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A Preliminary Investigation of Teacher-Reported, Classroom-Level Adversity and Teacher–Student Interactions

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Abstract

Early elementary-aged students with and at risk of emotional and behavioral disorders (EBD) tend to develop negative interaction patterns with their teachers. This preliminary study examines the extent to which symptoms of teacher burnout and teacher reports of classroom adversity are associated with the likelihood of negative interactions between teachers and students with and at risk of EBD. We conducted observations to assess teacher–student interactions in individual and group settings, and teachers reported on burnout and classroom adversity. This study included 10 teachers and 15 of their students with or at risk of EBD. High levels of classroom adversity increased the likelihood of negative teacher–student individual interaction. High levels of classroom adversity modified the relation between personal accomplishment and negative teacher–student interactions in group settings. Findings suggest teachers may need additional support for engaging in high-quality interactions with students with and at risk of EBD, particularly in classrooms facing high levels of adversity, and inform intervention design and implementation.

Keywords

elementary education, teacher–student interactions, burnout, classroom context, emotional and behavioral disorders

In early elementary school, approximately 12% of students display symptoms consistent with chronic problem behavior (e.g., disruptive behavior, inappropriate emotional responses, and defiance; Forness et al., 2012). Students displaying these behaviors are at risk of being later identified with an emotional behavioral disorder (EBD), and these students have consistent difficulty with the adjustment that continues through adulthood (Forness et al., 2012). Considering this trajectory, identifying factors that promote or hinder the well-being and adjustment of this population of students is imperative.

High-quality teacher–student interactions can promote the well-being and positive developmental trajectories of students with and at risk of EBD (Chow et al., 2020). Specifically, teacher–student interactions in the classroom are critically important, as students' early experiences with their teachers influence their long-term social and academic well-being (Cadima et al., 2016). Unfortunately, teachers and students with and at risk of EBD tend to develop negative interaction patterns that often lead to conflictual teacher–student relationships (Sutherland & Oswald, 2005). Considering this risk, practitioners are in need of support that will help improve teacher interactions with students with and at risk of EBD.

Prior work has established that (a) teacher–student interactions can vary from one student to another in the same classroom, and (b) classroom, teacher, and student characteristics contribute to this variation (Koles et al., 2009). However, less is known about which factors exert the greatest influence on the quality of teachers' interactions with students with and at risk of EBD. As a preliminary investigation, in a small sample of teachers and students, we consider the extent to which two symptoms of teacher burnout are associated with the quality of their interactions with students with and at risk of EBD. Specifically, we examine whether teachers' emotional exhaustion and personal accomplishment are associated with teacher–student interactions that are negative. We also examine whether these associations vary as a function of teacher reports of classroom adversity.

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Teacher Interactions With Students With and at Risk of EBD

Teacher–student interactions are critically important for children's language, literacy, mathematics, cognitive, and socio-emotional development, and the quality of these interactions is strongly linked to children's downstream competencies (Pianta et al., 2012). When teachers are sensitive and responsive in their interactions with students, students develop a sense of security that allows them to be more engaged in classroom activities and better prepared to receive instruction. In contrast, negative teacher–student relationships are associated with low rates of school enjoyment, loneliness, lower academic performance, and disciplinary infractions (Pianta et al., 2012). High-quality teacher–child interactions may be particularly important for students with or at risk of EBD who on average have more conflictual relationships with teachers (Sutherland & Oswald, 2005).

Students who exhibit problem behavior often evoke negative interactions from their teachers (Murray & Zvoch, 2011). The transactional nature of social interchanges suggests students with chronic problem behavior present classroom challenges that likely result in receiving lower rates of constructive teaching practices and less exposure to high-quality instruction (Sutherland & Oswald, 2005). Teachers report more conflict and less closeness with students who display high levels of externalizing problem behavior but report more closeness with children who display high levels of prosocial behavior (Nurmi, 2012). Unfortunately, negative interactions between teachers and students tend to persist over time. For example, teacher–child interactions remained negative with disruptive children 1 year after child externalizing behaviors were identified (Henricsson & Rydell, 2004). As such, students with and at risk of EBD may have more to gain from positive classroom interactions than other students, making the positive teacher–student experiences that teachers can facilitate critically important (Belsky, 1997).

Teacher Burnout

Teacher burnout is commonly operationalized as long-term occupational stress that results in experiences of negative emotions related to aspects of the teaching occupation (Skaalvik & Skaalvik, 2017). Recent estimates suggest that between 10% and 20% of teachers suffer from high levels of burnout, and between 20% and 40% of teachers suffer from moderate levels of burnout (Pozo-Muñoz et al., 2008). Teachers who are at an increased risk of burnout typically have fewer years of teaching experience, high job demands such as time pressure, low levels of support from colleagues, and low self-efficacy (Ford et al., 2019). Burnout is particularly problematic because it is strongly associated with higher levels of attrition, predicting turnover in the first 3 years of a teacher's career (Kelly & Northrop, 2015). Given that nearly half of new teachers leave the profession within the first 5 years and the high cost of teacher turnover, it is imperative that we learn more about the contexts and consequences surrounding burnout to best support and retain teachers (Kelly & Northrop, 2015). In the present study, we focus on two common burnout symptoms as measured by the Maslach Burnout Inventory: (a) emotional exhaustion and (b) reduced personal accomplishment (Maslach et al., 2001). Emotional exhaustion is related to feelings of being depleted emotionally by job-related demands and is the most evident sign of burnout. Reduced personal accomplishment is related to teachers' beliefs that they are ineffective and unable to accomplish personal goals for their work.

Teachers of students with and at risk of EBD are themselves at an increased risk of experiencing burnout-related symptoms and are more likely to leave the profession than teachers of students with learning disabilities, physical disabilities, or intellectual disabilities (Chang, 2009). Student disruptive behavior is an important and contributing factor in predicting emotional exhaustion and reduced personal accomplishment (Greenberg et al., 2014). This may be because practitioners widely report struggling to meet the needs of students who exhibit problem behavior and receive little training in teaching practices designed to prevent or ameliorate problem behaviors in the classroom (Greenberg et al., 2014). Reinke and colleagues (2011) reported 21% of elementary teachers rated their education and training in behavioral interventions as none or minimal, with only 17% reporting substantial education or training. In addition, the top area of need identified by teachers was strategies for working with students with problem behaviors (Greenberg et al., 2014). Teachers also report that educating students with problem behaviors is one of the most difficult aspects of their job (Maag, 2004). As a result, teachers may struggle to adapt their practices to effectively manage their students' disruptive behavior.

Burnout and Teacher–Student Interactions

Teachers' feelings of burnout are connected to poor-quality teacher–student interactions and relationships. Those who experience symptoms of burnout (e.g., being emotionally exhausted) may struggle to support student learning and redirect misbehavior in the contexts of positive classroom relationships (Eddy et al., 2020). In a sample of teachers and young children with autism, teacher stress was a significant predictor of decreased teaching quality and student engagement, and reduced personal accomplishment was associated with poorer long-term outcomes (Wong et al., 2017). Moreover, teachers who reduce their stress show higher levels of tolerance for disruptive classroom behavior and are less critical and punitive toward students, which in

turn may decrease the likelihood that negative interactions occur (Clunies-Ross et al., 2008). As such, burnout may prevent teachers from being able to attend to their students' needs and engage in developmentally sensitive teaching. This may explain, in part, why students with problem behaviors are more likely to have negative interactions with teachers (Nurmi, 2012).

Classroom-Level Adversity

Although teacher burnout is expected to increase the likelihood that negative interactions occur between teachers and students with and at risk of EBD, this relation may not exist uniformly across all classroom contexts. The bioecological model suggests that teacher–student interactions are determined in part by individual factors that teachers and students bring with them to the interaction as well as surrounding contexts (Bronfenbrenner & Morris, 2006). Applying this theory to the present study, various classroom contexts (e.g., classroom adversity) may influence the nature of the connection between burnout and teacher–student interactions. In addition, drawing from job demands–resources theory (Demerouti et al., 2001), when classroom settings are highly demanding, such as those with high levels of adversity, teachers may experience more job-related burnout, and their interactions with students may be compromised. It is these demand and resource factors that contribute to teachers' intent to continue teaching.

At the individual student level, it is well understood that cumulative risk is linked to a number of adverse outcomes (Evans et al., 2013). However, we know less about how the collective risk that students face is associated with teaching practices and student outcomes. Studies of collective student characteristics have focused primarily on one characteristic at a time (e.g., percentage of low-SES students and average levels of aggression; see Abry et al., 2018); however, this approach may be limited, as individuals who face a single risk often face multiple personal and environmental risk factors at once (Belsky, 1997), which tends to be more harmful compared with single- or no-risk exposure (Evans et al., 2013). As such, a more inclusive measure of cumulative classroom-level risk may better reflect the challenges faced by teachers and students in a classroom context.

Teachers vary their teaching practices as a function of collective student dynamics, and they adjust learning opportunities for students to meet the needs of the aggregate classroom group (Nurmi & Kiuru, 2015). For example, the ability composition of small learning groups affects the level and type of instruction teachers deliver (Wilkinson & Fung, 2002). In addition, first- and second-grade teachers increase their emotional and instructional support and classroom organization in response to the number of children who show active task avoidance early in the school year (Pakarinen et al., 2014). Furthermore, in preschool classrooms, higher levels of collective classroom externalizing behavior in the Fall are related to higher teacher stress in the Spring; in turn, moderate levels of teacher stress are related to more positive classroom emotional climates, and low and high levels of teacher stress are associated with lower classroom emotional climates (Friedman-Krauss et al., 2014). This is important because externalizing behavior is connected to conflictual teacher–student relationships in classrooms with high levels of collective student problem behaviors (Friedman-Krauss et al., 2014).

To our knowledge, only three studies have considered the influence of classroom adversity on teaching practices and student outcomes (Abry et al., 2017, 2018; McLean et al., 2020). Each of these studies examines classroom adversity through teacher reports.

In regard to student outcomes, teacher-reported classroom adversity is associated with higher levels of student externalizing behavior in early and late elementary grades (Abry et al., 2017). In regard to teaching practices, Abry and colleagues (2018) examined direct and indirect associations between first-grade classroom adversity, first-grade teaching practices, and student academic skills and executive functioning at first- and third grades. Results confirmed first-grade classroom adversity was negatively associated with first-grade teachers' classroom management quality; teachers in higher adversity classrooms were less effective in preventing disruption and maintaining and regaining order in their classrooms. In addition, first-grade classroom adversity was positively associated with controlling instruction; teachers were more likely to use structured, teacher-directed activities in classrooms with higher level adversity. Finally, first-grade classroom adversity was negatively associated with the amount of time teachers spent on academic instruction. More recently, McLean and colleagues (2020) found higher levels of classroom adversity were related to more depressive symptoms in first-year teachers and worse outcomes for students (above and beyond the influence of resources, such as instructional and curricular resources and professional development opportunities). Given these findings, we expected that classroom adversity may alter the relation between teacher burnout and teacher–student interactions with students with and at risk of EBD.

Findings from this study will contribute new knowledge about the extent to which the relation between burnout and teacher–student interactions can vary based on classroom context. This is important because teachers experiencing burnout may benefit more from intervention efforts targeted toward specific classroom contexts relative to intervention efforts generalized across classrooms. To illustrate, findings may support the need for interventions, such as practice-based coaching, to take into consideration classroom adversity when providing services.

The Present Study

In the present study, we build from previous work anticipating how the connection between teacher characteristics and practices may vary in response to teacher-reported classroom adversity. Our first goal was to descriptively examine the extent to which teachers' interactions with students with and at risk of EBD are negative in individual settings and in group settings. We define a negative teacher–student interaction as an exchange between the teacher and a student identified as having or at risk of EBD in which the student engaged in a disruptive, defiant, and aggressive behavior and/or the teacher exhibited negative behavior and or/affect.

Our second goal was to test for an association between burnout and the likelihood of a negative interaction between a given teacher and their students with and at risk of EBD. We expected teacher emotional exhaustion to be positively related to the likelihood of negative teacher–student interactions, and personal accomplishment to be negatively related to the likelihood of negative teacher–student interactions with students with and at risk for EBD.

Our third goal was to examine whether the relations between burnout and teacher–student interactions varied as a function of teacher-reported classroom adversity. We expected that highly adverse classrooms may magnify the relation between teacher burnout and negative teacher–student interactions, whereas classrooms with lower rates of classroom adversity may weaken the relation between teacher burnout and negative teacher–student interactions. Importantly, in all study models, we control for individual focal student problem behavior, as prior work demonstrates the intensity of student challenging behavior is related to negative teacher–student interactions and lower quality teacher–student relationships across time (e.g., Henricsson & Rydell, 2004).

Method

Participants

Teacher and student participants were recruited from three elementary schools in a Mid-Atlantic state. The mean number of students per school was 364 ($SD = 73.90$) and consisted of predominantly African American students (94%, 93%, and 98%, by school, respectively) from a low-income community (82%, 96%, and 96% qualified for free and reduced lunch, by school, respectively).

The present study includes teacher and student participants, from a comparison condition, who were part of a study aimed at testing an intervention designed to address the needs of young students who demonstrate persistent and intensive challenging behaviors in classroom settings. This intervention provided teacher training and coaching on evidence-based practices shown to reduce student problem behaviors and increase high-quality teacher–child relationships. Teachers were randomly assigned within grade and school to the intervention or a business-as-usual comparison condition. The present study used observations and surveys from the posttest time point (approximately April–June). All study activities were approved by the district and university human participants protection boards.

Kindergarten to third-grade teachers. Teachers were eligible for inclusion if they met the following criteria: (a) taught in grades kindergarten to third grade, (b) served at least one child identified as being at risk of EBDs, (c) had not participated in the intervention condition of the previous study, and (d) consented to participate. The present study includes 10 of the 11 teachers who participated in the comparison condition as one teacher was missing observational data due to extended absence and thus was not included in the present study.

Participating teachers were female. The majority were African American/Black (60%) and less than half were White (40%). All teachers were non-Hispanic/Latino. All teachers were licensed and had a bachelor's degree (70%) or master's degree (30%). Teachers ranged in age with 40% of teachers between the ages of 26 to 35, 30% of teachers between 36 and 45, and 30% of teachers between 46 and 55. On average, teachers had 7.2 years of teaching experience ($SD = 7.33$). Teachers were given US$100 for their participation.

Students. Teachers selected one to two focal students in their classrooms. Teachers were limited to two participating focal students per classroom due to study resources and funding. Students who met the following criteria were eligible for participation: (a) the student was enrolled in a participating teacher's classroom, (b) the student exhibited externalizing behaviors that interfered with participation in the classroom as indicated by the Systematic Screening for Behavior Disorders (SSBD; Walker et al., 2014), and (c) the student had parental/guardian consent to participate.

This study included 15 students who participated in the comparison condition who were observed to interact with the teacher in at least one-time sampling observation (one student was not observed to interact with the teacher during the observation periods and was excluded from the analyses). Student sample demographics included 80% African American/Black, 13.3% White, and 6.7% other ethnicities. All students were non-Hispanic/Latino. The majority of participating students were male (86.70%), and the average age was 7.10 years ($SD = 1.11$).

Measures

Student screening. Obtaining caregiver consent and screening of student participants began approximately one month after the beginning of school. To determine eligibility for

participation, teachers nominated up to five students who engaged in chronic externalizing problem behavior. Caregiver consent was then obtained, and systematic screening for risk of EBDs took place using the SSBD (Walker et al., 2014). The SSBD is a three-stage multigate screening system designed to proactively identify students who are at risk of negative developmental outcomes associated with their behavior patterns. The first two gates of this tool combine teacher ratings of the frequency and intensity of student adjustment problems in school. The third gate includes trained observer ratings of students' behaviors and is used to refer students for possible disability support according to federal and state special education guidelines (Walker et al., 1990). Given the scope of the intervention, only the first two stages of the tool were used to identify focal students. Both stages exhibit strong psychometric properties (see Walker et al., 2014).

Assessment of risk included scoring raw data across four scales and applying risk criteria to the scores to identify students at risk of externalizing behavior problems (see Walker et al., 2014 for scoring criteria). For the subsample of students included in the present study, these four scales included critical events ($M = 5.27$, $SD = 3.45$, range = 0–9), aggressive behavior ($M = 24.00$, $SD = 4.97$, range 17–28; note that only kindergarteners are rated on the aggressive behavior scale), maladaptive behavior ($M = 33.14$, $SD = 8.57$, range 20–48), and adaptive behavior ($M = 28.43$, $SD = 5.60$, range 19–38). After screening, one to two students per classroom were selected to participate in the study, depending upon returned caregiver consents and the most elevated externalizing scores on the SSBD. In the present study, five teachers had two participating students in their classrooms. The remaining five teachers did not have more than one student qualify for participation under the study criteria and thus had only one participating student in their classroom.

Focal student problem behavior. Focal student problem behavior was included as a covariate in the present study because it influences how teachers and students interact with one another. Focal student problem behavior was measured with the Social Skills Improvement Rating System (SSIS-RS; Gresham & Elliott, 2008), a teacher report measure. Teachers completed this measure in approximately April to June. Each item on the SSIS-RS is rated on a 4-point frequency scale, with responses ranging from 0 (Never) to 3 (Almost Always). These items are grouped into subscales. The subscale of interest in this study was problem behaviors ($M = 126$, $SD = 20.48$, range 92–156). Example items include, "talks back to adults" and "acts without thinking." The standard score was used which is derived from the scores of a large nationally representative sample of individuals having a similar age and the same sex. They have a mean of 100 and a standard deviation of 15, with a higher score indicating more problem behavior (see Gresham & Elliott, 2008). For the current sample, internal consistency was acceptable for problem behavior with Cronbach's alpha of .96.

Negative teacher–student interactions. In each observational coding interval, coders recorded whether a teacher–student interaction occurred and whether the interaction occurred in a group setting or an individual setting.

In a group setting, the teacher was observed to interact with a group that included the focal student. In an individual setting, the teacher was observed to interact with the focal student one-on-one without peers in proximity, or the teacher was observed to interact directly with the focal student in a group setting (i.e., the teacher and focal student behaviors/verbalizations were directed toward one another and did not include any other students in the group setting). We operationalized negative teacher–student interactions as an exchange between the teacher and the focal student in which the student engaged in a disruptive, defiant, and aggressive behavior and/or the teacher exhibited negative behavior and or/affect. This could include interactions in which the teacher appears impatient, discouraging, sarcastic, terse, frustrated, or irritable. It could also include interactions in which the teacher uses an elevated voice quality and negative tone, exhibits facial expressions that indicate frustration or anger, or interactions that are intended to shame or humiliate the student. Examples of negative teacher–student interactions include a harsh reprimand to correct student behavior or a teacher telling a student to "stop crying" in a negative tone. Non-examples of negative teacher–student interactions include: a teacher attempts to redirect students back to activity. We coded the presence or the absence of a negative interaction whenever a teacher–student interaction was coded, with a code of 1 indicating a negative interaction did occur and a code of 0 indicating a negative interaction did not occur. Kappa = .71 for negative teacher–student interactions.

Classroom-level adversity. Classroom-level adversity was measured by teacher reports on the Problems Preparing Children for Academic Success scale, adapted from the Schools and Staffing Survey (National Center for Education Statistics, 1993). Using a 5-point scale ranging from 1 (*Not a problem*) to 5 (*Serious problem*), teachers responded to the prompt, "How much of a problem are the factors below in preparing your children to succeed academically?" The 17 factors were home/family life, parent cooperation/support, child health, inadequate nutrition, low intelligence, cultural differences, English proficiency, nonstandard English, special learning problems, behavioral problems (disruptive), inadequate supplies, student/teacher ratio, student mobility, students not ready socially, students not ready academically, students have attention problems, and student

tardiness/absenteeism. Ratings were averaged across the 17 items (α = .84), with higher scores indicating higher teacher-perceived classroom adversity. Classrooms in the present study were on average rated as higher in adversity (M = 2.8, SD = .70, range = 1.59–4.00) compared with a national sample (M =1.78, SD = .50; Abry et al., 2018), suggesting these classrooms served students who had experienced a high number of adverse events.

Teacher burnout. The Maslach Burnout Inventory (Maslach et al., 1986) measures three subscales of teacher burnout: Depersonalization, Emotional Exhaustion, and Personal Accomplishment. Teachers responded to five statements on a 7-point scale from 0 (*Never happens to me*) to 6 (*Happens to me every day*), with higher scores indicating higher rates of each. Example items for the emotional exhaustion subscale include "I worry that this job is hardening me emotionally" and "I feel emotionally drained from my work." Example items for the personal accomplishment subscale include "I have accomplished many worthwhile things in this job" and "I feel energetic." This measure has demonstrated good internal reliability (Maslach et al., 1986). In the present study, alphas were .82. and .86 for emotional exhaustion (M = 3.2, SD = .94, range 1.25–4.25) and personal accomplishment (M = 5.0, SD = .67, range = 3.36–6.0), respectively. The depersonalization subscale did not demonstrate good internal reliability perhaps due to a small number of teacher reports (N = 10) and a small amount of variability in teacher responses (depersonalization alpha = .57, M = .80, SD = .50, range 0–5). Therefore, depersonalization was not included in study models.

Protocol for Observations

Observational data were collected from each of the 10 teachers and assessed their interactions with each of their focal students using the *Teacher Student Interaction System*. This observational measure is an adaptation of the *Teacher–Child Interaction Direct Observation System*, which has shown to reliably assess teacher and student behaviors during classroom interactions (see Sutherland et al., 2013). Each of the 15 teacher–student dyads was observed in the morning (between approximately April and June) during classroom instructional time chosen by the teacher. Trained research project staff (N = 3; 66.60% female) observed teachers and focal students during the instructional time using a teacher–student-focused observational protocol. The research project staff members were post-bachelors research assistants hired to assist with study data collection and observations. The training was conducted using vignettes and practice observations and led by the lead researcher, with assistance from graduate research assistants and research project staff. At the end of the training, coders were determined to be reliable if interobserver agreement (i.e., kappa statistic) for all codes on the four master-coded videos indicated moderate agreement/reliability above .60 (Cohen, 1960).

During an observation session, trained coders observed teacher–student interactions and focal student behavior every 10 s across a 5-min observation period using momentary time sampling (Meany-Daboul et al., 2007), resulting in 30 samplings of behavior within each observation period. At each 10-s mark, coders recorded and coded the teacher–student dyad interaction. Coders conducted two 5-min observations of each teacher–child dyad on the same day and typically occurred within an hour of one another. This resulted in a total of 60 coded samplings of behavior for each teacher–child dyad. Across the full sample of teacher–student dyads, we collected 870 coded samples of behavior (for one dyad, we only had one 5-min sample). Prior use of brief observational measures to capture teacher and student classroom behaviors suggests these data are reliable, valid, related to teacher and student outcomes, and sensitive to change. To illustrate, the *Brief Student–Teacher Classroom Interaction Observation* is a similar 5-min observational assessment and is a reliable and valid tool for assessing teacher and student classroom behaviors (Reinke et al., 2016).

At each mark, a teacher–student interaction was coded when a teacher was observed to direct her visual, verbal, or auditory attention to the focal student during an observation period. If the teacher–student interaction was observed, coders recorded the tone of the interaction and whether the setting was in a group or with the individual child. Once the codes were recorded, coders began the next 10-s observation. On average teacher–focal student dyads were observed to interact during 31.67 ten-second observations (SD = 16.98, range = 2–60) for a total of 475 ten-second observations in which teachers and students interacted with one another. We use the average proportion of time a teacher was observed to be in teacher–student interactions (out of the total number of their observations; M = 60%, SD = 26%, range = 23%–100%) as a covariate because teachers who report more burnout symptoms may engage in significantly fewer interactions with students.

We obtained reliability estimates by pairing coders for observations. Each individual independently and simultaneously coded the teacher's behavior. We conducted reliability observations on 44.40% of the total observations. To control for chance agreement, kappa statistics were used to assess interobserver agreement. We calculated kappa statistics by measuring the agreement between the two raters and then subtracting out the agreement due to chance (Martin & Bateson, 1993).

Analyses

First, we tested the extent to which there was an association between teacher burnout and the likelihood of a negative interaction between a given teacher and their students with

and at risk of EBD. To answer this question, we fit three generalized (nonlinear) cross-classified multilevel logistic models to account for the three-level structure in which observations were nested both within students and within teachers (Goldstein, 2011). This modeling strategy was an appropriate match to the data structure because observations were repeated for each student, and teachers were observed to interact with one to two students (resulting in observations that were simultaneously nested within both students and teachers), which violates the assumption of independence of observations in regression modeling. In addition, some teachers had only one student in the study, and others had multiple students. Thus, the flexible structure of cross-classified models, which account for nonhierarchical nesting, was used (Leckie, 2013). Models did not need to account for missingness, as data on all study variables were present for all 10 teachers and 15 students. However, as stated earlier, one student was observed for only one 5-min observation period.

We built models using STATA version 15.1 (StataCorp, 2017). The binary coded variable negative interaction (i.e., 1 = a negative interaction did occur; 0 = a negative interaction did not occur) served as the dependent variable in all models. Given the limited number of students and teachers in the study, we chose to create separate model sets for teacher individual student interactions and teacher–student group interactions. In Model 1a and Model 1b, the main effects of classroom adversity and emotional exhaustion were included as independent variables, with negative individual teacher–student interactions and negative group teacher–student interactions serving as the dependent variables, respectively. In Model 3a and Model 3b, the main effects of classroom adversity and personal accomplishment were included as independent variables, with negative individual teacher–student interactions and negative group teacher–student interactions serving as the dependent variables, respectively. We also included the proportion of time each teacher was engaged in interactions with focal students and student problem behavior as covariates in all study models. We took the grand mean center of the independent variables to ease interpretability (Enders & Tofighi, 2007).

Our next aim was to examine whether the relations between burnout and teacher–student interactions varied as a function of teacher-reported classroom adversity. Building sequentially from the previous models, we added interaction terms to each of the previous models. These interaction terms were generated by multiplying the two subscales of teacher burnout by classroom adversity which resulted in terms for classroom adversity by emotional exhaustion and classroom adversity by personal accomplishment. Again, we took the grand mean center of the independent variables to ease interpretability (Enders & Tofighi, 2007).

The present study included a sample of 10 teachers and 15 students, which presents concerns about power when using cross-classified multilevel logistic models. To probe the robustness of study results in light of a small sample, we also conducted two types of sensitivity tests (Thabane et al., 2013). The first test compared the cross-classified multilevel logistic models to an identical model using robust standard errors. The second test identified outliers in study data using Cook's distance plots. These outliers were removed, and study models were reanalyzed. See Table 1 for these sensitivity test results.

Results

Preliminary Analyses

First, we conducted preliminary analyses to examine the descriptive statistics, skewness, and kurtosis pertaining to all study variables. Tabachnick and Fidell (2007) suggest that when levels of skewness and kurtosis are two times, the standard error of the variable should be transformed. All variables were within this range and therefore did not require any transformations.

Teacher Interactions With Students With and at Risk of EBD

Teacher–student dyads interacted in a group setting during an average of 28.13 ten-second observations (SD = 16.88, range = 2–59), and teacher–student dyads interacted in an individual setting during an average of 3.53 ten-second observations (SD = 3.83, range = 0–13). We coded teacher–student dyad interactions as negative in a group setting on average 7.87 of the 10-s observations in which a teacher–student interaction was observed (SD = 4.82, range = 2–16) and teacher–student dyad interactions as negative in individual settings on average 1.47 of the 10-s observations in which a teacher–student interaction was observed (SD = 1.92, range = 0–5).

Burnout, Classroom-Level Adversity, and Negative Teacher–Student Interactions

For teacher–student individual interactions, results did not reveal significant main effects for teacher emotional exhaustion (Model 1a) or teacher personal accomplishment (Model 3a). Only classroom adversity was a significant predictor of negative teacher–student interactions in individual settings (Model 1a: $B = 2.24$, $p < .01$, odds ratio [OR] = 9.39; Model 3a: $B = 2.73$, $p < .01$, OR = 15.33).

For teacher–student group interactions, results did not reveal significant main effects for teacher emotional exhaustion (Model 1b) or teacher personal accomplishment (Model 3b). Classroom-level adversity was not a significant predictor in Model 1b, which also included the main effect for emotional exhaustion. However, classroom adversity was a

Table 1. Negative Teacher–Student Interactions by Teacher Burnout and Classroom Adversity.

	Model 1a			Model 2a			Model 3a				Model 4a		
	B	*SE*	OR	*B*	*SE*	OR	*B*	*SE*	OR	OR Robust *SE*s	*B*	*SE*	OR
Outcome: Teacher individual student interactions													
Constant	3.55***	0.46	34.81	3.60***	0.46	36.60	3.67***	0.48	39.25	39.30***	3.89***	0.62	48.91
Proportion of teacher–student interactions	1.48	1.73	4.39	1.23	1.81	3.42	1.86	1.75	6.42	6.41*	1.77	1.81	5.87
Student Problem behavior	−0.02	0.02	.98	−0.02	0.02	.98	−0.01	0.02	.99	0.99	0.00	0.02	0
Classroom adversity	2.24**	0.71	9.39	2.26**	0.69	9.58	2.73**	0.85	15.33	15.35***	2.90**	0.92	18.17
Emotional exhaustion	−0.12	0.43	.87	−0.05	0.47	.95	—	—	—		—	—	—
Personal accomplishment	—	—	—	—	—	—	−0.62	0.60	.54	0.54	−1.12	1.02	.33
Classroom Adversity × Emotional Exhaustion	—	—	—	0.59	1.73	1.80	—	—	—		—	—	—
Classroom Adversity × Personal Accomplishment	—	—	—	—	—	—	—	—	—		−1.24	1.92	.29

	Model 1b			Model 2b			Model 3b			Model 4b				
	B	*SE*	OR	*B*	*SE*	OR	*B*	*SE*	OR	*B*	*SE*	OR	OR Robust *SE*s	OR Outliers Removed
Outcome: Teacher–student group interactions														
Constant	−0.52**	0.20	.59	−0.53*	0.21	.59	−0.55**	0.19	.58	−.88***	0.19	.41	0.41***	0.15***
Proportion of teacher–student interactions	−1.62	0.89	.20	−1.62	0.89	.20	−1.93*	0.84	.15	1.51*	0.68	4.53	0.22***	0.42
Student problem behavior	0.00	0.01	0	0.00	0.01	0	0.00	0.01	0	0.00	0.01	0	0.99	0.97***
Classroom adversity	−0.58	0.34	.56	−0.59	0.37	.55	−0.69*	0.34	.50	−.85**	0.27	.43	0.43***	0.10***
Emotional exhaustion	−0.20	0.28	.82	−0.20	0.29	.82	—	—	—	—	—	—		
Personal accomplishment	—	—	—	—	—	—	0.53	0.34	1.70	1.04**	0.33	2.83	2.83***	19.13***
Classroom Adversity × Emotional Exhaustion	—	—	—	−0.07	0.66	.93	—	—	—	—	—	—		
Classroom Adversity × Personal Accomplishment	—	—	—	—	—		—	—	—	2.03**	0.71	7.61	7.58***	192.06***

Note. Cross-classified models (Goldstein, 2011; Rasbash & Goldstein, 1994) were used to account for the fact that observations were nested both within students and within teachers simultaneously. OR = Odds ratio; the odds that a negative interaction occurred in an observation given predictors. Negative interactions coded as 0 = negative interaction did not occur and 1 = negative interaction did occur. N's = 10 teachers; 15 students; 475 observations (in which teachers and students interacted with one another).Sensitivity Analyses are found in the following models: Model 3a: Predicting Negative Teacher–Student Individual Interactions and Model 4b: Predicting Negative Teacher–Student Group Interactions. *SE* = Standard error.
*$p < .05$. **$p < .01$. ***$p < .001$.

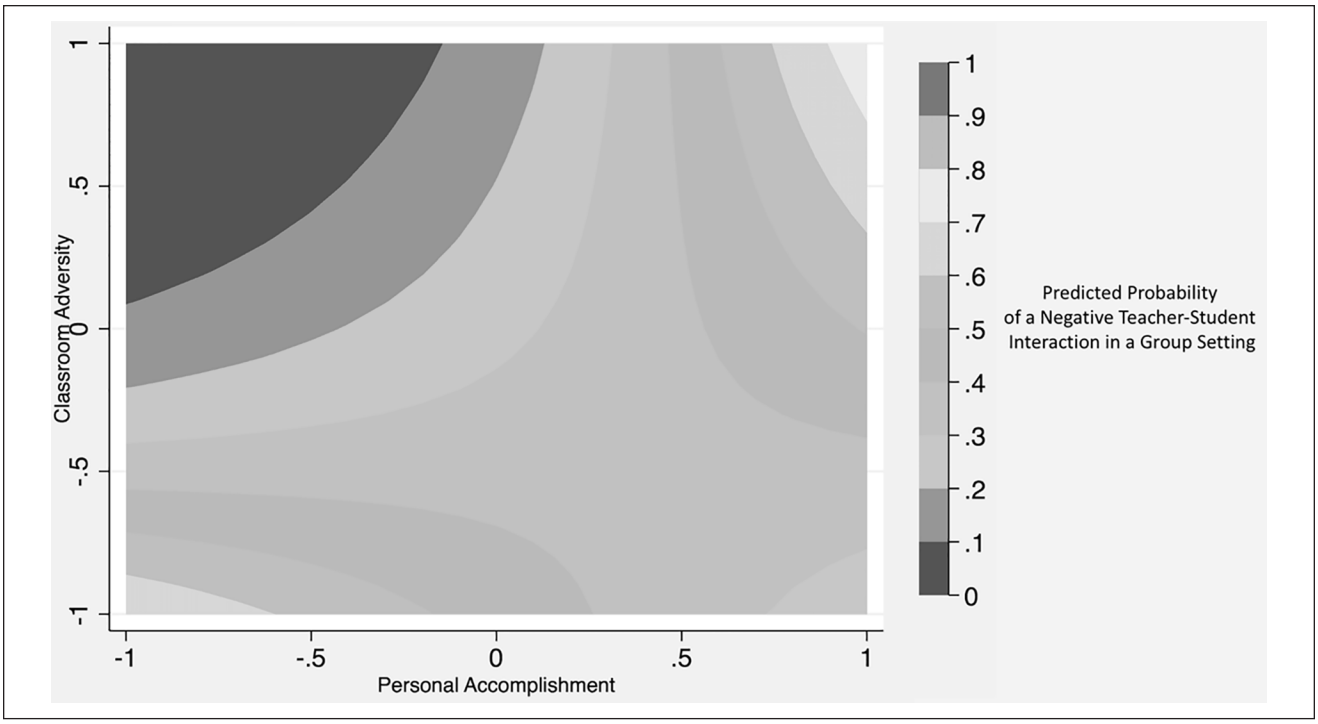

Figure 1. Contour plot of Classroom Adversity × Personal Accomplishment interaction effect.
Note. Both variables are grand mean-centered, with 0 representing the mean score; −1 and 1 are the approximate observed minimum and maximum of each variable, respectively.

significant predictor in Model 3b, which also included the main effect for personal accomplishment ($B = -69$, $p < .05$, OR = .50).

Burnout × Classroom-Level Adversity and Negative Teacher–Student Interactions

For teacher–student individual interactions, results did not reveal significant interactions between emotional exhaustion (Model 2a) and classroom adversity or between personal accomplishment and classroom adversity (Model 4a). However, the main effect of classroom adversity remained a significant predictor.

For teacher–student group interactions, the main effect of emotional exhaustion was not a significant predictor (Model 2b). However, the main effect of classroom adversity was a significant predictor of negative interactions ($B = -.85$, $p < .01$, OR = .43; Model 4b). In addition, the main effect of personal accomplishment was a significant predictor of negative interactions ($B = 1.04$, $p < .01$, OR = 2.83; Model 4b). These main effects were subsumed by a significant interaction effect between classroom adversity and personal accomplishment ($B = 2.03$, $p < .01$, OR = 7.61; Model 4b). To interpret the interaction, we examined a contour plot, a visualization technique useful for interpreting interactions of two continuous variables. As seen in Figure 1, combinations of classroom adversity and personal accomplishment in the upper right quadrant of the graph were associated with the highest predicted probability of negative interaction, above 70%. This quadrant corresponds to teachers with higher-than-average personal accomplishment scores, who are teaching in classrooms with the highest classroom adversity scores.

Sensitivity Analysis

In regard to negative teacher–student individual interactions, the robust standard error model provided results similar to the original model, reinforcing the hypothesis that classroom adversity was positively associated with negative teacher–student individual interaction (Model 3a). However, upon examining outliers, 31 observations were removed, which consequently resulted in the removal of all positive interactions (observations in which negative teacher–student individual interaction was coded as 0). Removing this variability constrained our ability to run study models. Ultimately, this meant the original model findings were not robust to the exclusion of outliers and changed when they were excluded. Results from the original models should be interpreted cautiously in light of these sensitivity tests.

In regard to negative teacher–student group interactions, the estimates in the robust standard error model and the model with outliers removed (in which 13 outliers were removed) were consistent with the original model (Model

4b). Taken together, these patterns signal that the influence of classroom adversity and personal accomplishment on negative teacher–student group interactions is robust to the exclusion of outliers and hint at the durability of the findings in light of a small sample of teachers and students.

Discussion

In the present study, there was variability in the extent to which teacher–student interactions were negative in individual settings and in group settings. Furthermore, teachers had negative interactions with the focal student in group settings more often than in individual settings. Overall, the rates from the current study are somewhat inconsistent with prior work that reports (a) teachers and students with and at risk of EBD tend to have more negative interactions with one another compared with other students and (b) students' behavioral problems tend to correspond with low-quality teacher–student relationship (Sutherland & Oswald, 2005).

The difference in findings between the current study and prior work may be related to the contexts under which prior work assessed teacher–student interactions. Henriccson and Rydell (2004) observed teachers and students across a range of classroom settings across the day. McClowry and colleagues' (2013) conducted observations of teacher feedback to students with high rates of externalizing problem behavior during teacher-directed morning lesson time. In this study, we observed teachers and students during both group and individual instructional settings and in teacher- or student-directed instruction. We selected observation times when the opportunity to interact with the focal student was the highest (e.g., small group time). We did not conduct observations during noninstructional time (e.g., reading time) nor during special classroom events (e.g., teaching assistant leading). The present study adds to the literature by observing teachers and focal students identified as with or at risk of EBD across instructional contexts in both the group and individual settings with a high likelihood of teacher–student interaction.

Teacher–Student Interactions in Individual Settings

Higher rates of teacher-reported classroom adversity were associated with increases in the likelihood of negative interactions during teacher–student interactions in individual settings. This is similar to prior work that suggests classroom adversity influences teaching processes and quality; Abry and colleagues (2018) report teachers were less likely to minimize classroom disruptions and maintain classroom order in high-adversity classrooms. The present study finding helps us understand the classroom experiences of teachers and their students with and at risk of EBD within the context of the broader classroom environment. Unfortunately, negative interactions with students with and at risk of EBD tend to persist over time and may magnify student problem behavior (Sutherland & Oswald, 2005). It may be particularly difficult for teachers who are in high adversity classrooms to break the cycle of student problem behaviors and negative interaction patterns in students with and at risk of EBD.

In regard to students in this study, positive teacher–student interactions are critically important for positive developmental trajectories (Curby et al., 2011). Findings from the present study suggest students with or at risk of EBD who are in classrooms with peers also experiencing adversity were at an elevated risk of negative interactions with their teachers. Future work should investigate whether students with EBD in high-level adversity classrooms are less likely to encounter teacher interactions that use positive behavior management strategies and positive academic instruction compared with teachers in classrooms with lower levels of adversity. Taken together, these findings highlight the importance of supporting teachers who are in classroom contexts with elevated levels of risk and in particular supporting those who instruct students with or at risk of EBD within these contexts.

This association is problematic not only for students but also for teachers. Positive teacher–student relationships are critically important for overall teacher well-being and are a primary factor in teacher retention (O'Connor, 2008). When teachers in high-adversity classrooms have an increased rate of engaging in negative interactions and perhaps difficulty engaging in positive teacher–student interactions, it may further limit the extent that they interact with students with EBD. Future studies should examine how to best help teachers engage in positive individual interactions specifically in students with and at risk of EBD and in classrooms with high adversity.

Teacher–Student Interactions in Group Settings

A different pattern of findings emerged for negative teacher–student interactions in group settings. The personal accomplishment was positively related to the likelihood of a negative interaction between the teacher and the focal student group at the average level of classroom adversity. This is surprising given that prior work demonstrates teachers who experience burnout symptoms, such as emotional exhaustion and reduced personal accomplishment, may struggle to build positive relationships in their classroom and effectively manage student misbehaviors (Eddy et al., 2020). Also surprising was that higher classroom adversity was associated with a decrease in the likelihood of negative teacher–student interactions in group settings. Given these results, there may be substantive differences between the interactions that teachers have with groups and individual interactions that warrant further study.

These main effects should be interpreted conditionally, as findings were altered when the interaction between classroom adversity and personal accomplishment was added. An examination of the contour plot helps to unpack this interaction effect. Figure 1 depicts regions of significance with each of the gradients signaling significant slopes associated with the interaction effect. Specifically, high levels of classroom adversity modified the relation between personal accomplishment and negative interactions; high rates of personal accomplishment combined with high classroom adversity was associated with the highest likelihood of a negative interaction occurring (i.e., the upper right quadrant of the contour plot). In classrooms with higher levels of adversity, teachers are faced with multiple and varied demands for their attention (and also more potential personal goals and/or challenges to choose from). This may alter the relation between personal accomplishment and negative interaction with a given student. In contrast, in a classroom with lower-than-average adversity, a teacher may be more likely to tie their feelings of personal accomplishment to interactions with a given student, thereby strengthening the relationship between accomplishment and negative interactions. In a limited-resource context and as demands increase, teachers may be making nonconventional and potentially inconsistent choices about who, and how, to interact with students.

Limitations

It is important to highlight that this preliminary study consisted of a large number of observations but a small number of teachers and students. Although the sensitivity tests signal the durability of the models predicting negative teacher–student group interactions, the models predicting negative teacher–student individual interactions were not as robust. In addition, the schools from which teachers were recruited may have a limited range of variability with regard to classroom adversity. Findings should be interpreted in light of small sample size and the potential for this restricted range. Future work should include a larger number of teachers and students across a diverse range of schools to increase the precision and generalizability of findings. This would also allow for more robust modeling of additional simultaneous interaction effects, which we were not able to undertake with adequate statistical power, given the small number of teachers and students. In addition, this would allow future work to include a range of school, teacher, and student covariates to conduct a more rigorous assessment of study relations. Important covariates to consider are teacher education, teacher gender, years of teaching experience, class size, school resources, child gender, mother's education, and family income-to-needs (Abry et al., 2018).

Several other limitations of this study should be considered. First, teachers were aware of who the focal student participants were in their class and as a result knew which students the coders were observing. This awareness may cause teachers to modify their behavior, although participating teachers were observed often throughout the year by observers from the current study and school administrators, potentially decreasing the influence of observers on behavior. Second, we did not collect information about the students for whom caregivers did not provide consent and whether these students differed on variables such as externalizing problems or gender. Future work should collect this information to provide insight into the generalizability of study findings. Third, interrater reliability estimates were calculated on 44% of observations, and the kappa score for these paired observations was .71 for negative interactions. Future studies should extend the length and number of observational assessments as the value of Kappa is influenced by the prevalence of the evaluated behavior and some of the behaviors in the present study were observed in a limited number of observations (Cohen, 1960).

An important area for consideration is the current state of measurement of classroom adversity. As Abry and colleagues (2017, 2018) and McLean and colleagues (2020) note, an important next step in this line of work will be to use a more robust and nuanced measure of classroom adversity. Currently, the measure of classroom adversity consists of teacher reports on student-level variables, which when accumulated index classroom-level stress. Several of the items included in the current measure imply value judgments inherent in classifying these characteristics as indicators of classroom adversity (e.g., nonstandard English use). In addition, current measures of classroom adversity are based on subjective teacher reports; we do not currently know the extent to which this measurement is an accurate reflection of the classrooms' objective level of adversity. For instance, there may be items included in the measurement of classroom adversity that teachers have limited information or knowledge about (e.g., student home life). The field is in need of an empirically validated measure that comprises assessments and reports from other informants across a range of adversity-related characteristics. These characteristics could include school records of special education, English proficiency, and free/reduced lunch status, tardiness and absenteeism, student mobility, direct assessments of student competencies; and parent-reported attitudes, practices, and involvement (see Abry et al., 2018). The development of this measure should include factor analysis to determine the extent that classroom adversity is a unidimensional construct. In addition, this measure should be developed and evaluated with consideration

about what classifying these characteristics as risk implies about the expectations around which traditional classrooms/schools are designed and about teacher preparation.

Implications

Interpreted cautiously, study findings present a preliminary but meaningful signal for the need for future work that more thoroughly investigates classroom adversity, teacher burnout, and teacher–student interactions. Findings also suggest teachers would benefit from interventions or support designed to help them increase their motivation or ability to engage in positive interactions with students with and at risk for EBD. Moreover, in high-adversity classrooms, teachers and students may benefit from supports that target classroom management and foundational student competencies. However, this study did not compare teacher interactions with typical students or include identification of student disability status (e.g., special education eligibility); future work should expand the student sample to further inform practice and teacher support recommendations. Future work should also examine *how* we can increase teachers' motivation and incentives to engage in positive interactions under these classroom contextual factors. For example, it may be that teachers' attributions for students' challenging behavior play a role in the relation between classroom context and teacher–student interactions. Teachers may also need support in developing and maintaining positive, well-managed classroom environments, which can then set a foundation for high-quality interactions and instruction. Future work should examine how classroom adversity influences classroom quality and classroom management and how additional teacher factors, such as teaching efficacy may play a role in these associations.

Conclusion

This study provides insight into the role of teachers' burnout symptoms in teacher–student interactions with students with and at risk of EBD and the extent to which teacher reports of classroom adversity influences this relation. We extend previous work in this area to students with or at risk of EBD from a high-risk population of students and schools. This preliminary investigation suggests the classroom environment may be an important characteristic associated with the teacher–student interactions these students are exposed to. Findings inform researchers and practitioners about supporting teachers in early elementary school and provide information about teacher and classroom contextual factors that may relate to negative teacher–student interactions with students with and at risk of EBD.

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