MEASURES OF TEACHER PRACTICES AND STUDENT BEHAVIORS

MEASURES OF TEACHER PRACTICES AND TEACHER RATINGS OF STUDENT SYMPTOMATOLOGY ON OBSERVED STUDENT ACADEMIC ENGAGEMENT

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Abstract

The current investigation examined whether teacher ratings of student symptomatology as measured by the Behavioral Assessment System for Children-Third Edition (BASC-3) and quality of teacher practices, as measured by the Classroom Strategies Assessment System (CSAS) predict direct observation of students’ academic engagement as measured by the Behavioral Observation of Students in Schools (BOSS) in elementary school classrooms. Participants included 98 classroom teachers and 262 students with or at risk for Externalizing Behavior Disorders (EBDs) from 18 elementary schools. Correlational analyses found teacher ratings of student symptomatology were significantly related to academic engagement behavior ($r = -.28, p < .01$) and teachers’ use of behavior management practices were significantly related to student academic engagement behavior ($r = -.17, p < .01$). A series of multilevel models were carried out to examine the predictiveness of student symptomatology and the quality of classroom practices on student academic engagement behaviors. Multilevel results revealed students with more symptomatology were predictive of lower student academic engagement behaviors whereas observed teacher practices were not predictive of student academic engagement behaviors. The interaction between student symptomatology and teacher practices predicted total student engagement. Study limitations and implications of findings for bridging research and practice are presented.
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Introduction

Externalizing behaviors or disorders in the classroom such as defiance, aggression, destruction, and noncompliance are a frequent concern among teachers, administrators, and mental health providers (Coalition for Psychology in Schools and Education, 2019). Children with externalizing behavior problems present unique challenges for teachers as problem behaviors can interfere with teacher-student interactions, student learning, and the overall classroom climate (Education Advisory Board, 2019). Interventions aimed at reducing problem behaviors are imperative due to the poor academic, social, and behavioral outcomes students with externalizing behaviors often experience (e.g., Odgers et al., 2008). As a result, researchers and school practitioners are interested in determining the factors that are associated with student behavior among students with Externalizing Behavior Disorders to better inform prevention and intervention efforts. However, the complex nature of schools, classrooms, and student-teacher interactions makes it challenging to identify the factors that influence student externalizing behavior and academic engagement (O’Brennan et al. 2014). The current study seeks to add to the literature by exploring the extent to which teacher ratings of student symptomatology and the quality of teacher instructional and behavior management practices are associated with student academic engagement during classroom instruction.

Externalizing Behavior Disorders (EBDs)

Externalizing Behavior Disorders (e.g., Conduct Disorder, Oppositional Defiant Disorder, Attention Deficit Hyperactivity Disorder) are prevalent among children and adolescents in the United States. A recent survey from the National Survey of Children’s Health found 7.4% of children aged 3-17 years had a current behavior problem and were receiving treatment by a mental health professional (e.g., Ghandour et al., 2019). Children with EBDs can
have significant negative outcomes that persist into adulthood including mental health, physical health, and economic problems (e.g., Henry et al., 2012; Odgers et al., 2008); convictions of violent crimes, aggressive behavior, and an increased risk of assault over the lifespan (Hodgins et al., 2008); risky decision making (Schutter et al., 2011); and limited academic achievement (Nelson et al., 2004). These outcomes are exacerbated in urban high-poverty populations due to the persistent risk factors such as exposure to violent neighborhoods, school failure and grade retention, and ineffective disciplinary strategies (Farmer et al., 2001; Kim et al., 2019).

Externalizing behaviors in the classroom not only impact the student’s trajectory, but also the classroom environment (Reddy et al., 2020). A survey of teachers in urban school districts found that 21% reported losing four or more hours of instruction per week due to disruptive student behavior (Walker et al., 2004). The lost instructional time is detrimental to the learning of all students in the classroom (Reddy et al., 2020). Barth et al. (2004, p. 129) found “poorer classroom environments were associated with poorer student outcomes (aggression, peer relationships, and academic focus).” Due to the pervasiveness of problem behaviors in the classroom and negative instructional implications for teachers and students with or at risk for EBDs, studies are warranted that further examine the relation between quality aspects of teachers’ instructional and behavior management in relation to student behaviors that support learning (academic engagement) and impede learning (disruptive and aggressive behaviors).

Assessments of Students with EBDs: Classroom Behavior and Academic Engagement

A primary focus of schools is the identification, prevention, and intervention efforts aimed at supporting students with or at risk for EBDs. Recent school reform efforts have led to the implementation of multi-tiered systems of support, response to intervention, and positive behavior interventions and support (Averill et al., 2011). Within these frameworks, when
students exhibit maladaptive behavior a problem-solving process is used to identify the problem and effectively intervene. The majority of assessments (60-90%) in schools for students referred for social, emotional, or behavioral concerns includes interviews, rating scales, and observations (Shapiro & Heick, 2004). Data are collected as a means to identify students in need for more intensive services. Data collection is an important aspect when evaluating student behavior and helps to inform diagnosis, classification, and prevention and intervention efforts (Whitcomb, 2013). As a result, the reliability and validity of the data obtained throughout the assessment process are critical.

The cornerstone of behavioral assessment is systematic direction observations of student behavior where data are collected immediately or soon after the instance of the behavior (Christ et al., 2009). Systematic direct observations are preferred to rating scales as there tend to be fewer assumptions involved and provide more contextual information about the classroom environment and situational factors that may impact student behavior (Chafouleas, 2011; Greenspoon 1993). Systematic direct observations also have been found in the literature to predict future behavior (Jiang et al., 2019). However, direct observation may require significant resources such as time and the use of a trained observers (Chafouleas, 2011).

Direct observations of students with or at risk for EBDs are used during the assessment and identification process as well as to monitor progress overtime. The focus of these observations is typically problem or maladaptive behavior; however, there is an increased focus on assessing student prosocial behavior (O’Brennen et al., 2014). Prosocial behavior has been found to predict both short- and long-term academic achievement (Gerbino et al., 2018). To this end, the current study will use direct observation to investigate factors that influence prosocial behavior (i.e., academic engagement).
Academic engagement behaviors are important for classroom learning and are a key requisite for students who struggle with behavior. Studies have demonstrated that active engagement is critical for academic and future success as students who exhibit more active engagement, have higher academic achievement (DiPerna, et al., 2005; Shapiro, 2004). Students with or at risk for EBDs, compared to typically developing children have lower rates of on-task behavior, which impacts future academic achievement (Erickson et al., 2006; Nelson et al., 2004). Classroom engagement is typically divided into two categories: passive and active engagement. Active engagement occurs when students respond to academic tasks (e.g., writing, reading aloud, talking to the teacher about the assigned material). Passive Engagement occurs when students inactively attend to the academic material (e.g., looking at an academic worksheet, listening to the lecture, watching a video). Taken together it is critical to enhance understanding of factors (e.g., teacher practices) that may influence active engagement in this population.

Understanding Students with EBDs Needs from a Systems Perspective

Bronfenbrenner’s Ecological Systems Theory (1992) provides a framework for understanding how factors directly and indirectly influence the development of prosocial and maladaptive behaviors for students. Ecological theory is often used in educational research because it considers both individual symptomatology in addition to broad societal and school factors. From the ecological perspective student problem and prosocial behaviors are impacted by individual student symptomatology, the immediate environment (i.e., classroom culture), as well as cultural and social factors (Bronfenbrenner, 1979). School-based research on student prosocial behaviors among students with externalizing problems should reflect the complex
nature of schools and consider the influence of both individual student-level factors and classroom-level factors on student behavior (Mackenzie & Sameroff, 2003).

**Environmental Factors**

Research has demonstrated that student behavior is influenced by a number of environmental factors including student-teacher relationships, the physical environment, curriculum components, and teacher practices (Decker et al., 2007; Lekwa et al., 2018). Over the past decade there has been an increased interest in directly assessing the classroom environment including teacher practices due to the emphasis on students’ response to instruction and interventions. Teacher practices including instructional and behavior management practices, have long been demonstrated in the literature to have a significant impact on student behavior and learning (Hughes et al., 2008; Rimm-Kaufman et al., 2005).

Behavior management strategies are practices implemented by teachers to “promote students’ compliance with tasks, or adherence to behavioral expectations” (Lekwa et al., 2018, p. 2). Some behavior management practices include establishing rules, providing positive reinforcement, and using clear directives (Gable et al., 2009; Kern & Clemens, 2007). Studies have replicated the finding that high quality behavior management practices are associated with improved student outcomes including academic, social, emotional, and behavioral (Korpershoek et al., 2016; Sutherland et al., 2000). Teachers who institute clear expectations and use praise to reinforce appropriate behavior have increased prosocial behavior and decreased problem behavior among students (Barth et al., 2004; Epstein et al., 2008; Sutherland et al., 2000). Although, the rates of these practices among general education teachers are lower than recommended by research (Reddy et al., 2013c).
Among students at risk for EBDs, less is known regarding the impact of teacher behavior management practices on student classroom engagement. A recent study Caldarella et al. (2019) found teachers’ increased use of praise statements and decreased use of reprimands improved student academic engagement behaviors among students at risk for emotional and behavioral disorders, though engagement was not influenced among typically developing peer-comparison. These findings indicate that behavior management practices may have a different impact on students at risk for emotional and behavioral disorders than typically developing peer comparisons.

Effective teaching also incorporates the use of high-quality instructional practices such as summarizing, questioning, and providing academic praise and corrective feedback (Kounin 1970; Oliver et al., 2011). The use of effective instructional practices includes the way in which teachers present information clearly, give opportunities to respond, and provide academic feedback (Lekwa et al., 2018). Evidence suggests that high-quality instructional practices are associated with improved student academic engagement behaviors (Hattie & Timperley, 2007). However, direct observations of general education teachers’ use of high-quality instructional practices found that on average, teachers use modest rates of these practices (Reddy et al., 2013c). Despite literature demonstrating the association between teacher practices and student academic engagement behaviors (Downer et al., 2007; Lekwa et al., 2018), additional studies are warranted to better understand instructional and behavior management practices employed by teachers and their relation to prosocial behavior among students at risk for EBDs.

**Student-Level Factors**

Individual student characteristics also influence student behavior in the classroom. Studies on student characteristics typically focus on student demographics such as gender and
ethnicity. For example, studies have found that teachers often rate males and ethnic minority students as more aggressive (Kellam et al., 1998; Thomas et al., 2006). Other investigations include individual student symptomatology such as distractibility, level of activity, and impulsivity (Thomas & Chess, 1986). Studies found that specific student symptomatology in early childhood are related to later development of social, emotional, behavioral, and academic problems (Rothbart, 2007). For example, lack of control, impulsivity, and hyperactivity and aggression in preschool are individual symptomatology related to the development of later behavior problems (Galán et al., 2019; Pitzer et al., 2011; Stormont, 2002). Children at greatest risk for difficulties later in development are those with a large number of early and stable risk factors (Kingston & Prior, 1995; Stormont, 2002). Student symptomatology has also been found to relate to student engagement. For instance, Olivier et al. (2020) found student externalizing problems were associated with lower levels of student engagement.

During school-aged years, teachers are often a source used for obtaining information regarding student symptomatology by means of rating scales. Rating scales provide norm-referenced scores of both broad and narrow constructs of student symptomatology and behavior (Miller et al., 2018). The use of rating scales has increased significantly in school psychologists’ assessments of students with challenging behavior and are the most common measure of student behavior (Wilson & Lipsey, 2007). This may be in part because rating scales are easy to obtain and a cost-efficient method to obtaining detailed information about student symptomatology and behavior (Shapiro & Heick, 2004). The information gathered from rating scales also provides information about the student’s behavior in various settings. To this end, the current study will focus on teacher reports of student symptomatology such as aggression, hyperactivity, and conduct problems.
School-based research often utilizes an ecological framework to understand the extent to which individual- and classroom-level factors influence student behavior (e.g., Barth et al., 2004; McCormick et al., 2013; O’Brennan et al., 2014). A meta-analysis found that both quantity and quality of instructional practices (i.e., classroom-level factors) are equally as important to student symptomatology (i.e., student-level factors) for schooling outcomes (Viega et al., 2012; Wang et al., 1990). O’Brennen et al. (2014) investigated teacher perceptions of student- (e.g., gender, prosocial behavior), classroom- (e.g., class size, average classroom behavior, teacher behavior management practices), and school-level factors (e.g., school climate) on teacher perceptions of student problem behavior. The study found that student symptomatology had the largest influence on teacher perceptions of student behavior, although school- and classroom-level variables also influenced teacher perceptions. While this study highlights the need to better understand student behavior from an ecological perspective, the study relied on teacher reports of student problem behavior and classroom factors. The current study will extend this research by using a similar ecological framework to explore the influence of individual- and classroom-level factors on observed student academic engagement behaviors.

**Current Study**

The purpose of the current investigation is to evaluate the relationship between teacher ratings of student symptomatology, observed teachers’ use of evidence-based classroom practices and observed student academic engagement behaviors. The primary research questions are: (1) What is the relationship between observed student academic engagement behaviors as measured by the Behavioral Observation of Students in Schools (BOSS; Shapiro, 2004) and (a) teacher ratings student symptomatology as measured by the Behavior Assessment System for Children Third Edition (BASC-3; Reynolds & Kamphaus, 2015) and (b) observed teacher
practices as measured by the Classroom Strategies Assessment System (CSAS; Reddy et al., 2013)? (2) Do teacher ratings of student symptomatology predict observed student academic engagement behaviors? (3) Does the quality of evidence-based instructional and behavior management practices predict observed student academic engagement behaviors? (4) Do teacher ratings of student symptomatology and the quality of evidence-based instructional and behavior management practices predict student academic engagement behaviors? Based on prior research on teacher practices and student academic engagement (Hattie & Timperley, 2007; Lekwa et al., 2020), it is hypothesized that student symptomatology rated by teachers (BASC-3) and observed teacher instructional and behavior management practices (i.e., CSAS discrepancy scores) will significantly predict observed student academic engagement behaviors.
Methods

Participants

Data were obtained across 18 school districts in New Jersey. Participants included 98 classroom teachers and 262 students with or at risk for EBDs. Participating teachers in this study were part of a larger randomized controlled trial. Data used in this study were obtained prior to the start of the interventions.

Teachers were mostly female (96%) and self-identified as White (69%), Latino/a (13%), African American (9%), Asian or Middle Eastern (3%), and multiracial (6%). Fifty-five percent of teachers held a bachelor’s degree, 39% held a master’s degree, two teachers held a doctorate, two teachers completed some college (no degree) and one teacher held an associate’s degree. The average years of teaching experience was 3.09 (SD = 1.11; Range = 1 to 5). Most teachers (74%) were responsible for 10 or more students; 17% were responsible for five to ten students; 8% were responsible for two to four students; and one teacher was responsible for one student. Eighteen teachers did not complete the demographic form.

Students were predominately male (76%) and were enrolled in Kindergarten through Grade 5. Most students were enrolled in Kindergarten (26.3%), first grade (14.3%), second grade (8.9%), third grade (17.8%), fourth grade (18.9%), and fifth grade (12.9%). Students ranged from 6 to 11 years old. According to school demographic information obtained from the NJ Department of Education, approximately 56% of students qualified for free and reduced lunch and 24% of students were classified as Limited English Proficient. Twenty eight percent of students were White, 37% were Latino/a, 26% were African American, 6.4% were Asian, and 3% were Native Hawaiian, Native American, or two or more races.
Measures

*Behavioral Observation of Students in Schools*

The BOSS (Shapiro, 2004) measures student on- and off-task behavior in the classroom environment. The measure uses momentary time sample and partial interval recording procedures (15-second intervals). On-task behavior is broken down into Active Engagement and Passive Engagement. Active Engagement occurs when the student responds to an academic task (e.g., writing, reading aloud, talking to the teacher about the assigned material). Passive Engagement occurs when the student passively attends to the academic material (e.g., looking at an academic worksheet, listening to the lecture, watching a video). Active and Passive Engagement are recorded using momentary time sampling where the observer records the behavior at the beginning of each 15-second interval.

Partial interval recording is used to record five off-task behavior categories. The five categories include: Unique Student Target, Inappropriate Physical (e.g., hitting, damaging property, taking objects from others without asking permission), Inappropriate Verbal (e.g., tattling, calling out in class) Noncompliance (e.g., not following directions, not starting assigned work), and Disruptive Academic Behavior (e.g., looking out of the window when directed to complete work, staring blankly). The current investigation used Total Engagement and Total Nonengagement, Active Engagement, Passive Engagement, and Disruptive Academic Behaviors.

Evidence suggests strong inter-observer agreement in studies that used the BOSS to measure engagement among students with Attention Deficit Hyperactivity Disorder and disruptive behaviors (Briesch & Daniels, 2013; Pfiffner et al., 2013). Hooterman et al. (2008) found evidence of concurrent validity with teacher-rated student behavior. Predictive validity
was evidenced for the BOSS as Total Engagement was found to predict future severity of psychopathology (Jiang et al., 2019).

**Behavioral Assessment System for Children Third Edition**

The BASC-3 (Reynolds & Kamphaus, 2015) is a comprehensive measure used to assess social, emotional, and behavioral functioning, including clinical and adaptive dimensions in children and adolescents (aged 2 to 25 years old; Reynolds & Kamphaus, 2015). The BASC-3 includes three components: The Teacher Rating Scales, Parent Rating Scales, and Self-Report of Personality. The present investigation used the Teacher Rating Scale Child (TRS-C), which is designed for children ages 6 to 11. The TRS-C includes 156 items of behaviors rated on a frequency scale (1 = Never, 4 = Almost always). The TRS-C includes an overall score (Behavioral Symptoms), four composite scores (Adaptive Skills, Externalizing Problems, Internalizing Problems, and School Problems) and 15 subscales. The composite scores on the BASC-3 are reported as T scores, which have a mean of 50 and a standard deviation of 10. Higher T scores on the composites indicate more frequent behavior and/or emotional problems with the exception of the Adaptive Skills composite where higher T scores indicate higher adaptive functioning. The current investigation used the Behavioral Symptoms, Adaptive Skills, Externalizing Problems, Internalizing Problems, School Problems, and eight subscales (Attention Problems, Aggression, Anxiety, Conduct Problems, Depression, Hyperactivity, Anger Control, and Emotional Self Control).

Reliability coefficients for the TRS-C composites range from .92 to .97 (median = .96) and test-retest consistency range from .77 to .91 (median .87; Reynolds & Kamphaus, 2015). The BASC-3 TRS also demonstrates moderate to high correlations with other measures of child behavior such as the BASC-2, the Achenbach System of Empirically Based Assessment.
Caregiver-Teacher Report Form (Achenbach & Rescorla, 2000), and the Conner’s 3 Teacher Form (Conners, 2008).

**Classroom Strategies Assessment System**

The CSAS (Reddy et al., 2013) is a multi-rater dimensional classroom observational assessment of teacher’s use of evidence-based instructional and behavior management practices. The CSAS has two forms, one for observers and one for teachers designed to be used together to enhance professional development conversations. The CSAS Observer Form used in this study includes three sections: Strategy Counts, Strategy Rating Scales, and a Classroom Checklist. The Strategy Counts are obtained during a 30-minute classroom observation (during classroom instruction). The independent observer tallies each time the teacher uses specific instructional and behavioral management practices.

Strategy Rating Scales and the Classroom Checklist are completed immediately following the observation. There are two Strategy Rating Scales (Instructional Strategies and Behavior Management Strategies). For both Instructional and Behavioral Management Strategy Rating Scales, observers use a 7-point scale (1 = Never used, 4 = Sometimes used, 7 = Always used) to rate observed frequency and recommended frequency. The observed frequency is how often the teacher used the instructional and behavior management strategy; the recommended frequency is how often the teacher *should have* used each strategy. Observers rate the recommended frequency using (1) Specific notes from Strategy Rating Scales, (2) Objective of the lesson (3) Evidence-based recommendations for effective instruction. Scores from observed frequency and recommended frequency are used to obtain Instructional Strategy and Behavior Management Strategy Discrepancy scores. Discrepancy scores are calculated by subtracting the observed frequency rating from the recommended frequency rating for each item.


(|Recommended Frequency – Observed Frequency|). Small discrepancy scores indicate little suggested change in specific classroom practice and large discrepancy scores indicate a significant suggested change. After completing the Strategy Rating Scales the observer completes the Classroom Checklist, a yes-no checklist of environmental resources in the classroom. The current investigation did not use the Classroom Checklist.

Previous studies have found strong evidence for the reliability and validity of the CSAS (e.g., Reddy et al., 2013, 2013a). Evidence supports good levels of reliability for the factor structure of both Rating Scales. The CSAS has strong internal consistency (Cronbach alpha values greater than .90) in addition to acceptable test-retest and inter-rater reliabilities (Reddy et al., 2013a). Studies have also found evidence of convergent and discriminant validity with other observational measures. For example, convergent and discriminant validity was found for the Classroom Assessment Scoring System, a measure of the quality of teacher-student interactions (Pianta et al., 2008; Reddy et al., 2013); Danielson Framework for Teaching (Reddy et al., 2019); and the Responsive Environmental Assessment for Classroom Teaching, a measure of student ratings of the classroom environment (Nelson et al., 2017). Predictive validity was evidenced for the CSAS as both Instructional and Behavior Management discrepancy scores were found to predict student achievement on state-wide assessments (Reddy et al., 2013b) and student engagement (Lekwa et al., 2018).

**Procedures**

School district leaders helped to identify eligible elementary schools (grades K-5) that contained at least three paraprofessionals who work with three or more students with or at risk for EBDs. The principal investigators (Reddy & Glover) then conducted recruitment meetings. Once the district leaders agreed to participate, the schools were randomly assigned to either (1)
behavior support coaching condition or (2) waitlist control condition. Informed consent was obtained for all participating teachers and paraprofessionals.

The coaching condition received a 1-day professional development workshop explaining effective research-based behavioral assessments. Teachers in both conditions identified eligible students using a three-step process involving (1) teacher nomination (2) teacher-completed behavioral and emotional screener (BASC-3 Behavioral and Emotional Screening System) and (3) direct observations of student behavior (BOSS). Eligible students included students with or at risk for an EBD and did not have formal diagnoses of Autism Spectrum Disorder or other pervasive developmental disabilities. A passive consent process was used to obtain consent from the parents/guardians of the eligible students. Parents/guardians were given the opportunity to opt-out of the activities of the study at any time by removing their child from the study without any penalty. Once the students were identified, a period of baseline data collection followed.

During baseline data collection teachers completed rating scales including the BASC-3, a Paraprofessional Teacher Relationship Survey, and the Social Skills Improvement System (Gresham & Elliott, 2007). All participating classroom teachers were observed by independent observers (blind to conditions) for 30-minute time periods using the CSAS. Baseline CSAS scores were obtained by averaging the scores across observations. Students were observed by independent observers for 15-minute time periods using the BOSS. Baseline BOSS scores were obtained by averaging the scores across the observations. For this investigation only baseline data will be used to address the primary research questions.

**Observer Training**

Independent observers, unaware to the assigned treatment conditions, were undergraduate and graduate students trained to conduct observations using the CSAS and BOSS. Training for
the CSAS took place over several days (3.5). Observers were instructed by Master coders on how to score the CSAS. Master coders also reviewed the theory, design, and evidence of the measure. During the training, observers were taught research-based instructional and behavior management practices and were instructed on how to take specific notes on lesson format and strategy usage. Observers watched classroom videos to practice using the measure and were required to independently code five classroom videos to at least 80% agreement with Master coders.

Independent observers were trained on the BOSS during a one-day training that covered methods of systematic direct observation and operational definitions (active engagement, passive engagement, etc.). Observers watched a series of classroom videos and were provided opportunities to practice with feedback. Observers were assessed and required to code classroom videos to at least 90% agreement with Master coders.

Data Analytic Approach

Prior to analysis 92 teachers and eight students were removed due to incomplete data. Scores on the CSAS were averaged to obtain a single aggregate score, which represents an estimate of the instructional and behavior management practices typically employed by the teacher. On average, teachers were observed two times ($SD = 0.68$; Range = 1 to 5). An aggregate score of Total Engagement was obtained by averaging the percentage (the total number of intervals actively or passively engaged out of the total intervals observed) of engagement across observations. Students were observed one to six times ($M = 3$, $SD = 0.77$) each observation lasting approximately 15 minutes.

To address the primary research questions several data analytic methods were used. Descriptive statistics and correlations were carried out to assess the nature and relations between
student symptomatology, teacher practices, and student academic engagement. Pearson product moment correlations were used to determine the relationship between the measures. Correlations were classified using Cohen (1992) categories: .10 to .20 will be considered small, .30 to .40 medium, .50 to .60 large, and .70 to .80 very large.

A series of multilevel models (i.e., hierarchical linear models) using full information maximum likelihood were used to determine whether student symptomatology (i.e., Behavioral Symptoms) and quality of Instructional and Behavior Management practices predicted observed student Total Engagement. Multilevel modeling was also used to determine whether the interaction of student symptomatology and the quality of Instructional and Behavior Management practices predicted observed student Total Engagement. Multilevel modeling was used because of the nested nature of the dataset where individual students were assigned to unique (independent) paraprofessionals within the same classroom context. Each variable was mean centered before being entered into the model. The Null Model had no predictors and provided a baseline that all other models were compared. Model 1 included BASC-3 teacher-rated student Behavioral Symptoms and Model 2 included total CSAS Total Discrepancy scores. Model 3 included both Behavioral Symptoms and CSAS Total Discrepancy scores and the interaction term (Behavioral Symptoms*CSAS Total Discrepancy) was added in Model 4. Model fit was determined by comparing the Akaike Information Criterion (AIC) and a Likelihood Ratio Test. Model assumptions were tested by visual examination of residual plots and Quantile-Quantile plots of fixed and random effects. Multilevel models were conducted in Jamovi Version 1.6.6.0 and model assumptions were tested using R Version 1.3.1093.
Results

Descriptive statistics for student academic engagement behaviors, teacher-rated student symptomatology, and observed teacher practices are presented in Table 1. Student Total Engagement (TE) was coded on average 56% of total intervals. Minimum levels of TE were observed 2% of intervals and maximum levels of TE were observed 97% of intervals. Active Engagement (AE) was coded on average 25% of intervals and Passive Engagement (PE) was coded on average 31% of intervals. Teacher ratings (TR) on the BASC-3 resulted in an average Behavioral Symptoms T score of 71.53 ($SD = 12.20$; Range = 41 to 106). Externalizing Problems T scores ($M = 71.59$, $SD = 14.75$; Range = 41 to 115) suggest that on average, teachers rated students as having significant externalizing behaviors. Based on previous investigations, discrepancy score guidelines (Alperin et al., 2020; Breeden et al., 2020; Reddy et al., 2015) suggest that assessed teacher Instructional practices (IS) and Behavior Management practices (BMS; i.e., Total Discrepancy scores; $M = 37.76$, $SD = 18.72$; Range = 7.67 to 115) in this study were in general in the effective range. Investigations of histogram graphs revealed CSAS Total (IS+BMS), IS and BMS Total Discrepancy scores, teacher-rated student symptomatology, and student academic engagement behaviors were all normally distributed.

To address research question (RQ) 1, the relationship among the variables was analyzed using Pearson product moment correlations (see Table 2). The relationships between the BOSS and the (1) BASC-3 and (2) CSAS were in the expected directions. Observed student TE was moderately correlated with student symptomatology as rated by teachers on the BASC-3. The overall score on the BASC-3, Behavioral Symptoms was significantly related to student TE ($r = -.28, p < .01$), indicating students rated by teachers as having more symptomatology were less engaged during classroom instruction. Externalizing Problems was also significantly related to
MEASURES OF TEACHER PRACTICES AND STUDENT BEHAVIORS

TE ($r = - .29$, $p < .01$), indicating students rated by teachers as having more externalizing problems were less engaged during classroom instruction. Most of the subscales on the BASC-3 were significantly related to TE behaviors. Aggression ($r = - .30$, $p < .01$), Emotional Self-Control ($r = - .28$, $p < .01$), and Anger Control ($r = - .27$, $p < .01$) were all moderately associated with student TE behaviors.

| Table 1 BOSS, CSAS, and BASC-3 TR Descriptive Statistics |
|----------------------------------|--------------|--------------|
| BOSS ($n = 262$)                 | Mean | SD   | Range   |
| Total Engagement                 | 0.56 | 0.18 | 0.02 – 0.97 |
| Total Nonengagement              | 0.44 | 0.18 | 0.03 – 0.98 |
| Active Engagement                | 0.25 | 0.14 | 0.00 – 0.70 |
| Passive Engagement               | 0.31 | 0.14 | 0.02 – 0.79 |
| Disruptive Academic              | 0.16 | 0.12 | 0.00 – 0.62 |
| CSAS Discrepancy Scores ($n = 98$) |     |      |          |
| Total Discrepancy (IS + BM)      | 37.76 | 18.72 | 7.67 – 115.00 |
| Total Instructional Strategies Discrepancy | 16.82 | 10.16 | 1.50 – 53.00 |
| Total Behavior Management Discrepancy | 21.09 | 10.43 | 4.67 – 63.00 |
| BASC-3 TR ($n = 262$)            |     |      |          |
| Behavioral Symptoms              | 71.53 | 12.20 | 41 – 106 |
| Externalizing Problems           | 71.59 | 14.75 | 41 – 115 |
| Internalizing Problems           | 59.44 | 14.96 | 39 – 106 |
| School Problems                  | 64.58 | 9.31  | 42 – 85  |
| Adaptive Skills                  | 34.69 | 6.96  | 18 – 56  |

Classroom-wide BMS Total Discrepancy scores were associated with observed student TE ($r = - .17$, $p < .01$); indicating teachers with lower BMS Total Discrepancy scores (i.e., higher quality behavior management practices) had more observed academic engagement behaviors among students during academic instruction. Observed student TE behaviors were not significantly related to CSAS Total Discrepancy scores (IS + BMS) or IS Total Discrepancy scores.

CSAS Total Discrepancy scores (IS + BMS) were also significantly related to Externalizing Problems ($r = .16$, $p < .01$) and School Problems ($r = .18$, $p < .05$) on the BASC-3.
Total Discrepancy scores were also related to four subscales on the BASC-3 including Attention Problems ($r = .16, p < .01$), Aggression ($r = .15, p < .05$), Conduct Problems ($r = .13, p < .05$), and Hyperactivity ($r = .16, p < .05$). IS Total Discrepancy scores were not significantly related to any of the composites or subscales on the BASC-3. However, BMS Total Discrepancy scores were significantly related to Behavioral Symptoms ($r = .15, p < .05$), Externalizing Problems ($r = .20, p < .01$), School Problems ($r = .21, p < .01$), and Adaptive Skills ($r = -.13, p < .05$). In addition, BMS Total Discrepancy scores were related to a number of subscales on the BASC-3 including Attention Problems ($r = .19, p < .01$), Aggression ($r = .19, p < .01$), Conduct Problems ($r = .16, p < .05$), and Hyperactivity ($r = .19, p < .01$).
### Table 2 Pearson Product Moment Correlations

<table>
<thead>
<tr>
<th>BOSS</th>
<th>CSAS</th>
<th>BASC-3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOSS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Engagement</td>
<td>-1.00**</td>
<td></td>
</tr>
<tr>
<td>Active Engagement</td>
<td>.61**</td>
<td>- .61**</td>
</tr>
<tr>
<td>Passive Engagement</td>
<td>.62**</td>
<td>- .62**</td>
</tr>
<tr>
<td>Disruptive Academic</td>
<td>- .34**</td>
<td>- .34**</td>
</tr>
<tr>
<td>CSAS</td>
<td>Total Discrepancy</td>
<td>- .10</td>
</tr>
<tr>
<td>ISD</td>
<td>.01</td>
<td>.09</td>
</tr>
<tr>
<td>BMD</td>
<td>- .17**</td>
<td>.17**</td>
</tr>
<tr>
<td>BASC-3 Composites</td>
<td>Behavioral Symptoms</td>
<td>- .28**</td>
</tr>
<tr>
<td>Externalizing Problems</td>
<td>- .29**</td>
<td>- .29**</td>
</tr>
<tr>
<td>Internalizing Problems</td>
<td>- .14*</td>
<td>- .14*</td>
</tr>
<tr>
<td>School Problems</td>
<td>- .14*</td>
<td>- .17**</td>
</tr>
<tr>
<td>Adaptive Skills</td>
<td>.18**</td>
<td>- .18**</td>
</tr>
<tr>
<td>BASC-3 Subscales</td>
<td>Attention Problems</td>
<td>- .10</td>
</tr>
<tr>
<td>Aggression</td>
<td>- .30**</td>
<td>- .30**</td>
</tr>
<tr>
<td>Anxiety</td>
<td>- .04</td>
<td>.04</td>
</tr>
<tr>
<td>Conduct Problems</td>
<td>- .24**</td>
<td>- .24**</td>
</tr>
<tr>
<td>Depression</td>
<td>- .20**</td>
<td>- .20**</td>
</tr>
<tr>
<td>Hyperactivity</td>
<td>- .22**</td>
<td>- .22**</td>
</tr>
<tr>
<td>Anger Control</td>
<td>- .27**</td>
<td>- .27**</td>
</tr>
<tr>
<td>Emotional Self Control</td>
<td>- .28**</td>
<td>- .28**</td>
</tr>
</tbody>
</table>

**Note.** TE = Total Engagement; NE = Total Nonengagement; AE = Active Engagement; PE = Passive Engagement; DA = Disruptive Academic; TD = Total Discrepancy; ISD = Instructional Strategies Discrepancy; BMD = Behavior Management Discrepancy; BS = Behavioral Symptoms; EP = Externalizing Problems; IP = Internalizing Problems; SP = School Problems; AS = Adaptive Skills; AP = Attention Problems; AG = Aggression; AX = Anxiety; CP = Conduct Problems; DP = Depression; HA = Hyperactivity; AC = Anger Control.

* * p < .05. ** p < .01.
Prediction of Academic Engagement

A series of multilevel models using full information maximum likelihood estimation were used to address RQs 2-4 (see Table 3). The model assumptions were met through visual examination of residual and random effect plots (see Appendix A). For all models the outcome variable was TE as measured by the BOSS. For Model 1, BASC-3 Behavioral Symptoms (i.e., Total Score) was entered as the predictor. Behavioral Symptoms demonstrated improved fit over the null model ($\Delta$AIC = -12.49, Marginal $R^2$ = 0.05). BASC-3 Behavioral Symptoms was a significant predictor of BOSS TE, reflecting that overall student symptomatology reduced students’ academic engagement behavior. For Model 2, the CSAS Total (IS+BMS) Discrepancy scores did not significantly predict student TE scores. AIC values indicated no substantial improvement over the null model ($\Delta$AIC = 0.76).

Table 3  Multilevel Modeling to Predict Student Total Academic Engagement Behaviors

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Null Model</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (SE B)</td>
<td>B (SE B)</td>
<td>B (SE B)</td>
<td>B (SE B)</td>
<td>B (SE B)</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.56***</td>
<td>0.56***</td>
<td>0.56***</td>
<td>0.56***</td>
<td>0.56***</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>BASC-3 TR Behavioral</td>
<td>-</td>
<td>-0.003***</td>
<td>-0.003***</td>
<td>-0.003***</td>
<td>-0.003***</td>
</tr>
<tr>
<td>Symptoms Composite</td>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>CSAS Total (IS+BMS)</td>
<td>-</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Behavioral Sympts*CSAS Total</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.00)</td>
</tr>
<tr>
<td>Additional Information</td>
<td>0.49</td>
<td>0.49</td>
<td>0.49</td>
<td>0.46</td>
<td>0.47</td>
</tr>
<tr>
<td>ICC</td>
<td>-212.31</td>
<td>-224.75</td>
<td>-211.55</td>
<td>-223.67</td>
<td>-226.62</td>
</tr>
<tr>
<td>AIC</td>
<td>-201.60</td>
<td>-210.48</td>
<td>-197.28</td>
<td>-205.82</td>
<td>-205.21</td>
</tr>
<tr>
<td>BIC</td>
<td>109.16</td>
<td>116.38</td>
<td>109.77</td>
<td>116.83</td>
<td>119.31</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>0.49</td>
<td>0.50</td>
<td>0.49</td>
<td>0.50</td>
<td>0.51</td>
</tr>
<tr>
<td>Conditional $R^2$</td>
<td>0.00</td>
<td>0.05</td>
<td>0.01</td>
<td>0.06</td>
<td>0.08</td>
</tr>
</tbody>
</table>

Note. SE = Standard Error; ICC = Intraclass Correlation Coefficient; AIC = Akaike Information Criterion; BIC = Bayesian Information Criteria
* $p < .05$. ** $p < .01$. *** $p < .001$. 
Model 3 included both BASC-3 Behavioral Symptoms and CSAS Total (IS+BMS) Discrepancy scores. This model demonstrated improved fit over the null model (i.e., intercept; \( \Delta \text{AIC} = -11.36 \), Marginal \( R^2 = 0.06 \)). BASC-3 Behavioral Symptoms significantly predicted TE. CSAS Total Discrepancy scores did not significantly predict TE. The best fitting model (Model 4) included BASC-3 Behavioral Symptoms, CSAS Total Discrepancy scores, and the interaction term (Behavioral Symptoms*CSAS Total Discrepancy). Results indicated Model 4 is a better fit than Model 3 by a Likelihood Ratio Test (\( X^2 (1) = 4.96, p < .05 \)). The interaction term was a significant predictor of TE (see Figure 1).

![Figure 1](image)

*Figure 1* The Relationship Between Behavioral Symptoms and Student Total Engagement at Levels of Teacher Total Discrepancy Scores.
Discussion

Using observation and rating scale methodologies, the present study added to the literature on the assessment of student academic engagement behavior and classroom practices for students with or at risk for EBDs. This study employed an ecological framework to examine both individual- and classroom-level factors on academic engagement behavior. Specifically, teacher-rated student symptomatology as measured by the BASC-3 and independently observed teacher instructional and behavior management practices as measured by the CSAS were studied in relation to student academic engagement. Findings revealed relations between student symptomatology and academic engagement in addition to teacher behavior management practices and student academic engagement. Specifically, students with more symptomatology and teachers with lower quality behavior management practices were individually associated with lower student academic engagement behaviors. Findings from this study are compared to other investigations and discussed in light of the research to practice implications.

The first research aim was to examine the relationship between student symptomatology and student academic engagement. Small negative correlations were found between academic engagement and all the composites on the BASC-3 (i.e., Behavioral Symptoms, School Problems, Externalizing Problems, Internalizing Problems). In contrast, a small positive correlation was found between academic engagement and the Adaptive Skills composite, suggesting students with better adaptive skills were more engaged during classroom instruction. Student engagement was also significantly related to many of the subscales on the BASC-3 (e.g., Aggression, Conduct Problems, Depression, Hyperactivity, Anger Control). Taken together, these relationships indicate that students with more symptoms of psychopathology have lower
levels of academic engagement during instruction among students identified with or at risk for EBDs.

Similar results were found in previous studies that examined the relationship between student symptomaticity and classroom engagement. For example, one study found that students with Attention Deficit Hyperactivity Disorder had lower rates of engagement when compared to same-aged peers (Junod et al., 2006). While the current study results parallel these findings, this investigation expands our understanding of engagement among a broader population—students with or at risk for EBDs. Another similar study found that among the general and special education population, students with more oppositionality had greater school-related difficulties such as engagement (Archambault et al., 2017). However, it is important to note that student engagement was measured using a self-report questionnaire whereas the current study used direct observations of engagement.

In regard to the classroom-level factors, a significant correlation was found between quality of behavior management practices and student levels of academic engagement behaviors during classroom instruction. Teachers with lower quality behavior management practices were associated with lower individual student engagement. These findings confirm the results of Lekwa and colleagues (2018) on teachers’ use of behavior management practices and classroom-wide student academic engagement. Using correlational analyses, the study found teachers rated with larger behavior management discrepancy scores (i.e., teachers with greater need for change in behavior management practices) were associated with lower levels of student engagement. The current study builds on these findings by examining classroom-wide behavior management practices and individual student engagement among students with or at risk for EBDs. Instructional practices and overall discrepancy scores were not significantly related to observed
student academic engagement behaviors (i.e., TE). Findings in the present study are not consistent with Lekwa et al., (2018), which found a significant relationship between quality of instructional practices and student engagement. The differences in findings may be due to the fact the current study focused on academic engagement behaviors for students with or at risk for EBDs than classroom wide estimates of academic engagement with all students.

Another interesting finding was the relationship between the CSAS discrepancy scores and the BASC-3 teacher-rated student symptomatology. Specifically, there were small positive correlations between Total Discrepancy scores and two composites (Externalizing and School Problems). In addition, small positive correlations were found between Total Discrepancy scores and specific subscales including Attention Problems, Aggression, Conduct Problems, and Hyperactivity. Findings suggest that teachers with greater need for change in a combination of instructional and behavior management, reported students as having more externalizing symptoms. Small positive correlations were also found between teacher Behavior Management practices and a number of composites on the BASC-3 including Behavioral Symptoms, Externalizing Symptoms, and School Problems. These results indicate teachers with greater need for change in behavior management practices reported students as having more externalizing symptoms.

To further explore the relationship between student symptomatology, teacher practices, and student engagement a series of multilevel models were conducted. Student symptomatology significantly predicted student academic engagement (see Table 3, Model 1). This finding indicates that student symptomatology has a small but had a significant influence on student academic engagement. These findings confirm previous research that found student externalizing behaviors as measured by teacher-ratings of student hyperactivity/inattention and oppositionality
were associated with lower levels of student engagement (Olivier et al., 2020). However, engagement was measured using student reports rather than direct observation as used in the current investigation.

One potential explanation for student symptomatology predicting academic engagement is students with more symptoms of externalizing behaviors, specifically externalizing behavior problems also exhibit an increased level of maladaptive behaviors in the classroom (Stormont, 2002). Maladaptive behaviors are incompatible with prosocial academic behaviors such as classroom engagement. In addition, students with externalizing behavior problems also experience self-regulation deficits (White et al., 2013). Self-regulation skills in the classroom allow students to engage in prosocial behaviors such as engagement and inhibit inappropriate behaviors (Archambault et al., 2017).

Teacher practices (i.e., Total Discrepancy (IS+BMS) scores) did not significantly predict student academic engagement behaviors. These findings are inconsistent with a number of studies that found teacher practices significantly influence student engagement (e.g., Downer et al., 2007; Lekwa et al., 2018). Specifically, Lekwa et al. (2018) found that after controlling for lesson format and class size, instructional and behavior management practices as individual domains significantly predicted student engagement whereas instructional and behavior management practices as a single predictor did not significant predict engagement. The current study parallels the finding that teacher practices as a single predictor did not significantly predict academic engagement behaviors among students with or at risk for EBDs warranting further investigation.

The model that explained the data the best (Table 3, Model 4) showed that quality of teacher practices significantly moderated the relationship between student symptomatology and
student engagement, although small, the effect was statistically significant. The significant interaction indicates that teachers with discrepancy scores one standard deviation below the mean with students rated with less symptomatology had higher levels of student engagement compared to teachers with discrepancy scores one standard deviation above the mean. In contrast, teachers with discrepancy scores one standard deviation below the mean with students rated with more symptomatology had lower levels of student engagement compared to teachers with discrepancy scores one standard deviation above the mean. These findings indicate that in order to understand academic engagement among students with EBDs, it is important to use an ecological framework as both individual symptomatology and instructional context predict engagement.

Overall, the findings of this study suggest that student symptomatology predicts student academic engagement and there is evidence to suggest that quality of teacher practices significantly moderate the relationship between student symptomatology and student engagement. These findings extend previous research that used an ecological framework to explore individual-, classroom-, and school-level factors and their influence on teacher perceptions of student problem behavior (O’Brennen et al., 2014). O’Brennen et al. (2014) found that student symptomatology had the largest influence on teacher perceptions of student behavior, although school- and classroom-level variables also influenced teacher perceptions of student behavior. The differences between the current study and O’Brennen et al. (2014) highlight how this study adds to the understanding of how individual- and classroom-level factors influence student behavior in the classroom. For instance, the outcome of the current study was direct observation of student prosocial behavior (i.e., academic engagement) rather
than teacher perceptions of problem behavior. Additionally, the population of interest was students with or at risk for EBDs opposed to the general education population.

Limitations

Several limitations should be considered when interpreting and generalizing the findings of this study to other samples and contexts. Data were obtained from Kindergarten through fifth grade from suburban and urban school districts. Students were mostly male, and teachers were mostly female. Therefore, the generalizability of the findings to other samples of teachers and students is limited. Other limitations include method bias and selection bias. Teacher and student observational data scores were aggregated across observations, which may have reduced variability. Observational methods were used to measure quality of teacher practices and student academic engagement. Observers in the classroom may have influenced teacher and/or student behavior. In this study, teachers were asked to nominate up to five students with behavior difficulties that may have led to selection bias. Finally, teachers rated student symptomatology, which may be prone to social desirability biases.

Future Research

This study offers directions for future research. Other studies are warranted that examine the influence of both teacher and student behavior on student academic engagement behaviors. Future studies should investigate teacher and student behaviors that occur simultaneously (i.e., during the same lesson). Since teacher-student interactions are complex, collecting observational data of teacher practices and student engagement simultaneously may help to further understand the relationship between teacher practices and student engagement. Future studies should also investigate quality of instructional and behavior management practices individually as aspects of instruction may impact student engagement differently.
Additionally, future studies should include larger samples with middle and/or high school students and female students with externalizing problems or EBDs. In addition to investigating student symptomatology, future studies should look at student strengths such as social-emotional functioning. Finally, future studies should obtain data using a variety of informants and methods in addition to using a more systematic and objective method to identifying students for the study.

**Implications for School Practice**

Students enter the classroom with individual strengths and needs that impact their ability to engage in the learning and social opportunities afforded to them during classroom instruction and school (O’Brennen et al., 2014). Likewise, how teachers orchestrate the learning environment, deliver instruction and foster student behavior overall influences student learning and engagement (Lekwa et al., 2020). However, limited research has been conducted on assessing the influence of both individual- and classroom-level factors on academic engagement behavior for students with EBDs. Findings from the current study suggest there is a need to consider both the individual- and classroom-level factors of student engagement. Furthermore, the study findings have implications for assessments of students with EBDs. Assessments often include information gathered on student symptomatology; however, assessment of the classroom environment should also be considered.

**Conclusion**

The complex nature of schools, classrooms, and student-teacher interactions makes it challenging to identify the factors that influence student prosocial behavior in the classroom. To this end, the current study used an ecological framework to understand how teacher practices and student symptomatology influence student academic engagement among elementary students with or at risk for EBDs. Student symptomatology significantly predicted Total Engagement
behaviors whereas teacher Instructional and Behavior Management practices did not. The interaction between student symptomatology and teacher practices significantly predicted student engagement in elementary school classrooms. These findings indicate for children with or at risk for EBDs, overall student symptomatology and the instructional context influence academic engagement in elementary schools.
References


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MEASURES OF TEACHER PRACTICES AND STUDENT BEHAVIORS


Appendix A

Variance of the Residuals

Error Variance
Quantile-Quantile of Fixed Effects

Quantile-Quantile of Random Effects