced. None of the interaction terms were significant, indicating that student–teacher conflict mean levels, slope, and fluctuations were comparably associated with student fifth grade aggression regardless of initial levels of aggressive behavior.

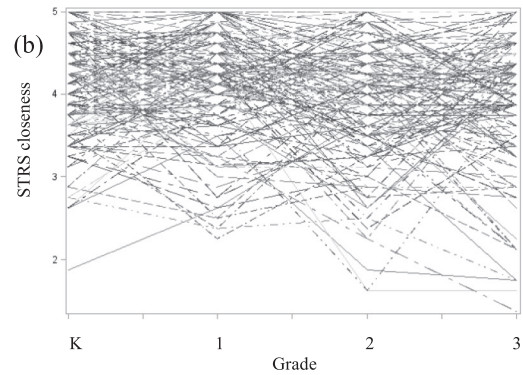
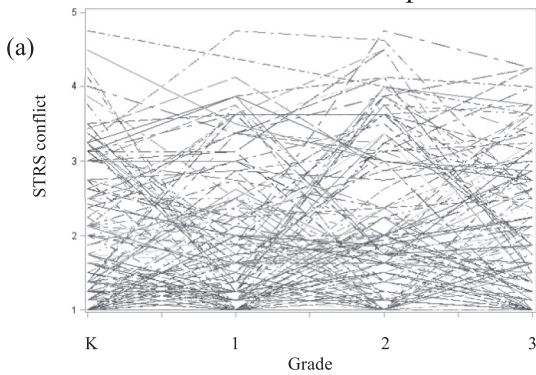
3.4.2. Student–teacher closeness

Similar regressions were conducted for student–teacher closeness, and results are presented in Table 6. Controlling for demographic variables and pre-kindergarten aggression, there were no significant main effects of mean level of student–teacher closeness or slope of the closeness trajectory predicting fifth grade aggression ($\beta = -0.16, p = .263$ and $\beta = -0.12, p = .353$, respectively) nor did fluctuations in student–teacher closeness add significantly to this prediction ($\beta = 0.11, p = .227$). No significant interactions emerged between initial child aggressive risk and mean levels of student–teacher closeness or the slope of the closeness trajectory,

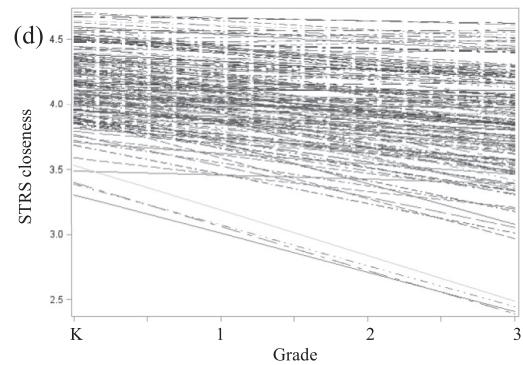
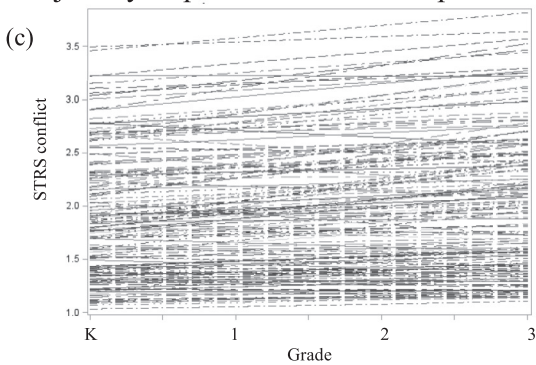
Student-Teacher Conflict

Student-Teacher Closeness

Raw student-teacher relationship scores



Trajectory of predicted relationship scores



Residuals

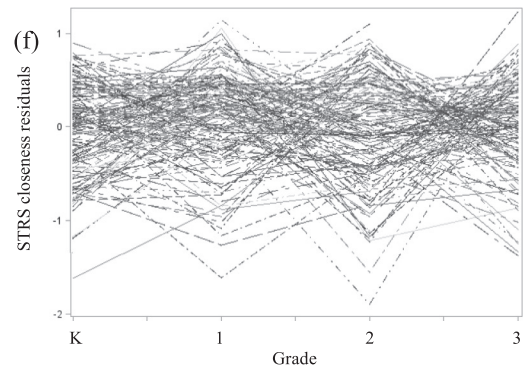
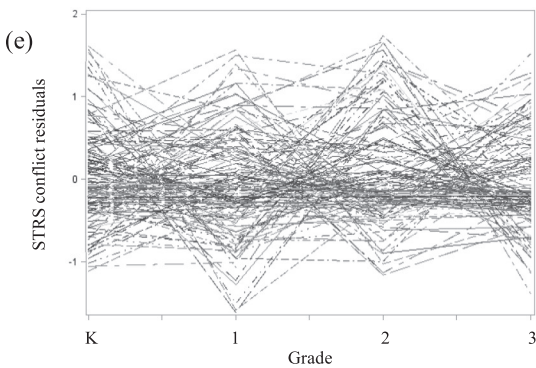


Fig. 2. Plots of individual student–teacher relationships across time.

All plots illustrate intra-individual changes in student–teacher relationship quality from kindergarten through third grade. Plots (a) and (b) show each student's raw data, plots (c) and (d) show each student's predicted linear growth trajectory, and plots (e) and (f) show the students' residuals around their linear growth trajectories (year-to-year fluctuations).

Note: Trajectories controlled for child age, gender, race, and pre-kindergarten student–teacher relationship.

demonstrating that the association between mean levels and slope of closeness and later child aggression was similar for all children. In contrast, a significant interaction emerged between child pre-kindergarten aggression and fluctuations in student–teacher closeness ($\beta = -0.18, p = .033$). To understand the nature of this moderation, post-hoc regression analyses were conducted using re-centered pre-kindergarten aggression at one standard deviation above (high aggression risk) and one standard deviation below (low aggression risk) the mean. Linear plots illustrating associations between year-to-year fluctuations in closeness and fifth grade aggression for children with high and low pre-kindergarten aggression are shown in Fig. 3. Simple slopes analyses in regression using the re-centered pre-kindergarten aggression variable demonstrated a significant association between fluctuations in relationship closeness and elevated fifth grade aggression only for students low in pre-kindergarten aggression ($\beta = 0.31, p = .020$) and not for students with elevated early aggression ($\beta = 0.02, p = .909$).

Table 4

Correlations among early elementary student–teacher relationship means, trajectory slopes, and year-to-year fluctuations.

	K-3 Conflict mean	K-3 Conflict slope	K-3 Conflict fluctuations
K-3 Conflict mean	–		
K-3 Conflict slope	.49**	–	
K-3 Conflict fluctuations	.58**	.35**	–
Mean (SD)	1.92 (.79) [*]	.047 (.065) [†]	.54(.37)

	K-3 Closeness mean	K-3 Closeness slope	K-3 Closeness fluctuations
K-3 Closeness mean	–		
K-3 Closeness slope	.71**	–	
K-3 Closeness fluctuations	–.40**	–.25**	–
Mean (SD)	4.03 (.49)	–.097 (.086)	.50 (.25)

* $p < .05$.** $p < .01$.† $p < .10$.**Table 5**

Regressions predicting fifth grade aggression with early elementary student–teacher conflict.

Predictors	Outcome			
	5th grade teacher-rated aggression			
	F	df	ΔR^2	β
Conflict				
Step 1	6.48**	4, 149	.15**	
Age				–.05
Sex				–.26**
Race				.15
Pre-k aggression				.23**
Step 2	13.5**	6, 147	.21**	
K-3 Conflict mean				.41**
K-3 Conflict slope				.14
Step 3	12.5**	7, 146	.02 [†]	
K-3 Con. fluctuations				.18 [†]
Step 4	10.0**	9, 144	.01	
Risk X Con. mean				.07
Risk X Con. slope				–.11
Step 5	9.00**	10, 143	.00	
Risk X Con. fluctuations				–.01

Note. Analyses control for child sex, age, race, and pre-kindergarten aggression.

* $p < .05$.** $p < .01$.

4. Discussion

This study used longitudinal growth curves to model changes in the quality of student–teacher relationships during the early elementary years (kindergarten through grade three) for each child. The findings confirmed that mean levels of conflict during the early elementary years predicted aggression at the end of elementary school, controlling for baseline aggression. Importantly and adding to prior research, fluctuations in student–teacher conflict also increased aggression beyond the impact of individual student's mean level and slope of relationship conflict. For students low in initial aggression only, fluctuations in student–teacher closeness also predicted increased aggression in fifth grade, beyond the mean levels and the slope of closeness across elementary school years.

4.1. Stability and variability in student–teacher conflict across elementary school

Consistent with prior research, year-to-year correlations for student–teacher conflict were moderate and higher than year-to-year correlations for closeness (Jerome et al., 2009). The stability in student–teacher conflict may, to some extent, reflect the impact of child aggression; children who frequently display challenging behaviors are likely to elicit teacher feelings of resentment and tension year after year (Henricsson & Rydell, 2004; Murray & Murray, 2004; O'Connor, 2010). In addition, teachers tend to warn their colleagues about challenging students, possibly increasing negative teacher expectations and behaviors regarding aggressive students and supporting a self-fulfilling prophecy across the years (Brendgen et al., 2006). As in prior studies, exposure to higher mean levels of student–teacher conflict across the early elementary school years predicted greater aggression in fifth grade in this study, with pre-

Table 6
Regressions predicting fifth grade aggression with early elementary student–teacher closeness.

Predictors	Outcome			
	5th grade teacher-rated aggression			
	F	df	ΔR^2	β
Closeness				
Step 1	6.18**	4, 149	0.14**	
Age				–0.04
Sex				–0.25**
Race				0.16
Pre-k aggression				0.24**
Step 2	6.50**	6, 147	0.07**	
K-3 Closeness mean				–0.16
K-3 Closeness slope				–0.12
Step 3	5.91**	7, 146	0.01	
K-3 Clo. fluctuations				0.11
Step 4	4.60**	9, 144	0.00	
Risk X Clo. mean				0.00
Risk X Clo. slope				0.03
Step 5	4.85**	10, 143	0.03*	
Risk X Clo. fluctuations				–0.18*

Note. Analyses control for child sex, age, race, and pre-kindergarten aggression.

* $p < .05$.

** $p < .01$.

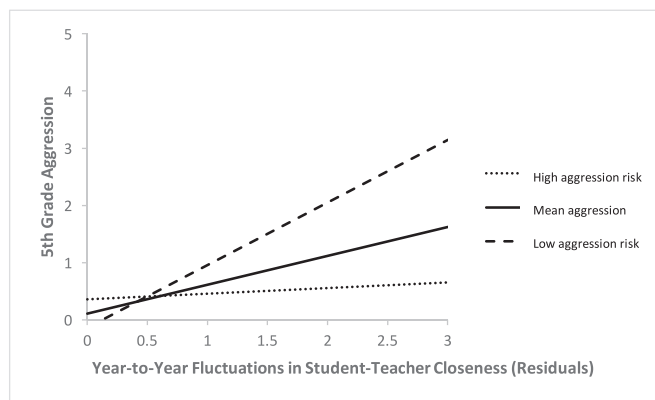


Fig. 3. Plots of moderation of early elementary student–teacher closeness effects by child aggression risk.

kindergarten levels controlled. These findings expand on extensive research documenting the detrimental effects of conflict with kindergarten and first grade teachers (Hamre & Pianta, 2001; Ladd & Burgess, 2001; Pianta & Stuhlman, 2004; Silver et al., 2005). Sustained, high levels of student–teacher conflict likely reflect ineffective behavior management and exposure to heightened levels of criticism and rebuke (Arnold, McWilliams, & Arnold, 1998; Birch & Ladd, 1997). When children are involved in conflictual relationships with teachers, they may experience anger and resentment that are difficult for them to regulate, fueling reactive aggression and hostile attribution biases (Birch & Ladd, 1997). In addition, children who experience sustained exposure to conflict with teachers may develop working models and associated expectations that increase their vigilance and reactivity to perceived slights in interactions with subsequent teachers, thus contributing to a self-fulfilling prophecy of conflictual relationships with teachers across elementary school (Brendgen et al., 2006).

In addition, an important new finding emerged in the present study regarding the detrimental effects of year-to-year fluctuations in student–teacher conflict. With mean levels and trajectories of student–teacher conflict accounted for in the model, year-to-year fluctuations provided additional prediction of fifth grade aggression. This finding suggests that, controlling for the level of conflict experienced, fluctuations in student–teacher conflict may be stressful for children as they repeatedly adjust to ups and downs. Prior research suggests that caregiving instability is stressful for children; instability in family structure and frequent transitions in early caregivers are both associated with increases in child aggression (Howes & Hamilton, 1993; Sandstrom & Huerta, 2013). Researchers have suggested that substantial and uncontrollable changes in routines may exert stress, even when changes lead to improved circumstances (Hill et al., 2013). Instability in caregiving adults may be particularly stressful, because of the emotional significance of adults in young children’s lives. Howes and Hamilton (1993) found that toddlers who experienced multiple caregivers showed biased

responding over time, reacting to new caregivers based on the quality of their relationship with a previous caregiver. It's unclear whether a similar process occurs when children experience substantial changes in levels of student–teacher conflict from year-to-year, but the unpredictability may undermine feelings of security and increase defensive fears regarding rejection, which in turn could fuel aggression (Lynch & Cicchetti, 1992). It is also possible that inconsistencies in teacher expectations and responses to challenging behaviors from year to year function in a similar way as inconsistent parenting to reduce support for the development of self-regulation and aggression control (Baumrind, 1996).

It is important to note that year-to-year fluctuations accounted for a small percentage of the variance (2%) in fifth grade aggression relative to mean levels and slopes of student–teacher conflict (21%). Thus, fifth-grade child aggression is best predicted by kindergarten aggression and high conflict with teachers across the elementary years; fluctuations in the level of conflict with teachers contribute a small, but significant, amount of additional stress promoting child aggression. Practically, these findings suggest that low conflict with teachers at the beginning of elementary school is ideal in setting the stage, and maintaining low conflict throughout elementary school is important for reduced child aggressive behavior later on.

4.2. Stability and variability in student–teacher closeness across elementary school

When both the mean and slope of the closeness trajectory were examined simultaneously, neither measure uniquely predicted fifth grade aggression. These findings suggest that the slope of the trajectory in early elementary student–teacher closeness is not associated with fifth grade aggression after accounting for mean levels of student–teacher closeness, and vice versa. However, additional analyses in the current study indicated that when the mean level or slope was examined on its own, each aspect significantly predicted fifth grade aggression. Thus, low levels of closeness and decreases in closeness over time individually predicted greater aggression in fifth grade, which is consistent with prior research. When examining different trajectories of student–teacher relationship quality, O'Connor et al. (2011) found that children displayed more externalizing behavior problems when they experienced relationship trajectories that started low and increased in supportiveness, started high and decreased, or were consistently low over the elementary school years. Although the O'Connor et al. (2011) study did not account for mean levels of relationship support in their trajectory analysis, it appears that any low support from teachers during elementary may adversely impact behavioral control and corroborates the current findings that do not distinguish the effects of mean level or slope of student–teacher closeness over time.

Looking beyond the mean level and slope, this study found that year-to-year fluctuations in student–teacher closeness was detrimental and associated with elevated student aggression, but only for children who entered school with low levels of aggression. In general, non-aggressive children tend to experience higher levels of student–teacher closeness than their aggressive peers. Researchers have speculated that close relationships with teachers reduce risk for student aggression by providing students with positive emotional support and promoting feelings of security, along with positive attention and reinforcement for prosocial and engaged learning behaviors (Hamre & Pianta, 2001; Ladd & Burgess, 2001). Experiencing fluctuations in closeness, with years of unexpected and unpredictable emotional distance from teachers, may reduce children's feelings of security and affect children's internal models of self and relationships with others (Howes, 2000; Lynch & Cicchetti, 1992). It is unclear why fluctuations affect the development of aggression for non-aggressive but not aggressive students, but it may be that fluctuations in student–teacher closeness is particularly unexpected by children who enter school without a history of problem behavior. It may also be that certain (unstudied) characteristics of some non-aggressive students, such as low social skills or emotional immaturity, make it more likely that some non-aggressive children will elicit fluctuations in teacher reactions. Possibly, the sub-group of non-aggressive children who experience high levels of fluctuations in teacher closeness is particularly dependent on teachers to support their developing social skills and capacity to regulate their emotions and behaviors, and hence are particularly negatively affected by the fluctuations in teacher support. Among this subgroup of children, experiences of inconsistent closeness may undermine trust and contribute to wariness and bias in children's internal working models and expectations for student–teacher relationships, such that they rebuff future teacher attempts to develop close relationships and may also have less motivation to follow teacher expectations for behaviors (Howes et al., 2000).

Prior research has often focused on youth with greater initial aggression, which indicate increased risk for later difficulties, and therefore, interventions have often focused on youth with early aggressive behaviors. However, the current findings point to the negative impact of fluctuations in closeness with teachers for non-aggressive children, and suggest further exploration of risks that contribute to the development of aggression in children who display little aggression prior to elementary school. Prior research has demonstrated the importance of close relationships for aggressive children, and the current findings highlight the importance of teacher closeness and support for all children, including children without aggressive difficulties, and maintaining consistent closeness across elementary school years.

4.3. Strengths and limitations

Strengths of this study include the longitudinal design from pre-kindergarten through fifth grade, which allowed for the control of individual child characteristics prior to school entry, as well as the independence of teacher-rated relationship quality in early elementary school (kindergarten through third grade) and teacher-rated behavioral outcomes in fifth grade. At the same time, this study also had limitations. Given that this study was correlational, interpretations of causal effects of student–teacher relationships are purely speculative. It is possible that there were bidirectional effects between the characteristics of the child and characteristics of their different teachers over time that were not detected by the analytic models used here. Although study models controlled for child characteristics prior to school entry, changes in child aggression may have occurred during the elementary school years that appeared

concurrent with experiences of student–teacher relationships but that were not caused by the student–teacher relationships. In addition, unmeasured variables may have contributed to the ratings of student–teacher relationship quality and may explain variability in ratings across school years. For example, there may be teacher characteristics (e.g. demographics, teaching experience, personality, self-efficacy, stress and burnout), which contribute both to the quality of student–teacher relationships and shape student aggressive behavior (Kokkinos, Panayiotou, & Davazoglou, 2005; Yoon, 2002). Similarly, factors such as the classroom composition may affect both student–teacher relationship quality, and peer effects on student aggression (Howes, 2000; Hughes et al., 1999).

The study also had measurement limitations that warrant mention. Different teachers rated each child each school year and there may be individual differences among teachers that may influence their ratings of their relationship with a child, creating inconsistencies in the way teachers used the scale (Kesner, 2000; Yoon, 2002). Relatedly, the fluctuations in student–teacher relationship quality across school years could reflect measurement error. However, other studies have found that teacher ratings of their relationship with a child correlate with observer ratings (Birch & Ladd, 1997; Pianta, La Paro, Payne, Cox, & Bradley, 2002). Additional measures of student aggression (observations or parent ratings) would have strengthened the study.

Finally, there were strengths and limitations with the study sample. Few studies have examined student–teacher relationships for low-income children, yet it is important to understand how changes in these relationships over time may impact disadvantaged students who are at greater risk for poor outcomes. This study focused on a low-income sample of children who attended Head Start preschool programs, so the findings may not generalize to all children. Given the evidence supporting the importance of student–teacher relationships for more socioeconomically advantaged students (e.g. Hamre & Pianta, 2001; O'Connor et al., 2011), year-to-year fluctuations in student–teacher relationship quality would also be expected to impact children from a range of economic backgrounds. However, it is possible that year-to-year fluctuations in student–teacher relationships may be more of an issue for low-income children who are more likely to experience the cumulative stress of fluctuations in relationships and life situations, such as income volatility, fluctuations in parent-child relationship quality, or housing instability. Also, this study followed a sample of 154 children from pre-kindergarten through the end of elementary school and the high retention rates were a strength of the study. However, additional research is needed with a larger sample size, in addition to examining year-to-year fluctuations in student–teacher relationships for children from different populations, including a range of socioeconomic backgrounds.

4.4. Implications and future directions

Children from socioeconomically disadvantaged backgrounds are at elevated risk for aggressive behaviors and negative school outcomes. Hence, understanding how student–teacher relationships are associated with the development of aggression control in low-income samples is of value. The findings have several implications for schools, teachers, and others invested in supporting children growing up in poverty. First, teacher training and certification programs should provide emerging elementary teachers with information about the developmental importance of supportive, non-conflictual relationships with children, and the skill training to enhance their capacity to relate effectively to all children, especially those exhibiting challenging behavior. Second, the interventions designed to promote social-emotional skills and aggression control among students exhibiting challenging behaviors should include attention to the quality of student–teacher relationships, along with positive behavioral management supports. Third, the current findings regarding the detrimental effects of variability in student–teacher conflict (and, for a subgroup of children, variability in student–teacher closeness) point to the value of interventions designed to create common expectations and behavioral supports that extend over multiple teachers in a school building and over multiple years. For example, establishing a common set of expectations and behavioral supports is a key goal of the School-Wide Positive Behavioral Supports intervention (Horner et al., 2009), which could provide a framework for targeting school-wide goals focused on student–teacher relationship quality. In addition, teachers may need supports to help them cope with feelings of resentment and frustration that may arise with some students.

This study focused on the elementary school years. Future studies should also examine the influence of past and concurrent student–teacher relationships as children transition to middle school. Since transition periods are often times of increased stress, it is important to understand how mean levels and variability in relationships experienced during elementary school might affect children after the transition into middle school. Given that students typically have different teachers for different academic subjects in middle school, it would also be of value to know whether fluctuations in student–teacher relationship quality across middle school teachers is associated with behavioral adjustment, concurrently and in later school years.

References

- Arnold, D. H., McWilliams, L., & Arnold, E. H. (1998). Teacher discipline and child misbehavior in day care: Untangling causality with correlational data. *Developmental Psychology, 34*, 276–287.
- Baker, J. A. (2006). Contributions of teacher–child relationships to positive school adjustment during elementary school. *Journal of School Psychology, 44*(3), 211–229.
- Baker, J. A., Grant, S., & Morlock, L. (2008). The student-teacher relationship as a developmental context for children with internalizing or externalizing behavior problems. *School Psychology Quarterly, 23*, 3–15.
- Baumrind, D. (1996). The discipline controversy revisited. *Family Relations: Journal of Applied Family and Child Studies, 45*, 405–414.
- Birch, S. H., & Ladd, G. W. (1997). The teacher-child relationship and children's early school adjustment. *Journal of School Psychology, 35*, 61–79.
- Brendgen, M., Wanner, B., & Vitaro, F. (2006). Verbal abuse by the teacher and child adjustment from kindergarten through grade 6. *Pediatrics, 117*, 1585–1598.
- Buyse, E., Verschueren, K., Doumen, S., Van Damme, J., & Maes, F. (2008). Classroom problem behavior and student-teacher relationships in kindergarten: The moderating role of classroom climate. *Journal of School Psychology, 46*, 367–391.
- Campbell, S. B., Shaw, D. S., & Gilliom, M. (2000). Early externalizing behavior problems: Toddlers and preschoolers at risk for later maladjustment. *Development and Psychopathology, 12*, 467–488.
- Carrasco, M. A., Holgado-Tello, F. P., & Serrano, M. A. R. (2015). Intraparental inconsistency: The influence of parenting behaviors on aggression and depression in children. *Family Relations, 64*, 621–634.

- Curby, T. W., Brock, L. L., & Hamre, B. K. (2013). Teachers' emotional support consistency predicts children's achievement gains and social skills. *Early Education & Development, 24*(3), 292–309.
- Dishion, T. J., & Patterson, G. R. (2006). The development and ecology of antisocial behavior in children and adolescents. In D. Cicchetti, & D. J. Cohen (Eds.). *Developmental psychopathology, Vol. 3: Risk, disorder, and adaptation* (pp. 503–541). New York: Wiley.
- Doumen, S., Verschueren, K., Buyse, E., De Munter, S., Max, K., & Moens, L. (2009). Further examination of the convergent and discriminant validity of the student–teacher relationship scale. *Infant and Child Development, 18*(6), 502–520.
- Drugli, M. B., & Hjemdal, O. (2013). Factor structure of the student–teacher relationship scale for Norwegian school-age children explored with confirmatory factor analysis. *Scandinavian Journal of Educational Research, 57*(5), 457–466.
- Dwairy, M. A. (2008). Parental inconsistency versus parental authoritarianism: Associations with symptoms of psychological disorders. *Journal of Youth and Adolescence, 37*, 616–626.
- Gest, S. D., Welsh, J. A., & Domitrovich, C. E. (2005). Behavioral predictors of changes in social relatedness and liking school in elementary school. *Journal of School Psychology, 43*, 281–301.
- Graham, J. W., Olchowski, A. E., & Gilreath, T. D. (2007). How many imputations are really needed? Some practical clarifications of multiple imputation theory. *Prevention Science, 8*, 206–213.
- Hamre, B. K., & Pianta, R. C. (2001). Early student-teacher relationships and the trajectory of children's school outcomes through eighth grade. *Child Development, 72*, 625–638.
- Henricsson, L., & Rydell, A. M. (2004). Elementary school children with behavior problems: Student-teacher relations and self-perception. A prospective study. *Merrill-Palmer Quarterly, 50*, 111–138.
- Hill, H. D., Morris, P., Gennetian, L. A., Wolf, S., & Tubbs, C. (2013). The consequences of income instability for children's well-being. *Child Development Perspectives, 7*, 85–90.
- Horner, R., Sugai, G., Smolkowski, K., Todd, A., Nakasato, J., & Esperanza, J. (2009). A randomized control trial of school-wide positive behavior support in elementary schools. *Journal of Positive Behavior Interventions, 11*(3), 113–144.
- Houts, R. M., Caspi, A., Pianta, R. C., Arseneault, L., & Moffitt, T. E. (2010). The challenging pupil in the classroom: The effect of the child on the teacher. *Psychological Science, 21*, 1802–1810.
- Howes, C. (2000). Socio-emotional climate in child care, student-teacher relationships and children's second grade peer relations. *Social Development, 9*, 191–203.
- Howes, C., & Hamilton, C. E. (1993). The changing experience of child care: Changes in teachers and in teacher-child relationships and children's social competence with peers. *Early Childhood Research Quarterly, 8*, 15–32.
- Howes, C., Phillipsen, L. C., & Peisner-Feinberg, E. (2000). The consistency of perceived teacher–child relationships between preschool and kindergarten. *Journal of School Psychology, 38*, 113–132.
- Hughes, J. N., Cavell, T. A., & Jackson, T. (1999). Influence of student-teacher relationship on childhood aggression: A prospective study. *Journal of Clinical Child Psychology, 28*, 173–184.
- Jerome, E. M., Hamre, B. K., & Pianta, R. C. (2009). Teacher–child relationships from kindergarten to sixth grade: Early childhood predictors of teacher-perceived conflict and closeness. *Social Development, 18*, 915–945.
- Kesner, J. E. (2000). Teacher characteristics and the quality of child–teacher relationships. *Journal of School Psychology, 28*, 133–149.
- Kokkinos, C. M., Panayiotou, G., & Davazoglou, A. M. (2005). Correlates of teacher appraisals of student behaviors. *Psychology in the Schools, 42*, 79–89.
- La Paro, K. M., & Pianta, R. C. (2000). Predicting children's competence in the early school years: A meta-analytic review. *Review of Educational Research, 70*, 443–484.
- Ladd, G. W., & Burgess, K. B. (1999). Charting the relationship trajectories of aggressive, withdrawn, and aggressive/withdrawn children during early grade school. *Child Development, 70*, 910–929.
- Ladd, G. W., & Burgess, K. B. (2001). Do relational risks and protective factors moderate the linkages between childhood aggression and early psychological and school adjustment? *Child Development, 72*, 1579–1601.
- Lee, P., & Bierman, K. L. (2015). Classroom and teacher support in kindergarten: Associations with the behavioral and academic adjustment of low-income students. *Merrill-Palmer Quarterly, 61*(3), 383–411.
- Lynch, M., & Cicchetti, D. (1992). Maltreated children's reports of relatedness to their teachers. *New Directions for Child and Adolescent Development, 57*, 81–107.
- MacMillan, R., McMorris, B. J., & Kruttschnitt, C. (2004). Linked lives: Stability and change in maternal circumstances trajectories of antisocial behavior in children. *Child Development, 75*, 205–220.
- Maldonado-Carreño, C., & Votruba-Drzal, E. (2011). Teacher–child relationships and the development of academic and behavioral skills during elementary school: A within-and between-child analysis. *Child Development, 82*, 601–616.
- Marceau, K., Ram, N., & Susman, E. J. (2015). Development and lability in the parent–child relationship during adolescence: Associations with pubertal timing and tempo. *Journal of Research on Adolescence, 25*(3), 474–489.
- Meehan, B. T., Hughes, J. N., & Cavell, T. A. (2003). Teacher–student relationships as compensatory resources for aggressive children. *Child Development, 74*, 1145–1157.
- Molloy, L. E., Ram, N., & Gest, S. D. (2011). The storm and stress (or calm) of early adolescent self-concepts: Within-and between-subjects variability. *Developmental Psychology, 47*, 1589–1607.
- Murray, C., & Murray, K. M. (2004). Child level correlates of teacher–student relationships: An examination of demographic characteristics, academic orientations, and behavioral orientations. *Psychology in the Schools, 41*, 751–762.
- O'Connor, E. (2010). Teacher–child relationships as dynamic systems. *Journal of School Psychology, 48*, 187–218.
- O'Connor, E., & McCartney, K. (2007). Examining student-teacher relationships and achievement as part of an ecological model of development. *American Educational Research Journal, 44*, 340–369.
- O'Connor, E. E., Collins, B. A., & Supplee, L. (2012). Behavior problems in late childhood: The roles of early maternal attachment and teacher–child relationship trajectories. *Attachment & Human Development, 14*(3), 265–288.
- O'Connor, E. E., Dearing, E., & Collins, B. A. (2011). Student-teacher relationship and behavior problem trajectories in elementary school. *American Educational Research Journal, 48*, 120–162.
- Petras, H., Chilcoat, H. D., Leaf, P. J., Jalongo, N. S., & Kellam, S. G. (2004). Utility of TOCA-R scores during the elementary school years in identifying later violence among adolescent males. *Journal of the American Academy of Child & Adolescent Psychiatry, 43*(1), 88–96.
- Pianta, R. C. (2001). *Student–teacher relationship scale*. Odessa, FL: Psychological Assessment Resources.
- Pianta, R. C., La Paro, K. M., Payne, C., Cox, M. J., & Bradley, R. (2002). The relation of kindergarten classroom environment to teacher, family, and school characteristics and child outcomes. *The Elementary School Journal, 102*, 225–238.
- Pianta, R. C., & Stuhlman, M. W. (2004). Student-teacher relationships and children's success in the first years of school. *School Psychology Review, 33*, 444–458.
- Racz, S. J., King, K. M., Wu, J., Witkiewitz, K., McMahon, R. J., & The Conduct Problems Prevention Research Group (2013). The predictive utility of a brief kindergarten screening measure of child behavior problems. *Journal of Consulting and Clinical Psychology, 81*(4), 588–599.
- Ram, N., & Gerstorf, D. (2009). Time-structured and net intraindividual variability: Tools for examining the development of dynamic characteristics and processes. *Psychology and Aging, 24*, 778–791.
- Ram, N., Rabbitt, P., Stollery, B., & Nesselroade, J. R. (2005). Cognitive performance in-consistency: Intraindividual change and variability. *Psychology and Aging, 20*, 623–633.
- Rudasill, K. M., Niehaus, K., Buhs, E., & White, J. M. (2013). Temperament in early childhood and peer interactions in third grade: The role of teacher–child relationships in early elementary grades. *Journal of School Psychology, 51*, 701–716.
- Sandstrom, H., & Huerta, S. (2013). **The negative effects of instability on child development: A research synthesis.** Retrieved from <http://www.urban.org/sites/default/files/alfresco/publication-pdfs/412899-The-Negative-Effects-of-Instability-on-Child-Development-A-Research-Synthesis.PDF>.
- Silver, R. B., Measelle, J. R., Armstrong, J. M., & Essex, M. J. (2005). Trajectories of classroom externalizing behavior: Contributions of child characteristics, family

- characteristics, and the teacher–child relationship during the school transition. *Journal of School Psychology, 43*, 39–60.
- Spilt, J. L., Hughes, J. N., Wu, J. Y., & Kwok, O. M. (2012). Dynamics of teacher–student relationships: Stability and change across elementary school and the influence on children's academic success. *Child Development, 83*, 1180–1195.
- Stormshak, E. A., Bierman, K. L., McMahon, R. J., Lengua, L. J., & CPPRG (2000). Parenting practices and child disruptive behavior problems. *Journal of Clinical Child Psychology, 29*, 17–29.
- Tsigilis, N., & Gregoriadis, A. (2008). Measuring teacher–child relationships in the Greek kindergarten setting: A validity study of the student–teacher relationship scale–short form. *Early Education and Development, 19*(5), 816–835.
- Wahler, R. G., & Dumas, J. E. (1986). Maintenance factors in coercive mother–child interactions: The compliance and predictability hypothesis. *Journal of Applied Behavior Analysis, 19*, 13–22.
- Werthamer-Larsson, L., Kellam, S. G., & Wheeler, L. (1991). Effect of first-grade classroom environment on shy behavior, aggressive behavior, and concentration problems. *American Journal of Community Psychology, 19*, 585–602.
- Yoon, J. S. (2002). Teacher characteristics as predictors of teacher–student relationships: Stress, negative affect, and self-efficacy. *Social Behavior and Personality: An International Journal, 30*, 485–493.