Teacher-Student Relationships, Stress, and Psychosocial Functioning During Early Adolescence

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Abstract

Early adolescence is a time of increased stress and risk for poorer psychosocial functioning, but few studies have explored the relationship between stress and psychosocial functioning in the context of teacher-student relationships during early adolescence. This study used a two-wave longitudinal design to investigate the unique and interactive effects of stress and teacher-student relationships on anxiety/depression, aggression, and rule-breaking behaviors. The sample included 288 6^{th} and 7^{th}-grade students (M_{age}=12.01; 54% females; 47% Black, 36% White, 9% Hispanic) and their parents and teachers. Student-perceived stress and teacher-reported teacher-student conflict were related to more aggressive and rule breaking behaviors at Wave 1; perceived stress also predicted more anxiety/depression symptoms at Wave 1. Further, teacher-reported teacher-student closeness predicted less aggressive behaviors over time. The findings suggest that interventions that promote stress management and positive teacher-student relationships may reduce adjustment problems concurrently and over time among early adolescents.

Keywords: Psychosocial functioning, teacher-student relationships, stress, early adolescence

Teacher-Student Relationships, Stress, and Psychosocial Functioning During Early Adolescence

Adolescence is a key developmental stage when youth experience rapid physiological, social-emotional, and cognitive changes while navigating new responsibilities and relationships (Neinstein, 2016). While many adolescents pass through this period with few problems, some experience increased depression, anxiety, and rule-breaking behaviors (Burt, 2012; Cohen et al., 2018; Gutman & McMaster, 2020). Changes in psychosocial functioning may be partially attributed to stress in relation to pubertal changes, cognitive maturation, and evolving relationships with peers and adults (Christies & Viner, 2005; Crone & Dahl, 2012; Neinstein, 2016). Early adolescent psychosocial functioning is also related to the quality of key interpersonal relationships, including those between the youth and their teachers (Lei et al., 2016; Lester et al., 2013; Roorda & Koomen, 2021). Supportive teacher-student relationships have been associated with lower levels of depression, aggression, and behavioral problems among children and adolescents of various grade levels (Joyce & Early, 2014; Lei et al., 2016; Troop-Gordon & Kopp, 2011), while conflictual teacher-student relationships have been linked with depression, anxiety, aggression, and antisocial behaviors (Jellesma et al., 2015; Lei et al., 2016). However, less is known about the role of teacher-student relationships in psychosocial functioning during early adolescence, especially their negative aspects (Roorda & Koomen, 2021). Finally, few studies have examined whether teacher-student relationships moderate the associations between adolescents' stress and psychosocial functioning. To address these gaps, this study examined the unique and interactive effects of stress and teacher-student relationships on anxiety/depression, aggression, and rule-breaking behaviors in early adolescence through the lens of Developmental Systems Theory (DST).

Developmental Systems Theory

DST is one perspective through which the relationship between stress, teacher-student relationships, and psychosocial functioning can be examined. According to DST, systems include units that work together with other interrelated units to promote survival and development. This includes the developing adolescent (Pianta et al., 2003). Each unit is part of a larger system with reciprocal, bidirectional relationships with other proximal and distal systems (Lerner & Castellino, 2002; Pianta et al., 2003). Proximal systems include biological systems, emotional systems, the nuclear family, or peer relationships; distal systems include teacher-student relationships, school environments, or the broader socio-ecological environment (Lerner, 1998; Pianta et al., 2003). Interactions among various developmental systems over time may promote either continuity or discontinuity (Lerner, 1998). Developmental changes occur when there are changes in any of these interrelated systems that create pressure for systems to adapt (Pianta et al., 2003). System changes are embedded in past historical change. However, change also has a temporal nature in which change is not always the same and may be context-dependent (Lerner & Castellino, 2002).

DST provides a theoretical framework for exploring the relationship between perceived stress, teacher-student relationships, and psychosocial functioning during early adolescence. The developing early adolescent experiences rapid bidirectional changes across multiple interacting systems including biological systems, cognitive systems, peer relationships, parental relationships, teacher-student relationships, community relationships, and schools (Neinstein, 2016). School-related systems, including teacher-student relationships, may be particularly important due to stressors such as transitioning to middle school, increased academic pressure, and evolving parent and peer relationships (Arnett, 1999; Brown et al., 2006; Fite et al., 2019; Washington, 2009). As will be discussed in the subsequent section, higher levels of perceived

stress have been associated with poorer psychosocial functioning (Cumming et al., 2019; Sontag et al., 2011). However, depending upon how the developing adolescent and related systems adapt, these changes and resulting psychological stress during early adolescents could result in either continuity and increased competency or discontinuity that could result in dysfunction and poorer psychosocial functioning (Bronfenbrenner & Morris, 2007; Lerner, 1998). Teacher-student relationships may be one key system for adaptation due to increasing conflict in parent-child relationships and the ability of teachers to provide another supportive adult relationship (Pianta et al., 2003). Consequently, the quality of teacher-student relationships has been associated with students' psychosocial functioning (Jellesma et al., 2015; Joyce & Early, 2014; Lei et al., 2016; Troop-Gordon & Kopp, 2011). Thus, teacher-student relationships provide an important developmental context during early adolescents to navigate change, reduce stress, and influence psychosocial functioning over time. The following sections will examine how these factors are related to psychosocial functioning in early adolescence consistent with DST.

Psychosocial Functioning and Stress in Adolescence

Early adolescence is a time of increased susceptibility to internalizing problems, such as anxiety and depression (McLaughlin & King, 2015). Anxiety and depression increase dramatically in prevalence during adolescence (Ghandour et al., 2019) and often persist into adulthood in the form of both mental health problems and suicidal behavior (Jonsson et al., 2011). Some subgroups are at a greater risk for internalizing problems (Ghandour et al., 2019). Anxiety and depression are more prevalent among children and adolescents that are female, Caucasians, or living in households with lower income levels (Bitsko et al., 2022; Ghandour et al., 2019). Depression is more common in households with parents with lower levels of educational attainment while anxiety is more prevalent in households with parents with higher

levels of educational attainment (Bitsko et al., 2022). Nevertheless, adolescents are still significantly more likely than children between 6 and 11 years old to be diagnosed with anxiety or depression after controlling for these other demographic factors (Ghandour et al., 2019).

Patterns of externalizing behaviors, such as aggression and rule-breaking, also change during adolescence (Burt, 2012; Underwood et al., 2009; Xie et al., 2011). While aggression generally tends to decline from childhood to adolescence, some youth show increasing patterns of physical and social aggression (Underwood et al., 2009). Unlike aggression, rule-breaking typically increases and peaks during adolescence (Burt, 2012; Givens & Reid, 2018). Aggression and rule-breaking during adolescence are associated with higher levels of criminality, increased substance use/abuse, risky sexual behaviors, and poorer academic outcomes over time (Burt, 2012; Okano et al., 2020; Timmermans et al., 2008). Certain populations are at increased risk. Behavioral and conduct issues like aggression and rule-breaking behaviors are more prevalent among male children and adolescents (Bitsko et al., 2022; Ghandour et al., 2019). While behavioral and conduct issues are most common among African American children and adolescents, Caucasians are significantly more likely to have behavioral or conduct issues than Hispanic and other race children and adolescents after controlling for other factors (Bitsko, 2022; Ghandour et al., 2019). Children and adolescents from lower-income households and with parents having lower educational attainment also have a higher prevalence of behavioral or conduct issues (Bitsko, 2022).

One contributing factor to adolescents' psychosocial problems is stress. Early adolescents experience heightened levels of stress due to multiple stressors including changes in parent and peer relationships, developing self-image and identity, academic pressures, and middle school transitions (Arnett, 1999; Brown et al., 2006; Fite et al., 2019; Washington, 2009). These

stressors increase the likelihood of psychological stress, which are interactions between an individual and the environment where stress is perceived to be unmanageable and potentially detrimental to well-being (Lazarus & Folkman, 1984). Increased exposure to stressors and higher stress levels are a risk factor and antecedent to mental health problems and psychosocial issues among adolescents and young adults (Fassett-Carman et al., 2020; Grant et al., 2005; Hankin et al., 2016). Due to puberty-driven physiological and neural changes, early adolescence is also a time of increased sensitivity to stress (Eiland & Romeo, 2013; Romeo, 2013). Thus, studies have found higher perceived stress levels during adolescence were associated with emotional and behavioral problems, poor academic performance, and lower life satisfaction (Burger & Samuel, 2017; Cumming et al., 2019; Goldstein et al., 2015; Sontag et al., 2011). However, many of these studies used a cross-sectional design that cannot establish a temporal relationship between perceived stress and psychosocial functioning. While researchers have suggested that factors can moderate the relationship between stress and psychosocial functioning (Grant et al., 2005), less is known about the specific factors that may exacerbate or buffer the relationships between adolescents' stress and psychosocial functioning (Nelemans et al., 2018).

Teacher-Student Relationships

In accordance with DST, the multiple, ongoing relationships that youth have with adults and other systems either promote successful adaptation or increase the risk for maladaptive development (Pianta et al., 2003). Given the substantial amount of time adolescents spend in school and interacting with teachers, teacher-student relationships represent an important developmental system that can influence youth development (Luo et al., 2020; Pianta et al., 2003). One way that teacher-student relationships can be measured is through teacher or child-reported measures that assess key dimensions of teacher-student relationships like closeness and

conflict (Sabol & Pianta, 2012). Closeness refers to the degree teacher-student relationships are warm, close, open, and secure, whereas conflict describes negative interactions, unpredictability, or underlying conflict between the student and teachers (Pianta, 2001). Teacher-student relationships represent a possible protective factor against emotional and behavioral problems, poor academic performance, and poor parent-child relationships (Sabol & Pianta, 2012).

Indeed, various studies have linked teacher-student relationships with internalizing symptoms. One systematic review found that child-reported supportive teacher-student relationships were associated with better emotional health among adolescents (Kidger et al., 2012). More recent studies also showed that children and adolescents reporting more supportive teacher-student relationships had lower levels of depression (Joyce & Early, 2014; Zhang et al., 2022). Conversely, child-reported teacher-student conflict was associated with greater student-reported anxiety in 9-12 year-old students (Jellesma et al., 2015). Thus, both teacher-student closeness and conflict reported by students have been associated with internalizing symptoms.

Teacher-student relationships have also been associated with externalizing behaviors. A meta-analysis showed that negative teacher-student relationships were associated with more externalizing behaviors in K-12 students, whereas positive teacher-student relationships were associated with fewer externalizing behaviors (Lei et al., 2016). A study of 4th and 5th-grade students found that teacher-reported, teacher-student closeness in the fall predicted lower physical aggression as rated by their peers in the spring of the same academic year (Troop-Gordon & Kopp, 2011). Similarly, conflictual teacher-student relationships reported by teachers in kindergarten through 3rd grade contributed to higher levels of teacher-reported aggression in 5th grade (Lee & Bierman, 2018). Teacher-student conflict reported by students was associated with student-reported externalizing behaviors, including aggression, among 7th through 11th-

grade students (Roorda & Koomen, 2021). Thus, both teacher-reported and student-reported teacher-student relationships have been associated with externalizing behaviors across studies.

Teacher-student relationships are also associated with child stress. One study linked positive teacher-student relationships reported by students with lower levels of student-reported stress and depression in 10th-grade students (Tong et al., 2019). Another study found that 1st-grade students with less supportive teacher-reported teacher-student relationships had flatter diurnal cortisol production based on saliva samples compared to those with supportive teacher-student relationships, suggesting poorer regulation of the stress response (Ahnert et al., 2012). Students reporting positive teacher-student relationships also had lower student-reported psychological distress among high school students who experienced peer victimization (Sulkowski & Simmons, 2018). Thus, both student and teacher-reported teacher-student relationships were associated with stress across studies.

Collectively, there is some evidence that lower quality of teacher-student relationships is associated with internalizing and externalizing problems. However, few studies have examined these relationships specifically during early adolescence when they may be of great importance (Roorda & Koomen, 2021), and most of the studies that have done so utilized cross-sectional designs (Troop-Gordon & Kopp, 2011). Thus, less is known about the prospective effects of teacher-student relationships on psychosocial functioning during early adolescence. Also, while teacher-student conflict likely increases student stress, this negative dimension of teacher-student relationships has received less attention in research (Pratt et al., 2019). Thus, additional research is needed to understand these relationships during this key developmental phase. However, consistent with DST, relationships depend on the interaction of two or more systems. Consequently, previous studies found that primarily student-reported teacher-student

relationships were associated with internalizing symptoms (Joyce & Early, 2014; Kidger et al., 2012; Jellesma et al., 2015; Zhang et al., 2022) while both teacher and student-reported teacher-student relationships were associated with externalizing behaviors (Lee & Bierman, 2018; Roorda & Koomen, 2021; Troop-Gordon & Kopp, 2011). This may be partially due to the reciprocal relationship between externalizing behaviors and teacher-student conflict (Douman et al., 2008; Mejia & Hoglund, 2016; Roorda & Koomen, 2021) along with the influence of externalizing behaviors on teacher-reported teacher-student conflict (Hamre et al., 2008). Thus, consistent with DST, interpretations of teacher-student relationships must consider the informant.

Stress, Teacher-Student Relationships, and Psychosocial Functioning

In addition to the associations among stress, teacher-student relationships, and psychosocial functioning, it is also possible that teacher-student relationships moderate the effects of stress on adolescents' psychosocial functioning. Adolescents' interactions with teachers provide a unique opportunity to provide support, guidance, security, and emotional stability to help deal with stress during early adolescence, whereas conflictual relationships with teachers may exacerbate the effects of stress on psychosocial functioning (Bronfenbrenner & Morris, 2007; Sabol & Pianta, 2012). However, few studies have examined these questions.

One cross-sectional study of 103 students from 7 to 15 years old found that teacher support reported by students attenuated the relationship between student-reported life stressors and parent-reported externalizing problems but not student-reported internalizing problems (Huber et al., 2012). Additionally, positive teacher-student relationships reported by teachers during adolescence attenuated the longitudinal relationships between parent-reported parent-child conflict and student-reported depressive symptoms and conduct problems (Wang et al., 2013). Conversely, greater teacher-student conflict reported by teachers was associated with a

stronger link between parent-reported family stressors and lower literacy as determined by student-completed assessments in a cross-sectional study of kindergarten students (Pratt et al., 2019). Thus, positive and negative qualities of teacher-student relationships may attenuate or exacerbate, respectively, the effects of stress on psychosocial functioning in early adolescence. However, the potential moderating roles of teacher-student closeness and conflict in the links between stress and psychosocial functioning have not been studied in early adolescence.

The Present Study

The present study builds upon previous research on the roles of stress and teacher-student relationships in adolescent psychosocial functioning while addressing gaps identified in this area of research. Specifically, this study expands on the previously identified gaps in the literature by examining teacher-student relationships and psychosocial functioning during early adolescence, examining the prospective effects of teacher-student relationships on psychosocial functioning, and examining the moderating role of teacher-student conflict and closeness on psychosocial functioning during adolescence. Based on the role that the teacher-student relationship system may have concurrently and over time in helping early adolescents adapt to avoid psychosocial problems despite heightened stressors during early adolescents according to the DST, understanding the relationship between stress, teacher-student relationships, and psychosocial functioning is important. If identified as a protective factor against poorer psychosocial, future interventions could target teacher-student relationships to reduce stress and improve psychosocial functioning during this key developmental period.

Thus, the current study examines the unique and interactive effects of stress and teacher-student relationships on concurrent and future psychosocial functioning during early adolescence While fewer studies have explored the relationship between teacher-student relationships and

psychosocial functioning among early adolescents (Lei et al., 2016; Roorda & Koomen, 2021; Zhang et al., 2022), studies among children and adolescents identified that positive teacher-student relationships were associated with better psychosocial functioning and negative teacher-student relationships were associated with poorer psychosocial functioning (Jellesma et al., 2015; Joyce & Early, 2014; Lee & Bierman, 2018; Troop-Gordon & Kopp, 2011). As children transition to early adolescence, teachers can provide a key developmental context that provides continuity and stability to help youth adapt and develop competence to promote psychosocial functioning consistent with studies of younger and older children. Alternatively, teachers can promote discontinuity that may exacerbate other stressors early adolescents experience from other systems, resulting in dysfunction and poorer psychosocial functioning consistent with studies among different aged children. Thus, with the already established relationship between stress and negative outcomes among early adolescents (Goldstein et al., 2015; Sontag et al., 2011), it is hypothesized that higher levels of perceived stress, higher levels of teacher-student conflict, and lower levels of teacher-student closeness will be associated with more anxiety/depression, aggression, and rule-breaking behaviors concurrently and over time. Additionally, it is expected that features of teacher-student relationships will moderate concurrent and prospective associations between stress and anxiety/depression, aggression, and rule-breaking behaviors, such that these relationships will be attenuated at higher levels of teacher-student closeness and exacerbated at higher levels of teacher-student conflict.

Method

Study Design and Participants

The present study used data from Waves 1 and 2 of the Adolescent Diet Study, a school-based study of nutrition, emotional functioning, and academic performance in early adolescence.

The study recruited 288 students (M_{age}=12.01; 54% female; 47% Black, 36% White, 9% Hispanic, 5% Other, 3% Missing) from 15 middle schools in Birmingham, Alabama, from January 2019 to November 2019. The study included 273 6th-grade and 15 7th-grade students who ranged in age from 11.1 years old to 13.7 years old; students from both grades were used due to differing grade levels for the start of middle school in the sampled communities. For each student, one primary caregiver (typically, biological mother) and two academic core teachers (e.g., from Math, Science, Social Studies, Reading) of each child completed confidential questionnaires online; paper copies were also available. The sample was socioeconomically heterogeneous, with an average family income of $30,000-50,000 and average parent education of some college/associate or technical degree. The sample closely mirrored the demographic composition of the Birmingham metropolitan (U.S. Census Bureau, 2020). Approximately 15 months later, 175 (61%) students completed Wave 2 assessments. Retention was negatively impacted by school closures due to the COVID-19 pandemic in 2020-2021, which occurred during Wave 2 assessments. Of the Wave 2 sample, 92 (53%) youth participated prior to school closures in March 2020 (82% retention), however, 83 youth participated in the 2020-2021 school year and during the COVID-19 pandemic (47% retention) when schools used a mixture of remote, hybrid, and on-site learning.

Attrition analyses determined that youth who participated during Wave 2 had lower aggression (M = 0.29, SD = .24 vs. M = 0.37, SD = .34; $t(280) = 2.32$; $p < .05$) and rule breaking behaviors (M = 0.12, SD = .17 vs. M = 0.18, SD = .23; $t(279) = 2.29$; $p < .05$) but higher teacher-student closeness (M = 3.60, SD = .72 vs. M = 3.40, SD = .71; $t(285) = -2.32$; $p < .05$) at Wave 1 compared to those who were lost to follow up. Compared to families who did not participate in Wave 2 (42% non-Hispanic White, 55% racial/ethnic minority, 4% missing), there was a higher

than expected number of racial/ethnic minority youth who participated in Wave 2 (33% non-Hispanic White, 65% racial/ethnic minority, 2% missing; X^2 (1) = 4.54, p <.05). However, there were no differences for participant sex, household income, or parent education for families that participated in Wave 2. These patterns of results suggest that the data can be assumed to be missing at random if Wave 1 aggression, rule-breaking, teacher-student closeness, and racial/ethnic minority are included in the analytic models.

Procedures

Students were recruited from one or two 6th or 7th-grade homerooms in each participating school. Trained project staff presented information about the study to the students and distributed packets containing information about the study and consent forms. Signed parent consent and student assent forms were collected at school approximately one week later (45% participation rate). Data collection began at least three weeks after the beginning of the school year to allow time for youth to build rapport with peers and teachers. All youth data collection activities occurred at school during a regular week (Friday to Friday) and were staggered across the school year for each school with data collected from different schools on different weeks. Students completed a battery of questionnaires during a non-academic class period using electronic tablets. One parent for each youth was emailed a link to an online confidential questionnaire that included measures of child behavior. Paper versions of questionnaires or in-person interviews were also offered in place of the online surveys. For each student, two teachers of core academic subjects were recruited. Teachers were emailed a link to an online confidential questionnaire that included measures of participating students' academic skills and behaviors. Students, parents, and teachers were compensated with gift cards for their time. The same procedures were used at Wave 2 until the COVID-19 pandemic necessitated school closures in March 2020. Data

collection resumed in September 2020 using a home- and lab-based protocol. Youth completed the assessment battery on electronic tablets provided at the research laboratory or at home. Parents were emailed online questionnaires, but teachers could no longer participate. The University of Alabama at Birmingham Institutional Review Board approved all study procedures.

Measures

Psychosocial functioning. Psychosocial functioning was measured at both Wave 1 and Wave 2 using child reports on the Achenbach System of Empirically Based Assessment (ASEBA) Youth Self-Report (YSR) (Achenbach et al., 2011). The YSR is a 112-item assessment that consists of 8 subscales. Youth were asked to rate how true each behavior describes them now or within the last six months. For the current study, the anxious/depressed (10 items; e.g., *I cry a lot;* Cronbach's α = .84 and .89 at Waves 1 and 2), aggressive behaviors (16 items; e.g., *I argue a lot*; Cronbach's α = .84 and 0.81), and rule-breaking behaviors (8 items; e.g., *I lie or cheat;* Cronbach's α = .60 and 0.56) subscales were used. Items were rated on a 3-point scale (0 = *Not true*, 1 = *Somewhat or sometimes true*, 2 = *Very true or often true*). For each subscale, items were averaged, with higher scores indicating more problems.

Teacher-student relationships. At Wave 1, teachers were asked about their current relationship with students by completing the Student-Teacher Relationship Scale (STRS) short-form (Pianta, 2001) consisting of 15 items rated on a 5-point scale ranging from 1 (*Definitely does not apply*) to 5 (*Definitely applies*). The STRS has two subscales of closeness and conflict. Closeness measures the degree to which the teacher-student relationship is warm, close, open, and secure (8 items; e.g., *I share an affectionate, warm relationship with this child*; Cronbach's α = 0.65), while conflict assesses negative interactions, unpredictability, or underlying conflict (7

items; e.g., *This child and I always seem to be struggling with each other*; Cronbach's α = 0.93). Scores were averaged for each scale so that higher scores indicated more closeness and conflict, respectively. Each teacher completed an average of 13.5 STRS. Unlike elementary school students, middle school students typically have multiple teachers. Thus, to ensure a more global measure of the participants' teacher relationships, the closeness and conflict scores were averaged across the two teachers reporting on each youth (correlations: *r*s=.38 and .50; $p<.001$) for the 280 students with measures completed by two teachers. A single score was used for 8 students that were only assessed by one teacher. Utilizing a global measure of teacher-student relationships or similar constructs was consistent with other studies of youth and adolescents with multiple teachers (Behrhorst et al., 2020; Galand & Hospel, 2013; Joyce & Early, 2014; Kim, 2021; Lee, 2015; Valdebenito et al., 2022)

Student stress. At Wave 1, students completed the Perceived Stress Scale for Children (PSS-C; Cohen et al., 1994) which prompted youth to describe how they have felt in the last week. The PSS-C is a 13-item measure of a child's perceived stress in several different areas including stress related to time, school, parent relationships, peer relationships, conflict, and feelings like fear, happiness, and anger (e.g., *In the last week, how often did you feel rushed or hurried; In the last week, how often did you feel worried about grades or school; In the last week, how often did your mom and/or dad make you feel loved*). The PSS-C is a unidimensional scale that measures youth's overall perceived stress on a 4-point scale ranging from 1 (*Never*) to 4 (*A lot*) (White, 2014). All items were recoded so that higher scores indicated more perceived stress and averaged (Cronbach's α = 0.69).

Covariates. Covariates included demographic characteristics of the student and family previously identified as being associated with psychosocial functioning (Bitsko, 2022; Ghandour

et al., 2019), as well as the timing of Wave 2 data collection as before vs. during the COVID-19 pandemic. Parents reported their child's sex (0=*male*; 1=*female*) and race/ethnicity (White, Black/African American, Hispanic/Latino, Asian, American Indian/Alaska Native, Pacific Islander, other). Race/ethnicity was recoded as either non-Hispanic White (0) or racial/ethnic minority (1) for all other races/ethnicities due to small samples from some other races/ethnicities. Socioeconomic status was computed as an average of two standardized indicators, parent-reported annual household income (13-point scale from 1 = < *$5,000* to 13 > *$90,000*) and highest parental education completed (1=*Less than 12th grade/no diploma* to 7=*Graduate or professional degree*). The COVID-19 indicator was coded 0 for youth who completed Wave 2 prior to the pandemic and 1 for those who completed it during the pandemic.

Statistical Analysis

Descriptive statistics and bivariate correlations using Spearman's rho (due to some non-normal distributions) were examined. Concurrent and prospective relationships between teacher-student closeness and conflict, perceived stress, and psychosocial functioning were analyzed with two hierarchical multivariate linear regression models in Mplus version 7.11 (Muthén & Muthén, 2013). The first model tested concurrent relationships between stress, teacher-student relationship, and psychosocial functioning within Wave 1. Step 1 included teacher-student closeness, teacher-student conflict, and perceived stress at Wave 1 as predictors of anxiety/depression, aggression, and rule-breaking behaviors also measured at Wave 1. Covariates included child gender, racial/ethnic minority status, and family socioeconomic status. Step 2 added interactions of centered teacher-student closeness and teacher-student conflict with centered stress to examine moderating effects. All centered variables were created utilizing grand-mean centering. The second model used the same predictors and covariates from Wave 1

to predict psychosocial functioning at Wave 2. Wave 1 psychosocial variables (anxiety/depression, aggression, and rule-breaking) were added as covariates, together with the Wave 2 COVID-19 indicator. Assumptions of multivariate linear regressions were tested prior to analyses. The models utilized robust maximum likelihood estimation (MLR) due to some of the variables not being normally distributed. Missing data (13.4% of data points) were handled with Full Information Maximum Likelihood, which utilizes all available data, provides unbiased estimates and standard errors when data are missing at random, and preserves the full sample size (N = 288) (Enders, 2010).

Results

Preliminary Analyses

Sample demographics are in Table 1; descriptive statistics and bivariate associations are in Table 2. Spearman's rho correlations indicated that student-perceived stress was associated with more teacher-student conflict at Wave 1 and student anxiety/depression, aggression, and rule-breaking behaviors at both Wave 1 and Wave 2. Higher levels of teacher-student conflict were related to lower teacher-student closeness, as well as more aggression and rule-breaking behaviors in Wave 1 and lower levels of anxiety/depression in Wave 2. All the psychosocial variables (anxiety/depression, aggression, and rule-breaking behaviors) were positively intercorrelated within and across waves, except for anxiety/depression and rule-breaking behaviors not being related over time.

Main Analyses

The results of the cross-sectional hierarchical multivariate linear regression model can be found in Table 3. After adjusting for sociodemographic covariates, students' perceived stress was uniquely associated with higher anxious/depressed symptoms, aggressive behavior, and rule

breaking. Teacher-student closeness did not uniquely predict any outcomes, but teacher-student conflict was uniquely associated with more aggressive behavior and rule breaking. Teacher-student relationships did not moderate the concurrent associations between stress and psychosocial functioning. Among the covariates, females and white students reported higher levels of anxious/depressed symptoms.

Table 4 shows the results of the longitudinal model. After adjusting for continuity in psychosocial functioning and other covariates, greater teacher-student closeness was associated with lower aggression over time. However, teacher-student conflict did not emerge as a unique predictor of anxiety, aggression, or rule breaking behavior over time. Likewise, student stress did not uniquely predict any Wave 2 psychosocial problems. Teacher-student relationships did not moderate the prospective associations between stress and psychosocial functioning. Among the covariates, females reported higher levels of anxious/depressed and aggressive behaviors, whereas the racial/ethnic minority students reported more anxious/depressed behaviors; all psychosocial problems were moderately stable over time; and students assessed during the pandemic had lower levels of anxious/depressed, aggression, and rule breaking behaviors at Wave 2.

Discussion

This study examined whether perceived stress, teacher-student relationships, and their interaction were associated with concurrent and prospective levels of anxiety/depression, aggression, and rule-breaking behaviors among early adolescents. Although students' perceived stress was correlated with lower levels of psychosocial functioning concurrently and over a 15-month period, it was uniquely associated with only concurrent psychosocial functioning but not future anxious/depressed, aggression, or rule-breaking behaviors over time. Additionally,

teacher-student conflict demonstrated unique relationships with concurrent aggressive and rule-breaking behavior but was not associated with psychosocial adjustment over time. Teacher-student closeness was only uniquely related to aggression over time, and student-teacher relationship quality did not moderate associations between students' perceived stress and psychosocial functioning.

Consistent with other cross-sectional studies (e.g., Cumming et al., 2019), student-perceived stress was uniquely related to concurrent lower, student-reported psychosocial functioning. Based on the DST's concepts of integration and relationism, multiple systems interact with the developing early adolescent to bring about change and adaptation (Lerner & Castellino, 2002). The PSS-C measures the youth's perceived stress from multiple internal systems (sense of belonging, emotional systems, biological needs) and external systems (parent relationships, peer relationships, school environment) (White, 2014). Thus, the concurrent relationship between perceived stress and psychosocial functioning may be understood by the potential influence of multiple systems on the developing early adolescent influencing both variables, but future studies are needed to better understand the temporal relationship between these variables and stressors during early adolescence.

However, perceived stress was not associated with psychosocial functioning over time. Early adolescence is characterized by rapid physiological and cognitive development accompanied by changing relationships (Neinstein, 2016). Thus, while continuity was hypothesized in the relationship between stress and prospective psychosocial functioning, interactions with multiple internal and external systems provide opportunities for youth to adapt and change, resulting in less stability in perceived stress between waves. In support of this explanation, one study found perceived stress reported by adolescents varied depending upon the

situation type and systems impacted (Seiffge-Krenke et al., 2009). Thus, perceived stress may have fluctuated between Waves 1 and 2, resulting in a less clear relationship between stress at Wave 1 and future psychosocial functioning. Alternatively, the PSS-C only measured perceived stress in general domains in the last week (White, 2014). The scale did not consider the intensity, duration, or frequency of these stressors. Thus, these stressors may be of transient nature and not affect psychosocial functioning over time. By contrast, more severe and chronic forms of stress (e.g., child maltreatment or household dysfunction) may have a stronger influence on youth that results in continuity of poorer psychosocial functioning (Bucci et al., 2016). The PSS-C was also a unidimensional measure of stress in several domains (White, 2014). There may have been stability or variations in various forms of stress over time that were not captured by this instrument. Finally, since only the cross-sectional relationship between perceived stress and psychosocial functioning was significant, it is less clear whether perceived stress has a reciprocal or causal relationship with psychosocial functioning. Thus, while greater perceived stress was associated with poorer psychosocial functioning, poorer psychosocial functioning could also contribute to elevated levels of perceived stress over time (Galaif et al., 2003). To better understand the relationship between stress and psychosocial stress over time, future studies should consider more frequent, repeated measures of perceived stress and psychosocial functioning, include measures across waves, explore more severe forms of stress, and explore the bidirectional relationship between perceived stress and psychosocial functioning during early adolescence.

In partial support of the hypotheses, higher teacher-student conflict reported by teachers was uniquely related to more student-reported aggression and rule-breaking behaviors, but not anxiety/depression symptoms in the cross-sectional model. These findings are consistent with

other studies that found concurrent links between negative aspects of the teacher-student relationship and more externalizing problems (Baker, 2006; Lee & Bierman, 2018). Another study among 7th to 11th graders found similar findings in which student-rated teacher-student relationship conflict was associated with higher levels of externalizing behaviors but not internalizing issues (Roorda & Koomen, 2021). When considering DST (Lerner & Castellino, 2002), students have reciprocal relationships with their teachers where interactions between teachers and students influence both systems, their interactions, and subsequent behaviors. However, due to the nature of internalizing symptoms, this reciprocal relationship may not be as evident. In contrast, teacher-student relationship conflict may result in increased student externalizing behaviors while increased externalizing behaviors may result in more conflictual teacher-student relationships. Other studies examining reciprocal effects found that students' externalizing behaviors predicted higher levels of teacher-student relationship conflict (Douman et al., 2008; Mejia & Hoglund, 2016; Roorda & Koomen, 2021).

Nevertheless, this study suggests that the relationship between teacher-reported teacher-student conflict and student-reported externalizing issues may not be as persistent over time. As youth progress to a new grade with different teachers, early adolescents likely draw on historic teacher-student relationships, but the introduction of new teachers and interactions with other systems during and between waves may have brought about change and adaptation that differentially influenced psychosocial functioning. In support of this explanation, a longitudinal study of elementary school students found that high levels of teacher-reported teacher-student relationship conflict declined among most boys and girls with only small subsets of children experiencing consistently high teacher-student conflict across grade levels (Split et al., 2012). Thus, teacher-student conflict may be less persistent over time. In addition, teacher-reported

teacher-student relationship conflict has been found to also be associated with characteristics of the individual teacher or classroom (Hamre et al., 2008), further supporting that teacher-student relationship conflict may not be as persistent across teacher-student relationships. Nevertheless, these findings contrast with other studies where teacher-student conflict was associated with future externalizing issues among elementary school students (Lee & Bierman, 2018) and 7th through 11th-grade students (Roorda & Koomen, 2021). However, unlike elementary school students, early adolescents often have multiple teacher-student relationships, creating more opportunities for youth to adapt through these relationships. Also, the study exploring 7th through 11th graders explored student-reported relationships with teachers of two subjects (math and Dutch). Only teacher-student conflict with the math teacher, not the Dutch teacher, was associated with externalizing behaviors (Roorda & Koomen, 2021). Other studies have found that teacher-student relationships may differ by subject or based on the ratio of positive to negative teacher-student relationships (Martin & Collie, 2019; Roorda & Bosman, 2022; Roorda et al., 2019). Thus, the relationship between teacher-student relationships and psychosocial functioning for students with multiple teachers may be more nuanced. Future studies should explore how to best understand teacher-student relationships among multiple teachers and how they relate to psychosocial functioning over time.

The hypotheses were partially supported for the effect of teacher-student closeness on psychosocial behaviors over time. Teacher-student closeness was associated with students' aggression over a year later, but not anxiety/depression or rule breaking behaviors. These results contrast with other studies that linked teacher-student closeness with lower levels of depression and externalizing behaviors in students (Joyce & Early, 2014; Lei et al., 2016; Zhang et al., 2022). However, unlike this study, those studies utilized student perceptions of teacher-student

relationships or involved younger students. The current study also only measured teacher-student relationships at one point in time. Student-reported relationships may have given a fuller understanding of the teacher-student relationships due to possible varying perceptions of the relationship by students and teachers. Given the dynamic nature of relationships, there could also be fluctuations throughout the school year with more persistent and stable relationships having the greatest impact consistent with studies with younger populations (Miller-Lewis et al., 2014). This study also only included measures from two teachers per student; STRS completed by all teachers may provide a fuller understanding of early adolescent teacher-student relationships. Future studies that incorporate multi-informant measures and repeated teacher-student relationship measures with all teachers across grade levels may provide a fuller understating of teacher-student relationships and psychosocial functioning.

Nevertheless, this study did find that teacher-student closeness was associated with lower levels of aggression one year later. Early adolescence is a period of change in multiple domains that are impacted by multiple dynamic systems including peers, parents, other adults, and other developing systems (Lerner & Castellino, 2002; Neinstein, 2016). Due to these factors, anxiety and depression typically become more prevalent during adolescence (Burt, 2012; Ghandour et al., 2019; Givens & Reid, 2018). Thus, while teacher-student closeness may be adaptive, these other systems also interact to potentially have a great impact on these specific psychosocial issues. However, unlike depression, anxiety, and rule breaking behaviors, aggression typically declines throughout adolescence (Underwood et al., 2009). Interactions from multiple systems likely contribute to this decline, but this study suggests that teacher-student closeness may be a key factor in reducing aggression during early adolescence. These patterns may be more visible over time than concurrently since consistent, stable supportive teacher relationships likely create

an environment through which youth adapt, and their behaviors change. Consistent with DST, the student's positive interactions with teachers in one grade also likely influence the student's perception of teachers in subsequent grades. Teachers are also part of a larger system, the school, which likely contributes to their approach with students, discipline, and relationships (Pianta et al., 2003). Thus, these developmental systems work together to create changes in both teachers and students in which students are less likely to engage in aggressive behavior. This decline in aggressive behavior due to teacher-student closeness over time was also consistent with another study of 4th and 5th-grade students (Troop-Gordon & Kopp, 2011). Thus, interventions and environments that promote positive teacher-student relationships can potentially contribute to lower levels of student aggression during this developmental period.

Finally, the hypothesis of teacher-student relationship qualities reported by teachers moderating links between student-reported stress and psychosocial functioning was not supported. These results contradict prior research where teacher-reported teacher-student conflict amplified the association between parent-reported family stress and poor academic performance on student-completed assessments among younger students (Pratt et al., 2019). However, this study primarily focused on academic outcomes among kindergarten students, who spend more time with an individual teacher. Academic outcomes may also have a stronger relationship with teacher-student relationships. In another study, positive teacher-student relationships reported by teachers attenuated a longitudinal link between parent-reported negative family relationships and student-reported adolescent misconduct (Wang et al., 2013). While this study was with an older youth with multiple teachers, both studies explored whether teacher-student relationships moderated the relationship between either family stressors or negative parent-child relationships and an outcome (Pratt et al., 2019; Wang et al., 2013). These studies added an additional

developmental system (families or parent-child relationships) not fully included in this study. Since early adolescent development is influenced by the interaction of multiple systems (Lerner & Castellino, 2002; Pianta, 2003), the addition of family relationships likely provided a better understanding of the factors that influence childhood development. Having at least one supportive adult relationship is also one of the strongest factors that mitigate the impact of stressors on youth adjustment (National Scientific Council on the Developing Child, 2015). Thus, a supportive teacher relationship among youth with poorer family/parent relationships may be more impactful. Such relationships were not observed in this study. As discussed previously, a fuller report on teacher-student relationships from multiple informants, including the student, and measures of stress and teacher-student relationships over time may also help to better understand how teacher-student relationships and stress influence psychosocial functioning. Future studies should include measures of parent-youth relationships to explore whether teacher-student relationships have a differential effect on students with poorer parent relationships.

Nevertheless, building on previous studies (Lee & Bierman, 2018; Lei et al., 2016; Roorda & Koomen, 2021; Troop-Gordon & Kopp, 2011), this study further established the relationship between teacher-student relationships and externalizing behaviors. Given the importance of teacher-student relationships, schools should seek to implement evidence-based teacher-student relationship interventions like Establish-Maintain Restore (Cook et al., 2019; Duong et al., 2019; Gaias et al., 2020) or Keys2Teach (Hoogendijk et al., 2020) to provide a supportive developmental context to navigate changes during early adolescence. In the absence of school-wide interventions, teachers can potentially promote positive teacher-student relationships utilizing strategies from these interventions like establishing consistency and guidelines, ensuring a high number of positive to negative interactions, creating opportunities for

one-on-one interactions with each student, and proactively resolving any student conflict that occurs (Keane & Evans, 2022).

Limitations

This study has some limitations that should be considered. First, teacher-student relationships were assessed based on teachers' reports. Student perceptions may have provided additional information to better understand how teacher-student relationships relate to students' psychosocial functioning. The teacher-student relationship measure was also averaged across two teachers to provide a more global measure of the student's relationship with teachers. While other studies have used similar global measures of teacher-student relationships (Behrhorst et al., 2020; Galand & Hospel, 2013; Joyce & Early, 2014; Kim, 2021; Lee, 2015; Valdebenito et al., 2022), some research has suggested that students with multiple teachers may have varying relationships with different teachers that can differentially impact various outcomes (Martin & Collie, 2019; Roorda & Bosman, 2022; Roorda et al., 2019). Furthermore, the correlations between teachers were low for teacher-student closeness and moderate for teacher-student conflict (Koo & Li, 2016). Thus, alternative methods may have identified that certain teacher relationships have a greater impact on psychosocial functioning or the relationship between stress and psychosocial functioning during secondary education. However, previous research has not established a consistent methodology to best capture teacher-reported teacher-student relationships among secondary-school students. Future research is needed to identify the best way to measure teacher-student relationships for older students with multiple teachers.

In addition, race/ethnicity was dichotomized due to smaller samples from certain races/ethnicities. However, the dichotomized variable likely did not fully capture the relationship between race and psychosocial functioning nor control for differences among minority youth

populations of different races previously identified in the literature (Bitsko, 2022; Ghandour et al., 2019). Also, this study measured general perceived stress among students over the last week. While increased levels of stress do have a relationship with psychosocial functioning (Grant et al., 2005; Hankin et al., 2016; Fassett-Carman et al., 2020), more severe and prolonged stress may have a greater impact on psychosocial functioning than the types of stress captured by the PSS-C (Frank, 2014). The measures of perceived stress and psychosocial functioning used in this study were also not school-specific (Achenbach et al., 2011; White, 2014); teacher-student relationships may have had a stronger relationship with measures of school-related stress and psychosocial functioning.

Also, the scale used to measure aggression in this study did not differentiate between different forms of aggression (i.e., relational and physical aggression); future studies should consider how the variables in this study may have differing relationships with various forms of aggression. Additionally, some measures had relatively low internal consistency, which may have attenuated their associations with other variables. In particular, the STRS closeness scale had lower internal consistency, which may be attributed to some items being less applicable to teacher-student relationships during early adolescence (Koomen et al., 2012).

Further, this study focused on students in general education classrooms; the relationships with psychosocial functioning may be stronger in higher-risk populations. Thus, research is needed to examine whether teacher-student relationships have a stronger link with psychosocial functioning among higher-risk populations. Finally, longitudinal retention was negatively affected by the COVID-19 pandemic, which may have also influenced students' reports of psychosocial functioning in Wave 2. Attrition analysis did identify some differences between Wave 1 youth that participated in Wave 2 compared to those who did not. Thus, the longitudinal

results need to be interpreted with caution and would benefit from replication in future studies.

Conclusions

This study yielded several interesting findings. First, the results showed that perceived stress was associated with lower levels of psychosocial functioning both concurrently and over time, but it was uniquely related only to concurrent adjustment. This suggests that interventions that promote stress management strategies in schools could potentially reduce adjustment problems for students during early adolescence. However, additional research is needed to better understand what types of stress contribute to psychosocial functioning during early adolescence and which protective factors attenuate these relationships. Second, teacher-student conflict was uniquely associated with students' concurrent aggression and rule breaking, whereas teacher-student closeness was uniquely associated with aggression over time. These findings demonstrate the connections between student behavior and relationships with teachers during the critical middle school years. This highlights the importance of promoting positive teacher-student relationships in schools. Additional research is needed to further understand the relationships between teacher-student relationship qualities and psychosocial functioning among higher-risk early adolescents.

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Table 1

Sample Demographics

	N	%
Child Gender		
Female	155	54%
Male	133	46%
Race		
White, Non-Hispanic	104	36%
Non-White or Hispanic	176	61%
Missing	8	3%
Total Household Income		
$15,000 or less	40	14%
$15,001 to $30,000	43	15%
$30,001-$50,000	49	17%
$50,001 to $70,000	27	9%
$70,001 to $90,000	23	8%
More than $90,000	63	22%
Missing	43	15%
Parent Education		
Less than 12th grade, no diploma	25	9%
High school graduate/GED	48	17%
Some college, no degree	57	20%
Technical school degree	12	4%
Associate degree	27	9%
Bachelor's degree	53	18%
Graduate or professional degree	40	14%
Missing	26	9%

Note: N=288

Table 2

Correlations and Descriptive Statistics of Predictor and Outcome Variables

Variable	M	SD	Range	N	1.	2.	3.	4.	5.	6.	7.	8
1. Perceived Stress (W1)	2.01	0.45	1.08-3.54	282								
2. TSR Closeness (W1)	3.52	0.72	1.56-5.00	288	0.01							
3. TSR Conflict (W1)	1.43	0.68	1.00-4.86	288	0.24**	-0.20**						
4. Anxious/Depressed (W1)	0.39	0.38	0.00-1.80	283	0.38**	0.05	-0.06					
5. Anxious/Depressed (W2)	0.46	0.47	0.00-1.80	175	0.23**	0.02	-0.16*	0.59**				
6. Aggressive Behaviors (W1)	0.32	0.29	0.00-1.50	283	0.38**	-0.02	0.18**	0.47**	0.24**			
7. Aggressive Behaviors (W2)	0.30	0.27	0.00-1.44	175	0.27**	-0.07	0.04	0.39**	0.52**	0.56**		
8. Rule-Breaking (W1)	0.14	0.20	0.00-1.14	282	0.32**	-0.07	0.18**	0.22**	0.02	0.57**	0.32**	
9. Rule-Breaking (W2)	0.15	0.21	0.00-1.57	175	0.18*	-0.03	-0.05	0.14	0.27**	0.31**	0.53**	0.43**

Note: *p<0.05; **p<0.01; W1 – Wave 1; W2 – Wave 2; TSR – teacher-student relationship

Table 3

Multivariate Regression Analysis Predicting Wave 1 Psychosocial Functioning from Wave 1 Stress, Teacher-Student Relationships, and Covariates

	Anxious/Depressed β (SD)	Aggressive behaviors β (SD)	Rule breaking β (SD)
Step 1			
Perceived Stress	0.49 (0.05)**	0.34 (0.06)**	0.28 (0.05)**
Teacher-Student Closeness	0.04 (0.06)	0.00 (0.05)	-0.03 (0.06)
Teacher-Student Conflict	-0.03 (0.07)	0.19 (0.07)*	0.15 (0.08)*
Female	0.14 (0.05)*	0.09 (0.06)	-0.01 (0.06)
Racial/Ethnic Minority	-0.15 (0.06)**	-0.06 (0.06)	0.01 (0.06)
Family SES	0.03 (0.06)	-0.07 (0.06)	-0.12 (0.07)
Step 2			
Closeness X Stress	0.06 (0.06)	0.05 (0.05)	0.03 (0.06)
Conflict X Stress	-0.05 (0.08)	-0.03 (0.08)	0.03 (0.08)
R^2	0.26	0.19	0.15

Note: *p<0.05; **p<0.01

Table 4

Multivariate Regression Analysis Predicting Wave 2 Psychosocial Functioning from Wave 1 Stress, Teacher-Student Relationships, and Covariates

	Anxious/Depressed β (SD)	Aggressive behaviors β (SD)	Rule breaking β (SD)
Step 1			
Perceived Stress	0.09 (0.09)	0.11 (0.07)	0.01 (0.08)
Teacher-Student Closeness	-0.08 (0.06)	-0.14 (0.06)*	-0.11 (0.06)
Teacher-Student Conflict	-0.07 (0.08)	0.02 (0.06)	-0.06 (0.06)
Female	0.20 (0.06)**	0.12 (0.06)*	0.02 (0.07)
Racial/Ethnic Minority	-0.14 (0.07)*	-0.05 (0.06)	0.09 (0.06)
Family SES	0.01 (0.07)	-0.05 (0.06)	-0.06 (0.06)
Anxious Depressed	0.50 (0.08)**	0.05 (0.07)	-0.04 (0.08)
Aggressive Behaviors	0.07 (0.11)	0.58 (0.09)**	0.38 (0.13)**
Rule Breaking	-0.13 (0.08)	0.03 (0.09)	0.24 (0.09)**
COVID-19 pandemic	-0.13 (0.06)*	-0.12 (0.05)*	-0.11 (0.06)*
Step 2			
Closeness X Stress	0.05 (0.08)	0.05 (0.05)	0.03 (0.05)
Conflict X Stress	0.12 (0.08)	0.09 (0.06)	0.03 (0.06)
R^2	0.40	0.53	0.38

Note: *p<0.05; **p<0.01