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Rudasill, Kathleen Moritz; Pössel, Patrick; Black, Stephanie Winkeljohn; and Niehaus, Kate, "Teacher support mediates concurrent and longitudinal associations between temperament and mild depressive symptoms in sixth grade" (2014). *Educational Psychology Papers and Publications*. 166.

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Teacher support mediates concurrent and longitudinal associations between temperament and mild depressive symptoms in sixth grade

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Abstract

The combination of changes occurring at the transition to middle school may be a catalyst for the onset of depressive symptoms, yet teacher support at this transition is protective. Research points to certain temperamental traits as risk factors for developing depressive symptoms. This study examines student reports of teacher support and teacher reports of student-teacher relationship (STR) quality as mediators of associations between child temperament (i.e. negative emotionality at age 4½ : and emotional reactivity in elementary grades) and depressive symptoms in sixth grade. Results indicate (a) negative emotionality predicted emotional reactivity and depressive symptoms; (b) emotional reactivity predicted depressive symptoms; (c) students' perceptions of teacher support (in grade 6) and teachers' perceptions of STR quality (in grades 4-6) predicted depressive symptoms; and (d) student-teacher conflict mediated associations between emotional reactivity and depressive symptoms. Findings point to the importance of teacher support and positive STRs during the transition to middle school.

Keywords: temperament, teacher support, student-teacher relationships, depression, structural equation modelling

The transition to middle school can be difficult as students experience simultaneous cognitive, emotional, social, physical, and environmental shifts (Eccles, Lord, Roeser, & Barber, 1997). The combination of these changes may be a catalyst for the onset of depressive symptoms. However, teacher support or positive relationships with teachers may be protective. Research shows that growth in perceptions of teacher support among middle school students corresponds to decrements in depressive symptoms (Reddy, Rhodes, & Mulhall, 2003). A recent longitudinal study by Pössel, Rudasill, Sawyer, Spence, and Bjerg (2013) showed reciprocal associations between depressive symptoms and adolescents' perceptions of teacher support across grades 8-12, such that more depressive symptoms predicted lower teacher support and lower teacher support predicted more depressive symptoms.

Although abundant research has connected adolescent depression to environmental forces, such as peer networks and family systems (Frey & Rothlisberger, 1996; Kerr, Preuss, & King, 2006; Newman, Newman, Griffen, O'Connor, & Spas, 2007; Rueger, Malecki, & Demaray, 2010), there is less work aimed at understanding the role of *school* environments, particularly teachers, in the development of depressive symptoms in early adolescence (for exceptions, see Murberg & Bru, 2004, 2009; Reddy et al., 2003; Rueger et al., 2010). There is ample evidence linking children's temperament with depressive symptoms (Compas, Connor-Smith, & Jaser, 2004), as well as emerging research linking children's temperament to teachers' perceptions of student teacher relationship (STR) quality in childhood and early adolescence (Rudasill & Rimm-Kaufman, 2009; Rudasill, Reio, Stipanovic, & Taylor, 2010). However, there has not been work on the combined contributions of children's temperament and teacher support (both student and teacher reports) to depressive symptoms in early adolescence. Thus, the purpose of the present study is to examine the extent to which students' perceptions of teacher support and teachers' perceptions of STR quality mediate associations between child temperament (i.e. negative emotionality rated at approximately age 4½, years and emotional reactivity rated in fourth, fifth, and sixth grades) and depressive symptoms in sixth grade.

Teacher support and depressive symptoms

Teacher support is important for students' psychological well-being (Demaray, Malecki, Rueger, Brown, & Summers, 2009). Research has revealed associations between adolescents' perceptions of support at school and depressive symptoms (Kovacs, 1989; Ross, Schochet, & Belair, 2010). Ross et al. (2010) found that school climate was negatively related to internalizing (i.e. anxiety and depressive) symptoms among sixth and seventh graders. In addition, a more positively regarded school climate was protective against internalizing symptoms for students higher in self-criticism in sixth and seventh grades and lower in self-efficacy in sixth grade. Reddy et al.'s (2003) longitudinal study across sixth-eighth grades showed increases in students' perceptions of teacher support reliably predicted increases in self-esteem and decreases in depressive symptomology over time. Although our searches of the literature revealed no research examining associations between teachers' perceptions of STR quality and children's or adolescents' depressive symptoms, evidence suggests they are related. Specifically, children with more internalizing symptoms are also likely to be rated by teachers as having STRs that are more conflictual (Murray & Murray, 2004), more dependent (Murray & Murray, 2004), and less close (Henricsson & Rydell, 2004). However, there remains a paucity of research examining teacher support as measured by teachers' perceptions of STR quality and depressive symptoms, particularly at the transition to middle school.

Temperament and depression

Temperament refers to an individual's general style of responding to people, events, and things in the environment (Thomas & Chess, 1977). It emerges from complex interactions between biology and environment (Shiner et al., 2012), and it is somewhat stable, yet developmentally fluid (Rothbart & Posner, 2005). That is, an individual's reaction to meeting a new person at three years old is likely to be quite different from his or her reaction to meeting a new person

at 15 years old; yet the initial tendency to approach or withdraw is likely to remain the same. Temperament is posited to have multiple dimensions, such as activity level, anger, shyness, and attention, and may be categorized as either reactive (i.e. an individual's emotional reaction to stimuli) or regulatory (i.e. an individual's ability to control the emotional or behavioral reaction to stimuli) (Rothbart & Bates, 2006).

Both reactive (e.g. negative emotionality) and regulatory (e.g. effortful control) aspects of temperament have been linked to depression (Compas et al., 2004; Verstraeten, Vasey, Raes, & Bijttebier, 2009), but evidence is particularly strong for the positive association between negative emotionality and depression (Compas et al., 2004; Loukas & Robinson, 2004; Verstraeten et al., 2009). Emotionality, both positive and negative, refers to the intensity of emotional response to environmental stimuli. A higher level of emotionality is indicative of a lower sensitivity threshold—less stimulation is needed to elicit a reaction (Rothbart & Bates, 2006). Negative emotionality is the extent to which an individual displays intense negative reactions to the environment, such as anger, fear, or sadness (Rothbart & Bates, 2006). Higher levels of negative emotionality are related to both anxiety and depression. Conversely, higher levels of positive emotionality are related to lower levels of depression (see Compas et al., 2004).

Much of the work linking temperament to depression uses concurrent ratings of both, thus limiting our understanding of the direction of effects between temperament and depression. Thus, one contribution of the current study is the simultaneous use of both early and concurrent ratings of temperament to predict depressive symptoms to gather temporal evidence of causality as well as a more complete picture of how temperament is related to depressive symptoms.

Temperament and teacher support

Children's negative emotionality is related to poorer social outcomes (Eisenberg et al., 1997), and a growing body of work links children's temperament to teachers' perceptions of STR quality in preschool, elementary school, and early middle school. Evidence suggests temperament characteristics associated with negative emotionality predict poorer teacher perceptions of relationships with students. Justice, Cottone, Mashburn, and Rimm-Kaufman (2008) found that higher levels of anger predicted more teacher-child conflict in preschool and Eisenhower, Baker, and Blacher (2007) found higher activity and demandingness at age three predicted lower quality teacher-child relationships at age six. Similarly, individuals with more difficult temperament (e.g. higher anger and lower inhibitory control) at preschool age had more conflict in relationships with teachers in late elementary and early middle school grades (Rudasill et al., 2010). However, DiLalla, Marcus, and Wright-Phillips (2004) did not find a long-term association between negative emotionality at preschool age and STR quality six to eight years later. Our searches of the literature revealed no work linking temperament to *students'* perceptions of teacher support in adolescence. Thus, one contribution of the present study is to connect early ratings of negative emotionality to students' ratings of teacher support in sixth grade.

The present study

The goal of present study is to gain traction on the prevention of depression in adolescence by understanding how teacher support may mediate associations between temperament and depression in early adolescence. To that end, we ask the following research questions.

- (1) (a) Are temperament ratings (negative emotionality from age 4½, years and emotional reactivity from fourth to sixth grades) related to students' perceptions of teacher support in sixth grade?
b) Do students' perceptions of teacher support in sixth grade mediate associations between children's temperament and their depressive symptoms in sixth grade?
- (2) (a) Are temperament ratings (negative emotionality from age 4½, years and emotional reactivity from fourth to sixth grades) related to teachers' perceptions of teacher support in fourth to sixth grades?
b) Do teachers' perceptions of teacher support in fourth to sixth grades mediate associations between children's temperament and their depressive symptoms in sixth grade?

Method

Participants

Participants were drawn from the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care and Youth Development (SECCYD). Extensive information about the sample, measures, and procedures is available at <https://secc.rti.org>. In 1991, mothers giving birth in hospitals in 10 cities in the USA were recruited for participation in the SECCYD. Of those willing and eligible for participation, 1364 were randomly selected and included. Data from the current study are from Phase II of the study when children were pre-school aged (approximately 4½, years old) and Phase III of the study when children were in fourth, fifth, and sixth grades. From the original sample ($N = 1364$), 1226 children were still enrolled at the beginning of Phase II. However, 70 of those participants were missing data on all key variables (temperament, teacher support, and depressive symptoms) yielding a final sample of 1156 participants (592 boys and 564 girls).

In terms of race/ethnicity, 82% were white, 12% were black/African-American, 1.6% were Asian/Pacific Islander, 0.4% were American Indian, Eskimo, or Aleut, and 6% were Other. The mean income-to-needs ratio for the initial sample, at birth, was 2.86 ($SD = 2.61$). The mean income-to-needs ratio for families of children remaining in the study in fifth grade ($n = 996$) was 4.53 ($SD = 4.06$). An income-to-needs ratio of 3.0 indicates "middle class" (Conger, Conger, & Elder, 1997).

Data from participating teachers were also collected. Teachers in fourth grade ($n = 932$) had 11.29 years of public school teaching experience ($SD = 10.24$), and were predominantly white ($n = 851$, 91% of those reporting race). Teachers in fifth grade ($n = 1045$) had 12.04 years of public school teaching experience ($SD = 10.62$), and were predominantly white ($n = 859$, 82% of those reporting race). Teachers in sixth grade ($n = 873$) had 11.55 years of public school teaching experience ($SD = 10.44$), and were predominantly white ($n = 794$, 91% of those reporting race). Typically only one study child was placed in a class; thus, most of the sample was not nested (i.e. over 93%).

Measures

Depression

Self reported depressive were measured in 6th grade with the Children's Depression Inventory (CDI Short Form; Kovacs, 1992), the most widely used self-report measure of depressive

symptoms in children (Kovacs, 1985, 1992). The CDI differentiates between normal and clinically depressed youth (Carey, Faulstich, Gresham, Ruggiero, & Enyart, 1987). Each of the 10 items on the Short Form employs a three-point scale (*e.g.*, 0 = "I am sad once in a while." 1 = "I am sad many times." 2 = "I am sad all the time."), with higher scores indicating more severe symptoms during the past two weeks. The possible range for total scores on the Short Form is 0-20. Internal consistency of the CDI in the current sample was .76.

Mother report of their children's depressive symptoms was measured in 6th grade with the Diagnostic and Statistical Manual of Mental Disorders oriented Affective Problems subscale of the Child Behavior Checklist for Ages 6-18 (CBCL/6-18; Achenbach, Dumenci, & Rescorla, 2003; Achenbach & Rescorla, 2001). Each of the 14 items of this subscale asks parents to respond regarding their children's mood and behavior within the past six months; parents respond on a Likert-type scale ranging from 0 (not true) to 2 (very true or often true), with higher scores indicating more agreement regarding symptoms. Total scores range from 0 to 28. Internal consistency of the CBCL Affective Problems was .72 in the current sample.

Temperament

Mothers completed eight subscales from the Children's Behavior Questionnaire (CBQ; Rothbart, Ahadi, & Hershey, 1994) when children were approximately 4½ years old. The CBQ asks parents to respond to items regarding their children's behavior within the past six months; parents respond on a Likert-type scale ranging from 1 (extremely untrue) to 7 (extremely true). Subscales used for the current study were selected to capture negative emotionality (Anger/Frustration, Fear, and Sadness). The Anger/Frustration subscale has 10 items; a higher score indicates more anger and frustration. Some items are "Has temper tantrums when s/he does not get what s/he wants" and "Becomes easily frustrated when tired." Internal consistency for this subscale was .78. The Fear subscale also has 10 items; a higher score is indicative of more fear. Some items are "Is afraid of loud noises" and "Is not afraid of large dogs and/or other animals (reversed)." Internal consistency for this subscale was .60. The Sadness subscale has 10 items; a higher score indicates more sadness. Some items are "Cries sadly when a favorite toy gets lost or broken" and "sometimes appears downcast for no reason." Internal consistency for this subscale was .59.

Children's emotional responses to events and environmental stimuli were rated by mothers using a measure designed for use in the NICHD SECCYD. Mothers responded to 10 items about their children's emotional reactions on a scale from 1 (never) to 5 (always) where a higher score indicated more emotional reactivity or intensity. Mothers completed this instrument; we used scores from fourth, fifth, and sixth grades. Responses were summed to form emotional reactivity scores for each grade. Some items are "My child is slow to become angry, nervous, or upset (reversed)", and "When my child feels an emotion, either positive or negative, my child feels it strongly." Internal consistency scores for the scale in fourth, fifth, and sixth grades were .74, .77, and .78, respectively.

STR quality

STRs were assessed using teachers' responses on the Student-Teacher Relationship Scale (STRS; Pianta, 2001), an instrument measuring the extent to which a teacher perceives his or her relationship with a student as conflictual and close. The 15-item version of the STRS used in the NICHD SECCYD contains eight items measuring conflict (*e.g.* "Dealing with this child

drains my energy”) and seven items measuring closeness (e.g. “I share an affectionate, warm relationship with this child”). Responses range from 1 (Definitely does not apply) to 5 (Definitely applies). Participants’ responses were summed for form scores for conflict and closeness in each grade. Internal consistency scores for conflict ratings in fourth, fifth, and sixth grades were .88, .88, and .89, respectively; internal consistency values for closeness in fourth, fifth, and sixth grades were .84, .86, and .86, respectively. The teacher who completed the STRS for each study child was the primary teacher. If the study child did not have a primary teacher (i.e. in middle school; NICHD ECCRN, 2001), then the teacher who completed the STRS was the language arts teacher. We used STR scores from fourth, fifth, and sixth grade teachers to get a better measure of the collective nature of students’ relationships with teachers prior to and during the middle school transitional year.

Teacher support

Teacher support was measured from student responses on the School Attachment and Environment questionnaire given in sixth grade. This instrument measures four components of students’ connection to school: School Attachment, Teacher Bonding, Negative Attitude towards School, and School Activity Participation. For the current study, we used the School Attachment and Teacher Bonding subscales to measure Teacher Support because they seem to most clearly reflect the construct. The School Attachment subscale contains five items ($\alpha = .74$) such as “I feel safe at my school.” The Teacher Bonding subscale contains three items ($\alpha = .61$) such as “I feel very close to at least one of my teachers.” Response choices range from 1 (Not at all true) to 4 (Very true) and participants’ responses were averaged to form scores for School Attachment and Teacher Bonding.

Data analysis

Data were analyzed using structural equation models with Analysis of Moment Structures (AMOS 18; Arbuckle, 2009) with Full Information Maximum Likelihood Estimation to accommodate missing data points. Three models of associations between students’ temperament and depressive symptoms were estimated with different mediators: Teacher support (model 1), student–teacher conflict (model 2), and student–teacher closeness (model 3). Paths were estimated from negative emotionality (at age 4½, years) to emotional reactivity (in grades 4–6), students’ reports of teacher support (in grade 6), teachers’ reports of student–teacher conflict or closeness (in grades 4–6), and depressive symptoms (in grade 6). In addition, paths were estimated between emotional reactivity and student–teacher conflict or closeness in grades 4–6 and depressive symptoms in grade 6 and between students’ reports of teacher support in sixth grade (Model 1), teachers’ reports of student–teacher conflict (Model 2) in fourth–sixth grades, or teachers’ reports of student–teacher closeness (Model 3) in fourth–sixth grades and depressive symptoms in grade 6. Finally, given extensive evidence that girls and boys differ in the level of support from teachers (Ewing & Taylor, 2009; Wentzel, Battle, Russell, & Looney, 2010), sex was added as a control variable predicting teacher support (students’ reports and teachers’ reports). As sex differences in depression do not typically emerge before the age of 13 (Hankin & Abramson, 2001), sex was not used as predictor of depressive symptoms. Tests for the mediating effects of Teacher Support were conducted with calculations of the confi-

dence intervals for the distribution of the products of the indirect effects (using PRODCLIN; MacKinnon, Fritz, Williams, & Lockwood, 2007).

We used a family of indices to determine model fit (Hu & Bentler, 1999; Marsh, Hau, & Wen, 2004): the chi-square model fit statistic (non-significance suggests good fit), Incremental Fit Index (IFI; values close to 1 suggest good fit), Tucker Lewis Index (TLI; values close to 1 suggest good fit), Comparative Fit Index (CFI; values close to 1 suggest good fit), and Root Mean Square Error of Approximation (RMSEA; values close to 0 suggest good fit) (Byrne, 2001).

Results

Preliminary analyses

Means, standard deviations, and ranges for all variables are shown in Table 1 and intercorrelations among variables are shown in Table 2. Students in this sample had lower mean levels of student-teacher conflict than student-teacher closeness. This is congruent with findings using a normative sample of younger children using the full STRS with 12 items for student-teacher conflict and 11 items for student-teacher closeness (Pianta, 2001). Students' self-report scores (using the CDI) and mothers' reports of their children's depressive symptoms (using items from the CBCL) suggested that students in this sample had very low depressive symptoms. Many of the variables in this study were significantly correlated.

Table 1. Means, standard deviations and ranges for temperament, teacher support, and depressive symptoms variables.

Variable name	<i>N</i>	Mean	Standard deviation	Range	Possible range
<i>Temperament</i>					
Anger/Frustration	1060	4.74	0.83	1.6-6.9	1-7
Fear	818	4.10	0.85	1.6-6.4	1-7
Sadness	955	3.96	0.71	1.6-5.9	1-7
Emotional Reactivity G4	1022	33.64	5.44	18-48	10-50
Emotional Reactivity G5	1021	33.51	5.66	15-49	10-50
Emotional Reactivity G6	1024	33.28	5.68	14-49	10-50
<i>Teacher support</i>					
School Attachment	991	3.45	0.52	1.2-4	1-4
Teacher Bonding	991	3.39	0.62	1-4	1-4
Conflict G4	915	11.14	5.73	7-34	8-40
Closeness G4	916	32.52	5.11	12-40	7-35
Conflict G5	930	11.44	5.74	7-35	8-40
Closeness G5	927	31.85	5.37	14-40	7-35
Conflict G6	857	11.07	5.64	7-33	8-40
Closeness G6	857	30.31	5.74	12-40	7-35
<i>Depressive symptoms</i>					
CDI (Short Form)	1011	1.41	2.15	0-19	0-20
CBCL (14 items)	1023	0.10	0.15	0-1.23	0-28

Table 2. Intercorrelations among variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Sex	1.0																
2. Anger/Frust.	-0.085	1.0															
3. Fear	0.048	0.210	1.0														
4. Sadness	0.097	0.452	0.386	1.0													
5. ER G4	0.066	0.352	0.089	0.228	1.0												
6. ER G5	0.058	0.311	0.092	0.166	0.717	1.0											
7. ER G6	0.089	0.307	0.085	0.177	0.692	0.751	1.0										
8. School Attach	0.183	-0.077	0.014	-0.017	-0.016	-0.009	0.004	1.0									
9. Teacher Bond	0.187	-0.031	-0.014	0.039	0.030	0.013	0.053	0.654	1.0								
10. Conflict G4	-0.186	0.115	0.026	0.027	0.104	0.152	0.111	-0.141	-0.158	1.0							
II. Closeness G4	0.234	-0.01	-0.033	0.022	0.037	0.027	0.021	0.205	0.193	-0.356	1.0						
12. Conflict G5	-0.175	0.136	0.015	0.043	0.076	0.090	0.091	-0.187	-0.213	0.497	-0.179	1.0					
13. Closeness G5	0.165	-0.001	-0.034	0.064	0.09	0.097	0.111	0.203	0.214	-0.100	0.334	-0.347	1.0				
14. Conflict G6	-0.227	0.102	-0.037	-0.032	0.055	0.130	0.116	-0.213	-0.242	0.451	-0.182	0.528	-0.187	1.0			
15. Closeness G6	0.204	0.031	-0.027	0.120	0.087	0.065	0.083	0.175	0.234	-0.067	0.222	-0.10	0.335	-0.314	1.0		
16. CDI	0.047	0.105	-0.023	0.04	0.091	0.099	0.105	-0.326	-0.198	0.085	-0.04	0.091	-0.076	0.06	0.016	1.0	
17. CBCL	-0.027	0.218	0.015	0.152	0.181	0.190	0.214	-0.158	-0.069	0.165	-0.084	0.122	-0.056	0.146	-0.084	0.271	1.0

All values > .068 significant at the .05 level; all values > .087 significant at the .01 level.

Anger/Frust = Anger/Frustration; ER = Emotional Reactivity; CDI = Child Depression Inventory; and CBCL = Child Behavior Check List items

Student perceptions of teacher support

The model provided good fit to the data [$\chi^2_{38} = 190$ ($p < .001$), IFI = .95, TLI = .91, CFI = .95, and RMSEA = .06] and all observed variables significantly loaded onto respective latent variables (see Figure 1 for standardized parameter estimates). Squared multiple correlations indicate that the model explained 4% of variance in students' perceptions of teacher support and 35% of variance in depressive symptoms. Sex was significantly related to teacher support (.18, $p < .001$), such that girls were more likely to perceive their teachers as supportive.

Paths between latent variables (i.e. from negative emotionality to emotional reactivity, teacher support, and depression) revealed some statistically significant associations. Specifically, negative emotionality predicted emotional reactivity (.439, $p < .001$) and depressive symptoms (.182, $p = .008$), emotional reactivity predicted depression (.226, $p < .001$), and teacher support was associated with depressive symptoms (-.465, $p < .001$). Thus, children with higher negative emotionality at age 4½, were rated as more emotionally reactive in grades 4-6 and had more depressive symptoms in grade 6. In addition, children rated as more emotionally reactive in grades 4-6 and reporting less teacher support in sixth grade were more likely to display depressive symptoms in sixth grade.

Students' perceptions of teacher support did not mediate associations between temperament (negative emotionality and emotional reactivity) and depressive symptoms in sixth grade.

Teacher perceptions of student-teacher conflict and closeness

Two models were estimated: one with conflict as a mediator and one with closeness as a mediator. The conflict model provided good fit to the data [$\chi^2_{48} = 157$ ($p < .001$), IFI = .96, TLI = .94, CFI = .96, and RMSEA = .04] and all observed variables significantly loaded onto respective latent variables (see Figure 2 for standardized parameter estimates). Squared multiple correlations indicate that the model explained 12% of variance in conflict and 18% of variance in depressive symptoms. Sex was significantly related to conflict (-.281, $p < .001$). That is, teachers were more likely to rate their relationships with boys as conflictual.

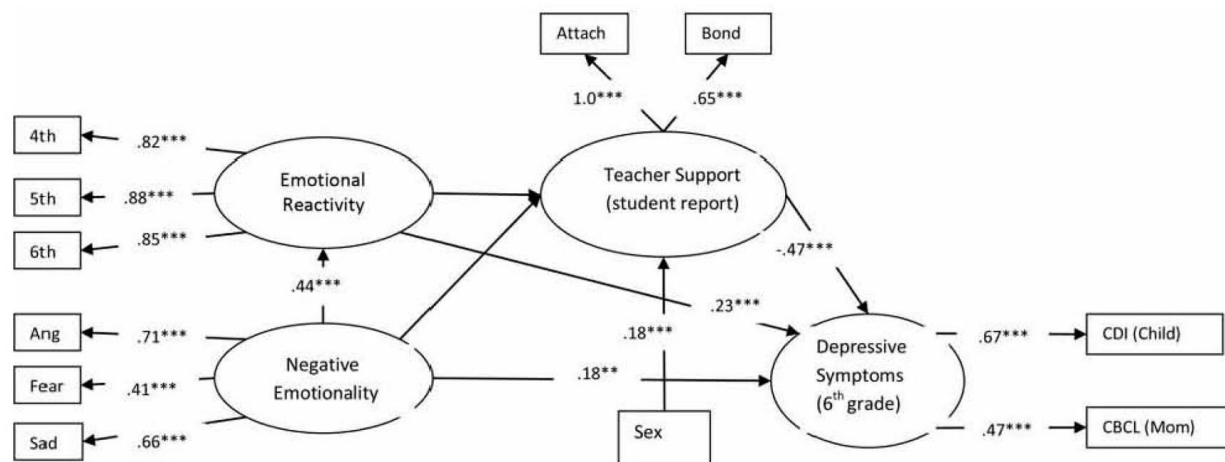


Figure 1. Depressive symptoms predicted by temperament and students' perceptions of teacher support.

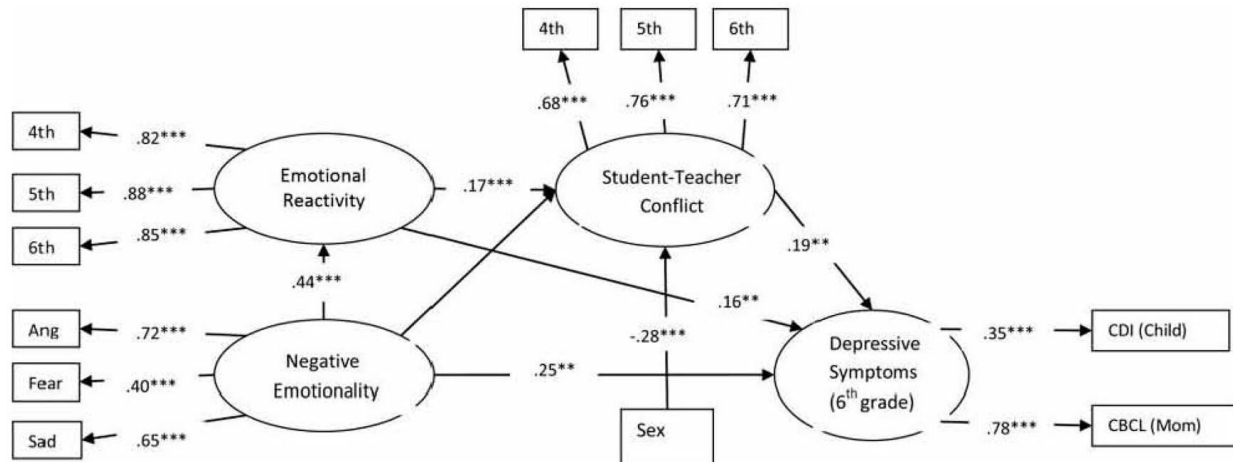


Figure 2. Depressive symptoms predicted by temperament and teachers' perceptions of teacher support (student-teacher conflict).

Paths between latent variables (i.e. from negative emotionality to emotional reactivity, conflict and depressive symptoms) revealed some statistically significant associations. Specifically, negative emotionality predicted emotional reactivity (.444, $p < .001$) and depressive symptoms (.246, $p = .002$), emotional reactivity predicted conflict (.165, $p < .001$) and depressive symptoms (.164, $p = .007$), and conflict was associated with depressive symptoms (.185, $p = .003$). Thus, children with higher negative emotionality at age 4½, were more likely to be rated as emotionally reactive in grades 4-6 and display more depressive symptoms in grade 6. In addition, children showing more emotional reactivity in grades 4-6 were more likely to be rated by teachers as conflictual. Finally, higher ratings for emotional reactivity and conflict in grades 4-6 predicted more depressive symptoms in sixth grade.

Because emotional reactivity was significantly related to conflict and depressive symptoms and conflict was related to depressive symptoms, conflict was examined as a mediator of the relationship between emotional reactivity and depressive symptoms using a confidence interval of the product of the indirect effect (MacKinnon et al., 2007). Lower and upper 95% confidence limits (lower = .0013 and upper = .00949) did not include zero, indicating conflict partially mediated this relationship. This suggests that a mechanism by which students' emotional reactivity predicts depressive symptoms may be the increased likelihood of conflict with teachers in the transition to middle school and the years immediately preceding the middle school transition.

The closeness model also provided good fit to the data [$\chi^2_{48} = 168$ ($p < .001$), IFI = .96, TLI = .93, CFI = .95, and RMSEA = .05] and all observed variables significantly loaded onto respective latent variables (see Figure 3 for standardized parameter estimates). Squared multiple correlations indicate that the model explained 13% of variance in closeness and 18% of variance in depressive symptoms. Sex was significantly related to closeness (.337, $p < .001$); teachers were more likely to rate their relationships with girls as close.

Paths between latent variables (i.e. from negative emotionality to emotional reactivity, closeness, and depressive symptoms) revealed some statistically significant associations. Negative emotionality predicted emotional reactivity (.441, $p < .001$) and depressive symptoms (.251, $p = .002$), emotional reactivity was marginally predictive of closeness (.109, $p = .04$) and predicted depressive symptoms (.213, $p = .002$) and closeness was associated with depressive symptoms (-.197, $p = .005$). Thus, children with higher negative emotionality at age 4½, were more likely to

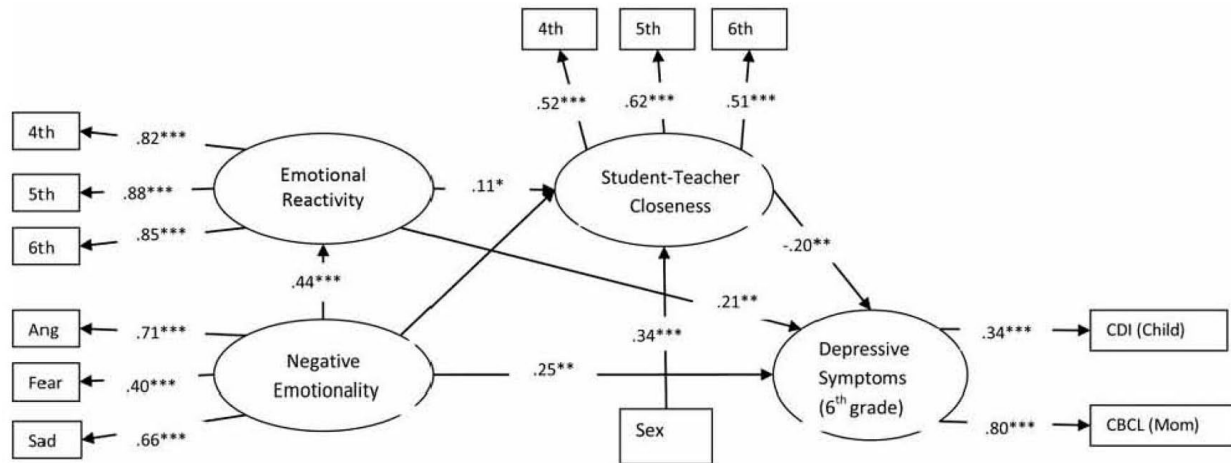


Figure 3. Depressive symptoms predicted by temperament and teachers' perceptions of teacher support (student-teacher closeness).

be rated as emotionally reactive in grades 4-6 and to display depressive symptoms in grade 6. In addition, children showing more emotional reactivity in grades 4-6 were more likely to be rated by teachers as having close relationships. Higher ratings for emotional reactivity were related to more depressive symptoms in sixth grade, while closer relationships predicted less depressive symptoms in sixth grade.

Because emotional reactivity was only marginally associated with closeness, we did not examine it as a mediator between emotional reactivity and depressive symptoms.

Discussion

The purpose of this study was to examine associations between children's temperament and depressive symptoms and to determine the extent to which teacher support (both student perceptions and teacher perceptions) mediated this association. This study is unique in that it merges literatures linking temperament to depressive symptoms and teacher support and linking teacher support to depressive symptoms. Four major findings emerged from this study. First, early temperament (negative emotionality at age 4½, years) predicted later ratings of emotional reactivity (assessed in grades 4-6) and depressive symptoms (assessed in grade 6). Second, emotional reactivity predicted depressive symptoms. Third, students' perceptions of teacher support (assessed in grade 6) and teachers' perceptions of STR quality (assessed in grades 4-6) predicted depressive symptoms in grade 6. Fourth, teachers' perceptions of conflict with students partially mediated associations between emotional reactivity and depressive symptoms.

The fact that early ratings of negative emotionality predicted later ratings of emotional reactivity and depressive symptoms is not surprising. Although negative emotionality and emotional reactivity were measured five to seven years apart, it is expected that they would be strongly correlated because the core construct is similar. Negative emotionality refers to the intensity of negative reactions to the environment and emotional reactivity refers to the intensity of reactions, both positive and negative, to the environment (Rothbart & Bates, 2006). What is interesting is that negative emotionality was assessed when children were preschool aged (approximately 4½, years), but the measure of emotional reactivity came

from much later when children were in fourth, fifth, and sixth grades. Thus, there appears to be some stability of emotionality across time, and this is congruent with other work linking early ratings of temperament to behavior in later elementary grades (Kagan, Resnick, Snidman, Gibbons, & Johnson, 1988; Rimm-Kaufman & Kagan, 2005) and adult personality (Caspi & Silva, 1995).

There is abundant support for concurrent and longitudinal connections between negative emotionality and emotional reactivity and depressive symptoms (Compas et al., 2004; Garber, 2006). Empirical studies show that emotionality (or emotional reactivity) is related to depressive symptoms, such that higher levels of negative emotionality predict more anxiety and depression (Anthony, Lonigan, Hooe, & Phillips, 2002; Phillips, Lonigan, Driscoll, & Hooe, 2002). Children with high negative emotional reactivity in first grade (approximately 6-7 years) had increasingly or consistently high levels of depression in early to middle adolescence (approximately 11-14 years; Brendgen, Wanner, Morin, & Vitaro, 2005). Furthermore, high school students with difficult temperament, marked by characteristics of negative emotionality such as intense and negative mood, had higher levels of concurrent depressive symptoms (Phillips et al., 2002; Windle, 1991).

Findings from this study add to growing support for the notion that teacher support plays a role in adolescents' depressive symptom development (Pössel et al., 2013; Ross et al., 2010). Congruent with related work, we found students' reports of more teacher support and teachers' reports of higher levels of student-teacher closeness were associated with fewer depressive symptoms. In addition, teachers' reports of more conflict with students were associated with more depressive symptoms. These results are especially important, as previous studies of links between teacher support and depression have exclusively focused on students' reports of teacher support. Results confined to student reports are limited by a potential monomethod bias of same informant and method for assessing teacher support and depressive symptoms (Marsh, 1993). In other words, using the same informant to assess both variables is likely to overestimate the association between both variables. In addition, depressed individuals demonstrate a so-called depressive bias (Abramson, Alloy, & Metalsky, 1989; Beck, Rush, Shaw, & Emery, 1979) resulting in perceptions of themselves, others, and their relationships as overly negative. This bias is likely to cause an underestimation of students' reported teacher support in depressed adolescents. Our inclusion of teacher perceptions of STR quality in replicating previous findings regarding students' perceptions of teacher support in predicting depressive symptoms side steps these biases and provides a more holistic estimation of the associations between teacher support, STRs, and depressive symptoms. Findings reported here indicate that one mechanism by which individuals with higher levels of emotional reactivity have more depressive symptoms may be more conflict with teachers. This finding is consistent with recent work showing social support as a partial mediator between student characteristics and depression (Wetter & Hankin, 2009). Specifically, with a sample of 350 students in 6th-10th grades, Wetter and Hankin (2009) found that adolescents' reports of social support (e.g. peers and family) partially mediated the link between positive emotionality and depressive symptoms, further confirming the importance of social support for the development and prevention of depressive symptoms. Thus, results from the present study bolster findings from related work on the important role teachers play in promoting positive outcomes for students, particularly in early adolescence.

Limitations and future directions

There were several limitations to this study. First, students' and teachers' perceptions were assessments of somewhat different constructs (teacher support vs. STR quality) using different instruments. This prohibits direct comparisons of different sources of teacher support or STR quality as mechanisms for associations between temperament and depressive symptoms. Future work should include parallel assessments of teacher and student perceptions. Second, although there is some temporal evidence of causality between temperament and depressive symptoms, this study is strictly correlational in nature. Research using experimental or quasi-experimental designs for determining the effectiveness of specific teacher behaviors indicative of support would be instrumental for examining causal links between teacher support and depressive symptoms. Third, reports by children and parents indicated that depressive symptoms among this sample were minimal. The restricted range of depressive symptoms may have attenuated associations between temperament, teacher support, and depressive symptoms. Certainly, future work should include examinations of the mediating role of teacher support on the relationship between temperament and depressive symptoms in clinical samples.

Implications

Findings from this study point to implications for practice in schools as well as future research. Regarding practice, this study's results, as well as findings from other recent work (Ross et al., 2010), highlight the important role of teachers and schools in ameliorating risk for a host of negative outcomes in early adolescence. The transition to middle school can be a difficult adjustment for some students and findings from the present study suggest that supportive teachers and close STRs may be instrumental for smoothing this transition. Specifically, teacher behavior that transmits support and warmth may reduce the likelihood of depressive symptoms and may be an avenue for prevention of depression. At the same time, student-teacher conflict appears to be mechanism by which individuals with more emotional reactivity have more depressive symptoms. Thus, teacher training should include emphasis on why and how to foster positive interactions with students, particularly during this critical transitional year in school. Furthermore, teacher training should include instruction on individual differences in emotional reactivity and how more emotional reactivity may increase vulnerability for depression. Teachers could use this information to identify students who may benefit from additional teacher support and assistance developing the social skills necessary for harnessing support from other sources, such as peers. Similarly, school personnel could inform parents about emotional reactivity as a risk factor for depression and address the importance of social support (both in and out of school) for prevention of depression.

Acknowledgment—This study was conducted by the NICHD Early Child Care Research Network supported by NICHD through a cooperative agreement that calls for scientific collaboration between the grantees and the NICHD staff.

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