

Optional ERIC Coversheet — Only for Use with U.S. Department of Education Grantee Submissions

This coversheet should be completed by grantees and added to the PDF of your submission if the information required in this form **is not included on the PDF to be submitted**.

INSTRUCTIONS

- Before beginning submission process, download this PDF coversheet if you will need to provide information not on the PDF.
- Fill in all fields—information in this form **must match** the information on the submitted PDF and add missing information.
- Attach completed coversheet to the PDF you will upload to ERIC [use Adobe Acrobat or other program to combine PDF files]—do not upload the coversheet as a separate document.
- Begin completing submission form at <https://eric.ed.gov/submit/> and upload the full-text PDF with attached coversheet when indicated. Your full-text PDF will display in ERIC after the 12-month embargo period.

GRANTEE SUBMISSION REQUIRED FIELDS

Title of article, paper, or other content

Instructional Support and Academic Skills: Impacts of INSIGHTS in Classrooms With Shy Children

All author name(s) and affiliations on PDF. If more than 6 names, ERIC will complete the list from the submitted PDF.

Last Name, First Name	Academic/Organizational Affiliation	ORCID ID
McCormick, Meghan	MDRC	
White, Hope	New York University	
Horn, Parham	New York University	
Lacks, Rachel	New York University	
O'Connor, Erin	New York University	
Cappella, Elise	New York University	

Publication/Completion Date—(if *In Press*, enter year accepted or completed) 2018

Check type of content being submitted and complete one of the following in the box below:

- If article: Name of journal, volume, and issue number if available
- If paper: Name of conference, date of conference, and place of conference
- If book chapter: Title of book, page range, publisher name and location
- If book: Publisher name and location
- If dissertation: Name of institution, type of degree, and department granting degree

Early Education and Development

DOI or URL to published work (if available) 10.1080/10409289.2018.1435943

Acknowledgement of Funding— Grantees should check with their grant officer for the preferred wording to acknowledge funding. If the grant officer does not have a preference, grantees can use this suggested wording (adjust wording if multiple grants are to be acknowledged). Fill in Department of Education funding office, grant number, and name of grant recipient institution or organization.

“This work was supported by U.S. Department of Education [Office name] Institute of Education Sciences through [Grant number] R305B140037 to Institution] New York University. The opinions expressed are those of the authors and do not represent views of the [Office name] Institute of Education Sciences or the U.S. Department of Education.

Running Head: Shyness, instructional support, academic outcomes

Instructional Support and Academic Skills:
Impacts of *INSIGHTS* in Classrooms with Shy Children

Revision Resubmitted: November 3, 2017

Abstract

Research findings. This study investigated how mean classroom-level shyness scores moderated the impacts of *INSIGHTS into Children's Temperament* on instructional support and students' math and reading skills in kindergarten and first grade classrooms. *INSIGHTS* is a temperament-based social-emotional learning intervention with teacher, parent, and classroom programs. Twenty-two low-income urban elementary schools, 90 teachers, and 435 children were included in the study. Schools were randomly assigned to *INSIGHTS* or an attention-control condition. Multi-level modeling demonstrated larger impacts of *INSIGHTS* on instructional support in first grade classrooms with greater mean classroom-level shyness scores. A further set of multi-level analyses showed larger impacts of *INSIGHTS* on math skills for students in classrooms with greater mean classroom-level shyness scores.

Practice and Policy: Results suggest the importance of considering temperament at the classroom-level when deciding how to allocate limited resources to implementation of temperament-based intervention and/or social-emotional learning programs. Moreover, providing professional development supports to teachers of shy students – who are at risk for poorer instruction and academic skills – should be considered by policymakers and practitioners.

Keywords: temperament, shyness, instructional support, intervention, academic skills

Instructional Support and Academic Skills:
Impacts of *INSIGHTS* in Classrooms with Shy Children

Low-income children arrive at kindergarten less school-ready than their more affluent peers (Duncan & Magnuson, 2013; Kalil, Ziol-Guest, Ryan, & Markowitz, 2016). A number of classroom-based interventions have been developed for schools primarily serving low-income students in order to help close these early school readiness and academic achievement gaps (Durlak, Weissburg, Dymnicki, Taylor, & Schellinger, 2011). Social-emotional Learning (SEL) programs are one such type of intervention, aiming to improve teacher practices and children's development of social-emotional skills, with the ultimate goal of improving students' academic outcomes (Jones & Bouffard, 2012). Although SEL programs have demonstrated the ability to enhance teacher practices (e.g., Brown, Jones, LaRusso, & Aber, 2010; Reyes, Brackett, Rivers, White, & Salovey, 2012) and children's behaviors, social-emotional skills, and academic competencies (Durlak et al., 2011), they are typically designed as primary prevention programs and delivered to all students within a targeted setting fairly uniformly (Bierman et al., 2010; Durlak et al., 2011; Greenberg et al., 2003). One group of students – children with a shy temperament – are rarely explicitly considered in the development of classroom-based SEL programs in low-income schools, yet are known to be at heightened risk for poor academic skills in early and middle childhood (Elias & Haynes, 2008; Evans, 2010; Kalutskaya, Archbell, Moritz, Rudasill, & Coplan, 2015). Indeed, shy children are more likely to be disengaged in early childhood classroom activities, and are less likely to receive attention from teachers (Rudasill & Rimm-Kaufman, 2009).

One SEL program in particular – *INSIGHTS into Children's Temperament* – was designed to consider the unique needs of children with different temperaments, including those who are shy and cautious/slow to warm up (McClowry, Snow, Tamis-LeMonda, & Rodriguez, 2010). Previous work conducted in low-income urban elementary schools demonstrated that *INSIGHTS* improved students'

behaviors and academic skills (Authors, 2015). Yet, given limited resources for expanding multi-component interventions like *INSIGHTS* in low-income schools, it may be particularly important to target programming towards the classroom settings that stand to benefit the most from them, particularly when the overall goal of programming is to improve the quality of teacher instructional practices and low-income children's academic outcomes.

A risk and resilience perspective argues that classrooms with greater mean classroom-level shyness scores¹ would be at highest risk for poor instructional support and student academic outcomes, given lower classroom engagement, quality of peer relationships, and heightened overall student anxiety in these settings (Bosacki, Coplan, Rose-Krasnor, & Hughes, 2011; Coplan, Hughes, Bosacki, & Rose-Krasnor, 2011). Other work suggests that shy students are likely grouped in classroom settings together by school personnel (Tomlinson, 2014). In line with this theory, implementation of an SEL program like *INSIGHTS* that explicitly addresses the risk factor – student shyness – at the classroom level, may stand to improve teacher instructional support and student academic outcomes in settings with higher than average mean classroom-level shyness scores, more so than when implemented in a setting with lower overall levels of shyness. The current study explores these hypotheses by leveraging data from a randomized trial of *INSIGHTS* conducted in low-income urban elementary schools, and testing whether mean classroom-level shyness scores moderated intervention impacts on instructional support, as well as children's math and reading skills, in kindergarten and first grade classrooms. We also explore whether grade (kindergarten versus first grade) further moderated these impacts. Examining such questions will inform efforts to target SEL programs and/or temperament-based interventions to the types of classrooms that need them most.

¹ Throughout this paper, we use the term “shyness” as a description for children with a temperament that is high in withdrawal. See Authors, 2014 for more detail on the use of this terminology and operationalization of shyness using the withdrawal dimension from the School-aged Temperament Inventory (SATI; McClowry, 2002).

Shyness in Early Education Settings and Low-income Schools

It is well established in the literature that children from low-income families are at-risk for poor achievement outcomes in early schooling (Duncan & Magnuson, 2013; Yoshikawa, Aber, & Beardslee, 2012). Schools have historically been viewed as institutions that should serve to reduce, and possibly eliminate the gaps in early skills separating children from lower-income and higher-income families (Becker & Luthar, 2002). As such, policymakers have shifted their focus to younger children, just beginning school, in an effort to reduce these achievement gaps as early as possible (Duncan & Magnuson, 2013; Duncan & Sojourner, 2013; Ramey & Ramey, 2004). Yet, instructional support, which is the aspect of an early elementary school classroom most predictive of children's academic skills (Pianta, Downer, & Hamre, 2016), is stubbornly low in classrooms serving students from low-income families (Early et al., 2007; LoCasale-Crouch et al., 2007).² In order to improve instructional support, researchers have focused on understanding key risk factors within settings that can be potentially intervened on through school-based programs. Efforts to do so have overwhelmingly been focused on classroom management strategies (Korpershoek, Harms, de Boer, Kuijk, & Doolard, 2016) and interventions that target low-income children with early behavior and conduct problems (Wilson, Gottfredson, & Najaka, 2001; Wilson & Lipsey, 2007). In contrast, shy students attending low-income schools – who are also at substantial risk for poor academic skills – are comparatively understudied.

A number of terms, such as *socially withdrawn*, *isolated*, and *anxious-solitary*, have been used in the literature to describe children with shy temperaments (Booth-LaForce & Oxford, 2008; Gazelle & Rudolph, 2004). In line with Evans's (2010) definition, the current study describes temperamentally shy children as being fearful, anxious, wary, and reluctant to take part in interactions with others in

² Instructional support, while shown to be important for supporting students' academic skills (e.g., Pianta et al., 2016), is just one component of a number of teacher practices – including delivery of content and content knowledge – that are important for improving students' outcomes in the early grades (Engel, Claessens, & Finch, 2013; Kunter, Klusman, Baumert et al., 2013).

situations that involve uncertainty, novelty, and actual or perceived judgment by others. Within early childhood and early elementary school classrooms, shy children are typically hesitant to engage in social interactions and unfamiliar situations without encouragement (Coplan & Arbeau, 2008). Accordingly, shyness in early childhood is closely associated with low-quality peer relationships (Nelson, Rubin & Fox, 2005). In their study of low- and middle-income Italian preschool children, Pecora et al. (2016) noted a positive association between shyness and both anxious, withdrawn behaviors and peer rejection. Such studies suggest that shy children are more likely than their peers to worry about how they are perceived by others, and that anxiety can hinder their ability to initiate and maintain positive peer relationships. Such associations are problematic because peer relationships and school adjustment in early educational settings are closely associated with classroom engagement (Buhs, Ladd, & Herald, 2006) as well as academic skills (Hughes & Coplan, 2010).

Indeed, studies have found that shy children evidence lower levels of early academic skills than their less-shy peers (Coplan, Gavinski-Molina, Lagace-Seguin & Wichmann, 2001; Spere & Evans, 2009). As teachers may spend more time attending to students who display disruptive behaviors, shy children's quieter natures can lessen the amount of attention they receive from teachers. While teachers may perceive shy children to be well-behaved and compliant, they may also understand these students to be less academically inclined, engaged, or capable (Deng et al., 2017). Such judgments can affect shy children's willingness to participate in class activities or seek assistance when they do not understand classwork. While some have noted that emotion regulation and language skills may serve as protective factors for shy children (Sette, Zava, Baumgartner, Baiocco, & Coplan, 2016; Kalutskaya et al, 2015), other research has shown a negative relationship between shyness and teacher perceptions of student reading and math skills for early learners (Hughes & Coplan, 2010). Work by O'Connor and colleagues (2014) has demonstrated this risk within a sample of low-income, urban children, finding that shy low-

income students exhibit concurrent risk for poor academic skills.

Temperament theory argues that it is critical for there to be a ‘good fit’ between children’s temperaments and their classroom environment (McClowry & Collins, 2012; Rothbart & Bates, 1998; Shiner et al., 2012). Goodness of fit refers to the match between the environment’s demands, opportunities, and expectations and an individual’s temperament (Chess & Thomas, 1984). Improving the responsiveness of the environment is particularly important in early education because academic outcomes are more strongly associated with temperament in the early grades than with cognitive aptitude (Entwisle, Alexander, & Olson, 2005). Gazelle (2006) has argued that there is generally a lack of goodness of fit between shy children’s temperaments and the typical early elementary classroom setting, thus explaining why shy children are at risk for poor academic outcomes. For example, shy children’s reluctance to speak up or volunteer to respond in front of their classmates can put them at odds with teacher expectations of normative behavioral engagement and participation in typical early elementary school activities, such as Circle Time or Story Time/Read Aloud. For example, Eggum-Wilkens and colleagues (2016) found that shyness in kindergarten predicted lower cooperative participation in second grade.

The studies cited above, however, only address how shyness is associated with risk for poor academic outcomes at the individual student level. Such a conceptualization ignores the classroom context in which children are embedded during early elementary school. Ecological systems theory posits that interactions within and among the multiple environments surrounding a child, including the classroom context, have independent, multi-layered, and interactive effects on individual-level child outcomes (Bronfenbrenner & Morris, 1998). Although goodness of fit is typically conceptualized as an individual level characteristic linking the student to the setting, it can be adapted for a classroom-level perspective. Given the demands on an elementary school classroom, it can be difficult for teachers to

fully differentiate their instruction to each individual child (Suprayogi, Valcke, & Godwin, 2017; Tomlinson et al., 2003). However, if teachers are aware of certain types of temperamental dispositions that may be more apparent in their specific classroom – like shyness – they can receive professional supports that help them effectively respond to a broader group of students in the classroom and the particular set of classroom dynamics that the temperaments of those children espouse.

With respect to considering classroom context, the teacher-student interactions that make up domains of classroom processes are predictive of student academic outcomes. One such domain – instructional support – is composed of the provision of opportunities that cognitively stimulate and challenge students, and is associated with stronger literacy and math skills among all children (Hamre & Pianta, 2005; Pianta, Hamre, & Allen, 2012). The ecological theory articulated above theorizes that children who are embedded in settings with higher levels of instructional support are more likely to evidence adaptive academic development. Yet, in classrooms with higher mean classroom-level shyness scores, overall levels of instructional support are likely to be lower, given shy children's lessened proclivity for engaging in the language modeling, opened-ended questioning, and back and forth interactions with teachers that define the instructional support domain (Bosacki et al., 2011; Crozier & Perkins, 2002). As such, all children in settings with higher mean classroom-level shyness scores may be at risk for experiencing poorer instructional support and academic skills.

Social-Emotional Learning (SEL) for Shy Children

In their comprehensive meta-analysis of the effects of classroom management strategies and programs, Korpershoek and colleagues (2016) found that interventions that were expected to improve primary school students' behavioral and academic outcomes saw the strongest effects when explicitly targeting social-emotional development. Echoing an earlier meta-analysis by Durlak and colleagues (2011), this study relayed the value of fostering children's social-emotional and behavioral development.

In addition, research suggests that when teachers are aware of temperamental characteristics that predispose their students to academic risk and are able to both provide positive behavioral controls (Viljaranta et al, 2015) and cultivate positive emotional classroom climates (Gazelle, 2006), they can mitigate otherwise negative effects of behavioral inhibition on social-emotional and academic outcomes. While some social skills training interventions have shown promise in improving young, shy children's prosocial behaviors and interactions with peers outside school (Li et al., 2016), few programs address the dynamics of a classroom exhibiting withdrawn and inhibited behaviors.

Similarly, research focused specifically on shy children has been limited by samples made up of middle and higher-income families (e.g. Rudasill, Hawley, & Molfese et al., 2016; Eggum-Wilkens, Lemery-Chalfant, Aksan, & Goldsmith, 2015; Sette et al., 2016). Though some recent studies have examined low-income shy children in Chinese communities, these researchers examined non-school-based play interventions (Li et al., 2016), focused on children transitioning into adolescence (Yang, Chen, & Wang, 2016), or looked at the association between social sensitivity and school adjustment, but not academic outcomes, for children in the middle school years (Chen, Liu, Ellis, & Zarbatany, 2016).

INSIGHTS into Children's Temperament is the only intervention to our knowledge that does explicitly include shy children's temperament in the program model (as well as those with other temperaments), and has been evaluated in a randomized trial where the target participants were low-income urban schools and students. *INSIGHTS* is a classroom-based intervention designed to enhance the development of low-income primary grade children at-risk for academic and behavioral difficulties. Using a temperament interventionist perspective, *INSIGHTS* aims to enhance goodness of fit, or the match between the environment and the child's temperament. The intervention implements a universal approach with some targeted elements. This design may help strengthen the conceptual model of the intervention, given strengths and weaknesses of both universal and targeted interventions.

Indeed, universal interventions address all students in a setting (e.g., classroom, grade, or school) with the aim of preventing problems and promoting overall academic success (Kellam et al., 2014). These programs have the benefit of strengthening the setting and reaching all students. However, universal programs may not be sufficiently individualized or intense to prevent at-risk students or students with initial difficulties from developing problems (Nastasi & Hitchcock, 2009). Targeted interventions, on the other hand, focus on identified groups of students at risk for academic and behavioral problems and aim to prevent more serious difficulties from developing. Targeted interventions are more individualized and intensive, which gives them a heightened chance of counteracting risk and alleviating initial problems among specific groups. However, students who might benefit from targeted interventions may not receive them due to imprecise identification or inadequate resources. Targeted interventions are generally more effective when universal programs are already in place (Cappella, Frazier, Atkins, Schoenwald, & Glisson, 2008). A recent trend in school-based interventions – and one employed by *INSIGHTS* – is to utilize programs that provide a multitiered system of support for children’s mental health services (Cook, Frye, Slemrod, Lyon, & Renshaw, 2015). The rationale of such an approach is to integrate a universal program that addresses the needs of most students with a targeted intervention for those who exhibit more serious behavioral problems.

Combining two interventions requires an integration of theoretical frameworks and is costly because it can require more materials and training. *INSIGHTS* is a unique school-based intervention because it uses one theoretical framework – temperament – to support all children and then also includes targeted strategies for those who require more intensive behavioral intervention. Previous work demonstrated that shy children randomly assigned to *INSIGHTS* evidenced faster growth in math and critical thinking skills across kindergarten and the transition to first grade than shy children assigned to an attention-control group (Authors, 2014). A concurrent study demonstrated impacts of *INSIGHTS* on

classroom emotional support and organization, but not instructional support, across kindergarten and first grade classrooms (Authors, 2015). These studies, however, did not explicitly consider variation across classrooms with differing mean classroom-level shyness scores. This limitation makes it difficult for schools and districts to determine if *INSIGHTS* stands to benefit instructional support and academic outcomes in classrooms with greater mean classroom-level shyness scores.

In considering the impacts of an early intervention like *INSIGHTS*, it is important to examine differences in effects across grades. For example, with respect to the transition to elementary school, children may experience different types of learning settings in kindergarten and first grade. Success in kindergarten relies on children's ability to regulate their behaviors and appropriately engage in a classroom setting (Lin, Lawrence, & Gorrell, 2003; Pianta, Cox, & Snow, 2007). In contrast, academic activities become increasingly structured in first grade, and students are increasingly required to be able to achieve academic competencies (e.g., early literacy, math) in order to perform well (Engel et al., 2013). Given the shift across the years from behavioral regulation to engagement with more academic material, it may be important to consider variation in impacts of a social-emotional learning program like *INSIGHTS* – seeking to affect both social-emotional and academic outcomes – by grade.

It is also important to consider different types of academic outcomes, rather than grouping school performance into one composite category. Math outcomes, in particular, are of general interest to policymakers given work demonstrating that early math skills are the strongest predictors of students' future academic outcomes (Duncan et al., 2007). Compared with reading, math is also more likely to be influenced by in-school learning provided through a social-emotional learning program, even in the earliest grades (Grimm, 2008). In contrast, students' reading competencies in the early grades may be largely representative of learning that occurs outside of the school—most likely in the home (Connor, Son, Hindman, & Morrison, 2005; Foster, Lambert, Abbott-Shim, McCarty, & Franze, 2005). Given the

notable differences in math versus reading outcomes in the early grades, it is particularly important to consider them as separate outcomes in current intervention work examining impacts on academic skills.

Current Study

The current study leverages data from the randomized trial of *INSIGHTS into Children's Temperament* to test whether mean classroom-level shyness scores moderated impacts of *INSIGHTS* on instructional support and student academic skills. The current study aimed to answer the following questions³:

- (1) Do mean classroom-level shyness scores moderate impacts of *INSIGHTS* on classwide instructional support in kindergarten and first grade classrooms?
- (2) Do mean classroom-level shyness scores moderate impacts of *INSIGHTS* on children's reading and math skills in kindergarten and first grade classrooms?

We hypothesize that we will observe statistically significant moderated effects in examining both research questions, such that there will be larger impacts of *INSIGHTS* on instructional support in classrooms with greater mean classroom-level shyness scores, relative to lower classroom-level shyness scores. Similarly, we hypothesize larger impacts of *INSIGHTS* on children's math and reading skills in classrooms with greater mean classroom-level shyness scores, relative to classrooms with lower mean classroom-level shyness scores. Findings will inform research on SEL interventions in early learning settings, and help schools and districts as they consider how best to target SEL programs to their unique contexts.

Method

Design

Data for this study were drawn from a school-randomized trial of *INSIGHTS* conducted in

³ Note that these data are drawn from a larger study that tested the main effects of the *INSIGHTS* intervention on classroom and student outcomes. As such, the research questions examined are considered exploratory in the context of the full study.

kindergarten and first grade classrooms. Children began participating in the study when they were in kindergarten (study year 1), and continued participating through the end of their first grade year (study year 2). The overall duration of the study was four years with three total cohorts. Each cohort entered the study over three consecutive years and participated in two years of data collection (kindergarten classrooms participated in year 1 and first grade classrooms participated during year 2).

Participants and Setting

The current study includes 90 kindergarten and first-grade classrooms from 22 public elementary schools in a large city. Teachers were predominantly female (94.2%) and identified as Hispanic or Latino (11.9%), Black or African American (56.4%), White (24.3%), and mixed/other (7%). On average, there were 1.40 adults per classroom during instruction ($SD = 0.60$). All classrooms were regular education and had an average of 16.62 students ($SD = 3.98$). There are 435 children included in this study, who were enrolled in the classrooms of participating teachers at the time of intervention. Children ranged from four to seven years of age at baseline ($M = 5.38$ $SD = 0.61$). Half (50%) of the children were male. Eighty-seven percent of the children qualified for free or reduced lunch programs. Approximately 72% of children were Black, 19% were Hispanic non-Black, and the remaining children were biracial. Approximately 28% of children's parents did not finish high school; 26% had a high school or GED diploma; 24% had attended some college; and 22% had completed college. Children enrolled in the study were similar in demographic characteristics to the other students at the schools who were invited but did not participate in data collection activities.

Research Procedures

Selection and randomization of schools. Elementary schools serving low-income students in one area of a large, urban school system in the northeast were targeted for participation in the study. Recruitment began by contacting principals of schools with free or reduced price lunch eligibility of

greater than 50% of students. Twenty-three principals agreed to participate. One school withdrew during baseline data collection after an administrative transition. A random numbers table was used to assign schools to receive the *INSIGHTS* intervention or the attention-control condition.

Selection of teachers. All kindergarten and first grade teachers in participating schools were eligible for the study. Ninety-eight percent of eligible teachers consented and none withdrew.

Study enrollment and timeline. Students participated in the current study across two years – kindergarten (study year 1) and first grade (study year 2). Students' kindergarten teachers were invited to participate in the study when they were enrolled in kindergarten (study year 1); first grade teachers were invited to participate when students were enrolled in first grade (study year 2). Children and classrooms were recruited for the study during the beginning of kindergarten and baseline data were collected from students and classrooms in the Fall of the kindergarten year. The *INSIGHTS* intervention was implemented for ten weeks in the winter of the kindergarten year. Data were then collected from classrooms and students in the spring of the kindergarten year. Following the summer, data were collected from the same set of students enrolled in the study in the Fall of the first grade year, as well as the new first grade classrooms participating in the second year of the study. The intervention was implemented across ten weeks in the late fall and early winter of the first grade year. Follow-up data were then collected in the spring of first grade from students and classrooms.

Students in *INSIGHTS* schools – regardless of whether they agreed to participate in data collection activities or not -- received the full intervention in both kindergarten and first grade. Parents who enrolled their children in data collection activities participated in the intervention in kindergarten only. Children had the opportunity to participate in two years of the study, but teachers only participated in the year of the study when the children they were teaching were targeted. In each school then, kindergarten teachers had the opportunity to participate in Year 1 of the study (when children were

enrolled in kindergarten), while first grade teachers could participate in Year 2 of the study (when children were enrolled in first grade. Across classrooms, participation in the study ranged from 33% of the students to 100% of the students. However, the average level of participation in the study was 62% of students in the classroom.

Data collection. Pre- and post-treatment data were collected within each study year via classroom observation and direct child assessments by trained data collectors. Teachers completed background questionnaires and parents reported on demographics and child temperament. Administrative data on school demographic characteristics were publicly available. Teachers, intervention facilitators, and fidelity coders completed intervention fidelity checklists.

***INSIGHTS* and Attention-Control Procedures**

Schools assigned to *INSIGHTS* received parallel sessions for teachers, parents, and children within their classroom. Parent and teacher sessions were held at each school in ten, two-hour meetings, with makeup sessions offered as needed. Teacher sessions were held during the school day or after school and parent sessions were also offered both during and after school. Parents received \$20 for each session attended and teachers received \$40 for classroom resources, as well as professional development credit. All parent and teacher sessions occurred in groups with facilitators at the school. Make up sessions were available to parents and teachers who missed regular sessions, but were used minimally.

As illustrated in the logic model for the *INSIGHTS* intervention (see Figure 1), in the *INSIGHTS* parent and teacher program sessions, caregivers learn to recognize a child's temperament based on four empirically derived temperament typologies (McClowry, 2002): Hilary the Hard Worker who is industrious; Gregory the Grumpy who is high maintenance; Fredrico the Friendly who is social and eager to try; and Coretta the Cautious who is shy.⁴ Parents and teachers are then encouraged to reframe

⁴ In McClowry (2002)'s identification of temperament typologies, the School Aged Temperament Inventory (McClowry, 2002) is used to operationalize four temperament profiles: 1) high maintenance children are high in negative reactivity, high

their perceptions more positively and to select strategies that match a child's particular temperament. For example, parents and teachers are taught to recognize that a child's temperament is shy and thus the child has a tendency to withdraw. For example, caregivers of shy children are encouraged to appreciate that shy children are often astute observers who are sensitive and cautious when encountering new situations or meeting people.

As illustrated in Figure 2, teachers and parents also learn to use a scaffold-and-stretch approach when children encounter temperamentally challenging situations. For example, when assigning a classroom activity that is challenging to a shy child, such as participating in a school assembly, teachers are encouraged to assess the student's distress level. If the child is likely to be unduly distressed, the teacher can make the activity more manageable. To support the child, the teacher might first arrange a practice session with a friend and then with a small group of classmates before a whole-class rehearsal (McClowry, 2014).

Acknowledging the child's efforts in each progressively challenging step is another part of this responsive strategy. In *INSIGHTS* classroom sessions, activities focus on empathy and problem-solving skills. The students are introduced to puppets exemplifying the same four temperament typologies. The children are encouraged to understand the puppets' respective strengths and challenges. For example, the Coretta the Cautious puppet thinks carefully before she acts but warms up when provided more time. The children also use the puppets to resolve videotaped dilemmas and those they encounter in their own lives. In a dilemma involving the Coretta the Cautious puppet, the children and the puppets encourage her to be assertive when she hesitates to ask her teacher for help.

To maintain model fidelity, facilitators followed scripts, used material checklists, and

in motor activity, and low in task persistence; 2) industrious children are high in task persistence, low in negative reactivity, and low in motor activity; 3) cautious/slow to warm up children are high in withdrawal; and 4) social/eager children are low in withdrawal.

documented sessions. Deviations or clinical concerns were discussed weekly in supervision with the program developer. Supervision focused on challenges related to conducting sessions, implementation logistics, and participant concerns. All teacher and parent sessions were videotaped and reviewed for coverage of content and effectiveness of facilitation (Hulleman & Cordray, 2009). Videotapes demonstrated that 94% of the curriculum was adequately covered in the teacher sessions and 92% of the curriculum was covered for the parent sessions.

Dosage. The average number of teacher sessions attended was 9.44 ($SD = .91$). The average number of classroom sessions attended by the children consented to the study was 8.30 ($SD = 2.25$). The average number of parent sessions attended by parents of participating children was 5.93 ($SD = 4.15$). Twenty-five percent of parents were present for all sessions and 30.3% were present for eight or nine sessions.

Attention-control

Schools not assigned to *INSIGHTS* participated in a 10-week, supplemental reading after school program for children whose parents consented. Teachers and parents attended two 2-hour workshops in which reading coaches presented strategies to enhance early literacy and provided reading materials. Parents received \$20 and teachers received professional development credit and \$40 for classroom resources for each workshop. We retain the terminology “attention-control” throughout the paper to describe this group, in order to align this study with prior work evaluating the *INSIGHTS* intervention. It should be noted, however, that the attention-control condition is a fairly low-dosage intervention relative to the treatment group, and impacts comparing the treatment and attention-control groups should be interpreted with that context in mind.

Measures

Classroom instructional support. Classroom instructional support was measured using the

Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2008), an observational measure that assesses teacher practices associated with classroom characteristics and is predictive of children's academic and social-emotional development (Brown, Molfese, & Molfese, 2008).

Dimensions of teacher practices included in the instructional support domain are concept development, language modeling, and quality of feedback. Each of these dimensions was rated on a 7-point scale with 1 or 2 as low and 6 or 7 as high. The broader CLASS observational system measures emotional support, classroom organization, and instructional support (Hamre et al., 2013). For this study, only the instructional support domain was used because that was the core focus of the study. The team found small correlations between instructional support and the emotional support ($r = .17$) and classroom organization ($r = .26$) domains, suggesting that this domain is representative of a unique construct.

Observations were conducted by a single data collector who was blind to study condition and trained to reliability by a certified CLASS trainer. During their first live classroom observation, data collectors observed with a master coder to ensure agreement in live coding. Data collector and master coder agreement was greater than 80% for all observations. Data collectors observed for fifteen minutes and recorded scores for ten minutes four times during the first one hundred minutes of the school day. This procedure was repeated on two separate days. The concept development, language modeling, and quality of feedback dimensions were coded both pre- and posttreatment and values across dimensions and data collection days were averaged for an overall instructional support domain score at each time point. Between data collection periods, each data collector passed a continuing reliability test. Intraclass correlations (ICC) were used to assess interobserver agreement between data collectors and the gold-standard codes. ICCs for instructional support were 0.81 to 0.86 across study waves.

Reading and math skills. Students' reading and math skills were measured using the Woodcock-Johnson Letter Word and Applied Problems assessments (WJ-III; Woodcock, McGrew,

Mather, 2001). The Letter Word assessment tests letter naming and word decoding and asks children to identify a series of letters and words presented in isolation. The Applied Problems test assesses children's counting skills and their ability to analyze and solve mathematical word problems presented orally. Possible scores for the Letter Word and Applied Problems tests range from 0 to 76 and 0 to 64, respectively. The Woodcock Johnson is a nationally normed and widely used achievement test and correlated with measures of cognitive ability. Original test-retest reliability ranged from .60 to .90 across individual subscales (Woodcock et al., 2001).

Mean classroom-level shyness scores. Mean levels of classroom-level shyness scores were operationalized using the School-Aged Temperament Inventory (SATI; McClowry, 2002). The 38-item parent-report measure has four dimensions: negative reactivity (12 items; the intensity and frequency with the child expresses negative affect), task persistence (11 items; degree of self-direction that child exhibits in completing a task); withdrawal (9 items; child's initial response to new people and situation), and activity (6 items; large motor activity). The SATI was standardized using a sample of 883 parents from diverse racial, ethnic, and socioeconomic backgrounds (McClowry, 2002). Cronbach's alphas for the SATI in the current study were similar to those identified in this previous measurement work (withdrawal, $\alpha = .81$).

The withdrawal dimension was used to operationalize individual student shyness with items such as "avoids new guests or visitors in the home" and "nervous or anxious in new situations." We made the decision to use withdrawal to operationalize shyness, given prior work by Authors (2014) using this same approach. Parents rated these behaviors on a 5-point Likert scale ranging from *never* to *always*. After identifying an individual level shyness score for all children in the sample, a score describing the mean shyness scores in the classroom was operationalized by calculating the aggregate mean shyness for the group of students embedded in each participating classroom. The aggregation method for

operationalizing group level means has been recommended by Raudenbush & Bryk (2002). We did not have information on student temperament for all children in every classroom in this study. Instead, participation in the study ranged from 33% of students to 100% of students, with a mean participation rate of 62%. Although data were not complete within each classroom, the number of participants meets standard requirements for data aggregation (Raudenbush & Bryk, 2002). We calculated the intraclass correlation to describe the extent to which we observed between-classroom variation in student shyness. We found that the intraclass correlation was .28, indicating that about 28% of the variation in shyness was explained by classroom-level membership. This significant level of between-classroom variation suggests that shyness can be operationalized at the classroom-level and can also describe some classroom-level property.⁵

Child behavior problems. The teacher-reported Sutter-Eyberg Student Behavior Inventory (SESBI) was used to measure children's behavior problems (Eyberg & Pincus, 1999), and is included as a pretreatment covariate in analytic models. The SESBI contains 36 items that measure disruptive or conduct problem behaviors. Using a 7-point Likert scale, teachers reported on the frequency with which each student engaged in a series of problem behaviors on a 7-point scale, ranging from 1 (*never*) to 7 (*always*). The overall average of the frequency of problem behaviors was taken to calculate the average score for each student. The SESBI has demonstrated high internal consistency, as well as high test-retest reliability and convergent and discriminant validity (Eyberg & Pincus, 1999; $\alpha = .96$ in current study).

Child sustained attention. Children's sustained attention was measured using the Leiter

⁵ Because we have significant variation in the number of students participating in the study by classroom, we conducted a check to determine if we observed similar ICCs for classrooms with almost complete participation (90% or more) versus the full sample of classrooms. This approach allowed us to have 12 total classrooms to examine for levels of between-classroom variation. Findings from ICC analyses at the classroom-level, and descriptive research were fairly well aligned with the findings from the broader set of classroom findings. Within this group of 12 classrooms, we found that 31% of the variation in shyness was between-classrooms. The between-classroom variation in the full sample was 28%. In addition, we found that the standard deviation for shyness in these classrooms ($SD = .43$) was aligned with the full sample ($SD = .47$ across both treatment and control groups). Accordingly, we did not find that the overall distribution in the high participation classrooms was significantly different than what we had originally found in the full sample.

International Performance Scale-Revised (Roid & Miller, 1997) and is included as a pretreatment covariate in this study. In this assessment, children are shown pictures of a variety of objects scattered throughout the page and a target object pictured at the top. Children are then asked to cross out as many of the objects that match the target as possible. Children are given thirty seconds for the first three trials and sixty seconds for the fourth trial. The Leiter is scored by counting the number of objects crossed out matching the target and subtracting the number of crossed-out objects not matching the target. The Leiter has high internal consistency for children age 5 and 6, and good test-retest reliability ($r = .85$; Roid & Miller, 1997).

Classroom behavioral engagement. Classroom behavioral engagement was measured using the Behavioral Observation of Students in Schools (BOSS; Shapiro, 2004) and is included as a pretreatment covariate in analytic models. The BOSS is an observational measure designed to assess students' behavioral engagement. Momentary time sampling is used to measure active engagement such as hand raising and writing versus passive engagement such as reading or listening. The BOSS reliably captures the duration of sustained behaviors in context (DuPaul et al., 2004; Volpe, DiPerna, Hintze, & Shapiro, 2005).

Each classroom was observed by a single data collector who was blind to condition. Data collectors participated in a four hour lab-based training, three segments of video practice coding, a two hour live training, and achieved 80% or greater agreement on all coding categories in two classroom observations with a master coder. Interobserver agreement was assessed prior to each wave of data collection. Each classroom at each time point was observed during the morning academic period for eight 15 minute observations conducted over two to four days. Each student's total engagement percentage was calculated by dividing the sum of active and passive codes by the total number of intervals observed and multiplying by 100.

School demographics. Available administrative data included the percent of students in each school who were eligible for free and reduced price lunch, identified as Black, identified as Hispanic, and average daily attendance. In addition, the percent of students in the school scoring in the competent and average ranges on state ELA and math tests were collected.

Teacher and classroom demographics. Teachers reported on their years of teaching experience and research assistants collected information on class size and number of adult staff present during academic activities during classroom observations. These variables were used as covariates in models examining impacts on outcomes. Class grade was included in models as a dummy variable such that 1 = first grade classroom and 0 = kindergarten classroom.

Student demographics. Student-level demographics included gender (female = 1; male = 0), child black (1 = black; 0 = white), child Hispanic (1 = Hispanic; 0 = not Hispanic), parents' marital status (married = 1; unmarried = 0), parents' education level (less than high school = 1; high school diploma or GED = 1; more than high school = referent group), and parent employment status (unemployed = 1; employed = 0).

Analytic Approach

Missing data analyses. There were no missing data for school-level variables. At the classroom level, two classrooms were missing data on teacher practices and eleven additional classrooms were missing a pretreatment covariate. At the student level, missing data ranged from 0 to 14%. As such, we first compared classrooms and students who were missing and not missing individual data points on a series of baseline characteristics. Although we did not find substantial differences in rates of missingness between students by treatment status or achievement outcomes, missingness patterns between baseline variables were not random. Students with lower levels of parental education, parents who were not married, or those with more behavior problems were most likely be missing outcome data.

A multiple imputation method (MI) was thus employed, and 20 separate datasets were imputed by chained equations, using STATA MICE in STATA version 12 (Enders, 2013). Multiple imputation assumes that data are Missing at Random (MAR), meaning that the probability that a variable is missing for a unit is dependent only on available information. MI replaces missing values with predictions based on all the other information observed in the study. STATA ran each set of analyses 20 times and aggregated the findings across the datasets.

Descriptive statistics. Before examining the main research questions of interest, we first considered descriptive statistics for key classroom and school-level variables in the analyses, as well as covariates. This set of analyses helps to test the core design assumption that the treatment and control groups are equivalent on observed and unobserved pretreatment measures. The means and standard deviations from these variables help contextualize the findings and provide broader information on the extent to which we observe variation in the mean classroom-level shyness scores across classrooms.

Research question 1. Due to the nested nature of the data (classrooms within schools) (Raudenbush & Bryk, 2002), analyses were conducted using multilevel modeling with XT MIXED in STATA 12 (Rabe-Hesketh & Skrondal, 2008). First, unconditional models were run on PostT classroom instructional support for the full classroom sample to determine whether there was significant between-school variation in this outcome. Intraclass (ICC) correlations were computed to assess the proportion of variance in instructional support for kindergarten (ICC = .08) and first grade (ICC = .11) attributed to mean differences between schools. Level 2 random effects were included in models to allow the intercept to vary across schools. To better understand the extent to which variation in shyness was explained by classroom, we also calculated an ICC for withdrawal at the student-level, finding that 28% of the variation in shyness was explained by classroom membership.

To answer research question 1, we then ran a series of multilevel regression models in which

posttreatment (PostT) instructional support was modeled as a function of (a) intervention condition, (b) PreT instructional support), (c) mean classroom-level shyness score, (d) classroom covariates, and (e) school covariates. We then tested whether mean classroom-level shyness scores moderated the effects of *INSIGHTS* on instructional support by adding the interaction of intervention condition and mean classroom-level shyness scores to the model. Finally, we considered whether grade (kindergarten vs. first grade) further moderated these effects by adding a three-way interaction between intervention condition, mean classroom-level shyness scores, and first grade to the model.

Research question 2. The second research question examines how mean classroom-level shyness scores moderated impacts of *INSIGHTS* on student-level math and reading skills. As such, we first examined the extent to which there was between-classroom variation in student math and reading achievement. Intraclass correlations from unconditional models demonstrated significant between-classroom variation for both math (ICC = .12) and reading (ICC = .15) achievement. Given these findings, coupled with the multi-level design we used for the prior research question, we used a series of three-level multi-level models with random effects for classroom and school to run the analyses for research question 2.

Specifically, we began this set of analyses by regressing the student math or reading achievement score on (a) intervention condition, (b) PreT level of the outcome, (c) the mean classroom-level shyness scores, (d) student-level covariates, and (e) school covariates. Then, to test whether mean classroom-level shyness scores moderated impacts of *INSIGHTS* on student-level outcomes, we added the interaction of intervention condition and mean classroom-level shyness scores to the model. Finally, to test whether grade further moderated these impacts, we added a three-way interaction between intervention condition, the mean classroom-level shyness scores, and first grade to the model.

Results

Descriptive statistics. Findings from descriptive analyses are presented in Table 1. In the first section of the table, we present information on the PreT classroom level variables for the full sample. We also break out the information separately for kindergarten and first grade classrooms, as we are interested in considering differential impacts in these contexts. In the second panel, we present descriptive findings from the PostT (Time 2) assessments. We used independent samples t-tests to evaluate statistically significant differences between treatment and control group PreT levels. We found that the *INSIGHTS* group had higher levels of teacher experience at baseline than the attention-control condition, $t(88) = 5.86, p < .01$. This difference held in the subgroup of kindergarten classrooms, $t(51) = 6.43, p < .01$. Further, in the kindergarten sample, we found statistically significant differences in class size such that the *INSIGHTS* group had fewer students per classroom than the attention-control group, $t(51) = 7.53, p < .01$. There were no statistically significant PreT differences within the first grade group. In addition, there were no statistically significant differences between treatment and control groups for the school-level variables.

As illustrated in Table 1, descriptive statistics revealed overall fairly low levels of instructional support across both treatment and control PreT and PostT. However, there was substantial variation in this measure, with standard deviations ranging from .68 to 1.47 across time points and grade subgroups. Measured on a five-point scale, mean classroom-level shyness scores were similar across both treatment and control at PreT, and exhibited substantial variation, with standard deviations ranging from .34 to .52. As such, it did appear that there were classrooms in the sample with greater mean classroom-level shyness scores than other classrooms.

Research question 1. As illustrated in the first panel of Table 2, we found no significant effect of treatment on classroom instructional support, $b = .02, SE = .24, p = .76$, and a statistically significant

effect of the mean classroom-level shyness scores on classroom instructional support, $b = -.12$, $SE = .05$, $p < .05$. As such, it did appear that classrooms with greater mean classroom-level shyness scores exhibited lower overall levels of instructional support across the full sample.

Next, we tested our hypothesis that mean classroom-level shyness scores would moderate the effect of *INSIGHTS* on instructional support. As illustrated in the second panel of Table 2, we did not find that the interaction of treatment and mean classroom-level shyness scores was statistically significant, $b = .24$, $SE = .33$, $p = .52$. However, we next considered whether grade might also matter for the analysis and tested whether the combination of mean classroom-level shyness scores and grade moderated the effect of *INSIGHTS* on instructional support. The third panel of Table 2 presents these results, demonstrating a statistically significant three-way interaction of grade, treatment assignment, and mean classroom-level shyness scores, $b = .35$, $SE = .15$, $p < .05$. It appears that classrooms with greater mean classroom-level shyness scores did benefit more from *INSIGHTS*, but only in first grade contexts. Figure 3 illustrates this three-way interaction. We used procedures recommended by Cohen, Cohen, Aiken, and West (2003) for calculating study effect size only within the first grade classrooms with high levels of shyness (defined as $+1$ *SD* above the mean) and found it to be a moderate effect size, $d = .55$.

Research question 2. Finally, we tested our hypothesis that mean classroom-level shyness scores would moderate the effects of *INSIGHTS* on children's reading and math skills at the end of the school year. As before, we first considered whether there was a main effect of *INSIGHTS* on math and reading skills across the school year, adjusting for covariates. Results are illustrated by Model 1 in Table 3. Math results are in the first two panels and reading results are in the second two panels. Findings of the first set of models (see Model 1) revealed that there was a main effect of treatment on math skills, $b = 1.29$, $SE = .61$, $p < .05$, but not on reading skills, $b = 1.51$, $SE = 2.10$, $p = .58$.

Results from the second set of models (see Model 2) demonstrated that mean classroom-level shyness scores did moderate impacts of *INSIGHTS* on math skills across the school year as expected, $b = 3.74$, $SE = 1.73$, $p < .05$, such that effects of *INSIGHTS* on math skills were larger in classrooms with greater mean classroom-level shyness scores. We calculated the effect size for this impact for classrooms with shyness levels 1 standard deviation above the mean (using the baseline control group standard deviation to define this group). Results revealed this to be a moderate effect size, $d = .35$. Figure 4 illustrates the variation in the impact on math skills for children from classrooms with greater mean classroom-level shyness scores. We did not find that mean classroom-level shyness scores moderated impacts on *INSIGHTS* on reading skills, $b = 4.26$, $SE = 5.99$, $p = .71$. Further, although not illustrated in Table 3, we did not find a statistically significant three way interaction between treatment, mean classroom-level shyness scores, and grade in predicting students' math and reading skills.

Discussion

This study aimed to extend literature on the efficacy of a temperament-based SEL program – *INSIGHTS* – in improving outcomes for shy children. Rather than focusing solely on individual children however, this study sought to consider the classroom context as a whole in order to help practitioners and policymakers understand how to better target SEL programs and determine the circumstances under which they work best. Results revealed that there was variation in mean classroom-level shyness scores; some classrooms clearly had higher average levels of shyness (operationalized using a continuous shyness score) than others. In addition, we found that mean classroom-level shyness scores moderated impacts of *INSIGHTS* on instructional support in first grade classrooms. Further, mean classroom-level shyness scores moderated the impact of *INSIGHTS* on students' math skills. Taken together, these findings suggest that it may be helpful to consider child temperament at the setting level when implementing a primary prevention program targeted at classroom-level contexts.

Instructional support has been shown to be notoriously low across early childhood and elementary school settings (Yoshikawa, Weiland, Brooks-Gunn, 2017) and difficult to change with intervention (Hamre et al., 2010; Morris, Mattera, Castells, Bangser, Bierman, & Raver, 2014). The current study replicates this descriptive research. Indeed, the scores demonstrated in the current study are in line with the instructional support findings reported in large studies of Head Start (Puma et al., 2010) and SEL programs in early childhood and elementary school (Hamre & Pianta, 2005; Morris et al., 2014; Torgesen, 2002). This trend of low scores is problematic because instructional support is the core teacher practice linked to students' academic gains (Burchinal, Vandergrift, Pianta, & Mashburn, 2010; Hamre & Pianta, 2005; Mashburn, Pianta, Hamre, et al., 2008; Perry, Donohue, & Weinstein, 2007). The current study also demonstrates that greater mean classroom-level shyness scores are associated with a lower level of classroom instructional support. Shy children are likely reticent to engage in open-ended and turn-taking conversations during instruction (Bosacki et al., 2011; Crozier & Perkins, 2002) which are key behaviors that are critical to generating high levels of instructional support. Accordingly, in classrooms with more shy children, creating a norm for instructional practices that require discussion, concept development, and language modeling may be more difficult.

Given how difficult it has been to move the needle on instructional support, it is notable that did moderate the impact of *INSIGHTS* on instructional support such that there were improvements in instructional support in first grade classrooms with higher mean classroom-level shyness scores. SEL programs do not typically focus on instructional content (Durlak et al., 2011). Rather, they aim to directly change classroom processes – including how students and teachers interact in the classroom – and children's social-emotional skills (Social and Character Development Research Consortium, 2010). *INSIGHTS*, in particular, helps teachers scaffold and stretch shy children so that they feel more comfortable engaging in classroom discussions as well as learning interactions with their teacher and

peers. Findings from the current study align with an academic risk hypothesis (Hamre & Pianta, 2001) suggesting that classrooms with greater mean classroom-level shyness scores are at heightened risk for experiencing fewer of these practices, and thus are more likely to improve after intervention.

The finding that first grade classrooms appeared to benefit but not kindergarten classrooms is in line with prior work on this sample, demonstrating impacts of *INSIGHTS* on classroom organization for first grade classrooms, but not kindergarten classrooms (Authors, 2015). In schools serving high proportions of low-income, racial/ethnic minority children, students may arrive at kindergarten without having attended a high-quality prekindergarten or having been sufficiently prepared for the increasing academic demands of the kindergarten setting (Barnett & Nores, 2012; Jones, Bub, & Raver, 2013; Reardon, 2011). Some work suggests that many kindergarten teachers view the primary goal of kindergarten as helping support students to learn how to behave and act at school while learning a core set of academic skills (e.g., counting, letters) (Petriwskyj, Thorpe, & Taylor, 2005; Piotrkowski, Botsko, & Matthews, 2000). Much of the instruction during kindergarten occurs in learning centers where children can engage in play-based activities to construct their own learning. In first grade, however, instruction shifts to be much more whole-group focused and seatwork is more common (Entwisle & Alexander, 1998; La Paro, Rimm-Kaufman, & Pianta, 2006). This context may result in shy children being less likely to engage in the limited opportunities for conversation and discussion in the classroom. In sum, first grade classrooms with higher mean classroom-level shyness scores are likely dually at-risk for poor instructional support. *INSIGHTS* may have effectively supported teachers in scaffolding and stretching students in those classrooms in a way that manifested itself as an impact on instructional support.

Results further revealed that individual students in classrooms with greater mean classroom-level shyness scores showed larger gains in math skills than students in control group classrooms with similar

mean classroom-level shyness scores. Effects of *INSIGHTS* on reading skills, however, did not vary by mean classroom-level shyness scores. This finding is in line with prior work demonstrating that shy children may be at particular risk for poor math outcomes relative to their non-shy peers (Dobbs, Doctoroff, Fisher, & Arnold, 2006; Hughes & Coplan, 2010; O'Connor et al., 2014). It is hypothesized that shy children who effectively engage in their classroom environment are more comfortable taking on the types of cognitive risks necessary to learning new math skills in first grade (Curby, Rimm-Kaufman, & Ponitz, 2009). In classrooms that have higher levels of mean shyness on average, the dynamics may be such that students are able to engage in math activities that require peer interaction and engagement with the teacher, which they may be less likely to engage in in classroom settings with peers who are more out-going and may demand more teacher attention. Reading achievement, however, may be less related to the pattern of social interactions at the classroom-level and more associated with individual time spent on-task practicing reading skills (Cipielewski & Stanovich, 1992; Mol & Bus, 2011). Additionally, it is important to remember that the attention-control condition in this evaluation study was a reading program. Program effects may have been diluted by comparison children taking part in a reading intervention. Effects must be interpreted over and above the assignment to this reading intervention.

Most SEL programs are either explicitly designed to be delivered in concert with literacy instruction (e.g., 4Rs, RULER; Brown et al., 2010; Hagelskamp, Brackett, Rivers, & Salovey, 2013) or implemented during literacy instruction given more potential overlap between relevant lessons and themes. For example, with respect to *INSIGHTS*, there are likely more opportunities to discuss behaviors in relation to puppets and storybook characters, than in the context of learning one's numbers or basic numeracy. As such, assuming less attention paid to math instruction in elementary school settings, there may be more room for growth in math achievement. Low-income parents increasingly report spending

time reading to children at home and exposing them to literacy-related activities (Bassok, Finch, RaeHyuck, Reardon, & Waldfogel, 2016). In line with this work, low-income shy children may not necessarily be at risk for poor reading outcomes in the way they are for poor math outcomes.

Limitations and Directions for Future Research

This study had several limitations that provide directions for future research. First, although the sample represents urban schools with higher mean classroom-level shyness scores, which is a population prioritized for early intervention, the generalizability of the findings is limited. Second, further study is needed to examine why *INSIGHTS* appears particularly effective in shy classrooms and whether other temperaments (e.g., children with a high maintenance temperament (McClowry, 2002)) benefit in a similar or different way from the intervention. Third, we were limited by the variation in shyness we observed in the data in operationalizing shy and non-shy classrooms. Further, not all students in each classroom were included in the operationalization of the mean classroom-level shyness scores. Future studies may consider how shy classrooms look depending on more concrete “cut-points” and/or may explicitly aim to enroll more shy children in classrooms. Fourth, students in first grade classrooms had already experienced a full year of the intervention in kindergarten. As such, it is possible that there were long-term effects of the intervention picked up at the first grade year actually attributed to the program in kindergarten. Next, although we believe the measures for the study are well triangulated – drawing on parent reports of temperament, observed measures of classroom quality, and assessments of academic outcomes – it is likely important to also consider teacher reports of temperament and how those may or may not align with parent perceptions.

Importantly, it is possible that some of the effects on students that were observed in the current study are related to the amount of intervention dosage that children received across kindergarten and first grade. Future work should consider the extent to which more participation over time links to

outcomes for students, and whether those impacts continue to vary by classroom characteristics, such as the mean classroom-level shyness scores. In addition, as noted earlier, this study was not originally designed to consider moderation impacts at the classroom level. As such, rather than considering this set of analyses as confirmatory, it is appropriate to frame this set of analyses as exploratory in nature, intended to build initial evidence that can inform future research. As such, it may behoove future researchers to explicitly power studies to examine impact variation across classroom settings. Additionally, this study only examined impacts on one classroom-level outcome of interest – instructional support. Further intervention work should consider other salient classroom-level predictors of student academic outcomes, such as the time spent on different content domains and/or teachers' effective differentiation of instruction. Finally, given the lack of research on shy children in general (e.g., Evans, 2010), this study was designed to explicitly consider shyness at the classroom level. However, there are other temperament typologies – such as children with a high maintenance temperament (high in negative reactivity, high in motor activity, low in task persistence; McClowry, 2002) – that also warrant a similar investigation with outcomes that are relevant to that temperament's specific risk factors.

Implications for Policy and Practice

This paper is one of the first to consider the role of temperament – specifically shyness – at the classroom level when examining moderated impacts of a temperament-based SEL program on instructional support and student academic outcomes. The major lesson from this work is that context matters. We found that in classrooms with greater mean classroom-level shyness scores – a key risk factor for lower instructional support and math achievement – impacts of *INSIGHTS* were generally larger. Although there are nuanced reasons to explain heterogeneity of effects, future evaluators of temperament-based interventions should build on this work to determine whether such moderated

impacts are replicated across diverse implementation settings.

Although support for the expansion and implementation of SEL programs like *INSIGHTS* is growing, school districts typically have limited funds for these interventions. In such a context, it is important to consider the types of settings that are most likely to benefit from such a program. Data from the current study demonstrate that students are grouped in such a way where some classrooms have higher percentages of shy students than other classrooms. In this case, findings suggest that there are clear delineations for the types of classroom compositions – based on temperament – that are most likely to benefit from *INSIGHTS*. Practitioners have a distinct interest in improving instructional support and student math achievement – two critical factors predictive of later successful outcomes for students – in low-income, urban schools (Duncan et al., 2007; Hamre & Pianta, 2005; Pianta et al., 2012).

To utilize these findings in practice, school administrators and policymakers could give agency to teachers and a possible menu of interventions or professional development supports for their classroom. Teachers that identify higher mean classroom-level shyness scores in their classroom and a goal of promoting positive academic outcomes for these children may be given the agency to select an evidence-based curriculum that has explicitly shown benefits for that type of classrooms. Second, practitioners and policymakers should be doing their own assessment to evaluate various interventions and policies they are promoting. They can learn from studies like these to understand why they might observe significant variation in impacts across classrooms.

Finally, policymakers may also consider how professional development supports for teachers should not always represent a “one-size” fits all model (Yoshikawa et al., 2012). Indeed, early education teachers are tasked with the tremendous challenge of providing instruction to a wide variety of students, who differ by such characteristics as family socioeconomic status, race/ethnicity, preschool attendance parental involvement, and temperament. The current study demonstrates that a simple tool (McClowry,

2002) to measure child temperament in schools can inform professional development supports for teachers and provide more nuanced information representative of the needs of their particular students. In allocating funds for teacher professional development, recognition of the heterogeneity of student populations at the individual and classroom level is warranted.

References

- Barnett, W. S., & Nores, M. (2012). *Estimated participation and hours in early care and education by type of arrangement and income at ages 2 to 4 in 2010*. New Brunswick, New Jersey: National Institute for Education Research.
- Bassok, D., Finch, J. E., RaeHyuck, L., Reardon, S. F., & Waldfogel, J. (2016). Socioeconomic gaps in early childhood experiences, 1988 to 2010. *AERA Open*, 2(3), 1-22.
- Becker, B. E., & Luthar, S. S. (2002). Social-emotional factors affecting achievement outcomes among disadvantaged students: Closing the achievement gap. *Educational Psychologist*, 37(4), 197-214.
- Bierman, K. L., Coie, J. D., Dodge, K. A., Greenberg, M. T., Lochman, J. E., McMahon, R. J., & Pinderhughes, E. (2010). The effects of a multiyear universal social-emotional learning program: The role of student and school characteristics. *Journal of Consulting and Clinical Psychology*, 78(2), 156-168.
- Booth-Laforce, C., & Oxford, M. L. (2008). Trajectories of social withdrawal from grades 1 to 6: Prediction from early parenting, attachment, and temperament. *Developmental Psychology*, 44(5), 1298-1313.
- Bosacki, S. L., Coplan, R. J., Rose-Krasnor, L., & Hughes, K. (2011). Elementary school teachers' reflections on shy children in the classroom. *Alberta Journal of Educational Research*, 57(3), 273-287.
- Bronfenbrenner, U., & Morris, P. A. (1998). The ecology of developmental processes.
- Brown, J. L., Jones, S. M., LaRusso, M. D., & Aber, J. L. (2010). Improving classroom quality: Teacher influences and experimental impacts of the 4rs program. *Journal of Educational Psychology*, 102(1), 153-167.
- Brown, E. T., Molfese, V. J., & Molfese, P. (2008). Preschool student learning in literacy and

mathematics: Impact of teacher experience, qualifications, and beliefs on an at-risk sample. *Journal of Education for Students Placed at Risk*, 13(1), 106-126.

Buhs, E. S., Ladd, G. W., & Herald, S. L. (2006). Peer exclusion and victimization: Processes that mediate the relation between peer group rejection and children's classroom engagement and achievement? *Journal of Educational Psychology*, 98(1), 1-13.

Burchinal, M., Vandergrift, N., Pianta, R., & Mashburn, A. (2010). Threshold analysis of association between child care quality and child outcomes for low-income children in pre-kindergarten programs. *Early Childhood Research Quarterly*, 25(2), 166-176.

Cappella, E., Frazier, S. L., Atkins, M. S., Schoenwald, S. K., & Glisson, C. (2008). Enhancing schools' capacity to support children in poverty: An ecological model of school-based mental health services. *Administration and Policy in Mental Health and Mental Health Services Research*, 35(5), 395-409.

Chen, X., Liu, J., Ellis, W., & Zarbatany, L. (2016). Social sensitivity and adjustment in Chinese and Canadian children. *Child Development*, 87(4), 1115-1129.

Chess, S., & Thomas, A. (1984). Genesis and evolution of behavioral disorders: From infancy to early adult life. *The American Journal of Psychiatry*, 141(1), 1-9.

Cipielewski, J., & Stanovich, K. E. (1992). Predicting growth in reading ability from children's exposure to print. *Journal of Experimental Child Psychology*, 54(1), 74-89.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*. Mahwah, NJ: Lawrence Erlbaum Associates:

Connor, C. M., Son, S. H., Hindman, A. H., & Morrison, F. J. (2005). Teacher qualifications, classroom practices, family characteristics, and preschool experience: Complex effects on first graders' vocabulary and early reading outcomes. *Journal of School Psychology*, 43(4), 343-375.

- Cook, C. R., Frye, M., Slemrod, T., Lyon, A. R., & Renshaw, T. L. (2015). An integrated approach to universal prevention: Independent and combined effects of PBIS and SEL on youths' mental health. *School Psychology Quarterly, 30*, 166–183.
- Coplan, R. J., & Arbeau, K. A. (2008). The stresses of a “brave new world”: Shyness and school adjustment in kindergarten. *Journal of Research in Childhood Education, 22*(4), 377-389.
- Coplan, R. J., Gavinski-Molina, M. H., Lagace-Seguin, D. G., & Wichmann, C. (2001). When girls versus boys play alone: Nonsocial play and adjustment in kindergarten. *Developmental Psychology, 37*(4), 464-474.
- Coplan, R. J., Hughes, K., Bosacki, S., & Rose-Krasnor, L. (2011). Is silence golden? Elementary school teachers' strategies and beliefs regarding hypothetical shy/quiet and exuberant/talkative children. *Journal of Educational Psychology, 103*(4), 939-951.
- Crozier, W. R., & Perkins, P. (2002). Shyness as a factor when assessing children. *Educational Psychology in Practice, 18*(3), 239-244.
- Curby, T. W., Rimm-Kaufman, S. E., & Ponitz, C. C. (2009). Teacher–child interactions and children's achievement trajectories across kindergarten and first grade. *Journal of Educational Psychology, 101*(4), 912-925.
- Deng, Q., Trainin, G., Rudasill, K., Kalutskaya, I., Wessels, S., Torquati, J., & Coplan, R. J. (2017). Elementary preservice teachers' attitudes and pedagogical strategies toward hypothetical shy, exuberant, and average children. *Learning and Individual Differences, 56*, 85-95.
- Dobbs, J., Doctoroff, G. L., Fisher, P. H., & Arnold, D. H. (2006). The association between preschool children's socio-emotional functioning and their mathematical skills. *Journal of Applied Developmental Psychology, 27*, 97–108.
- Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., ... Sexton, H.

- (2007). School readiness and later achievement. *Developmental Psychology*, 43(6), 1428-1466.
- Duncan, G. J., & Magnuson, K. (2013). Investing in preschool programs. *The Journal of Economic Perspectives*, 27(2), 109-132.
- Duncan, G. J., & Sojourner, A. J. (2013). Can intensive early childhood intervention programs eliminate income-based cognitive and achievement gaps? *Journal of Human Resources*, 48(4), 945-968.
- DuPaul, G. J., Volpe, R. J., Jitendra, A. K., Lutz, J. G., Lorah, K. S., & Gruber, R. (2004). Elementary school students with AD/HD: Predictors of academic achievement. *Journal of School Psychology*, 42(4), 285-301.
- Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development*, 82(1), 405-432.
- Early, D. M., Maxwell, K. L., Burchinal, M., Alva, S., Bender, R. H., Bryant, D., ... Henry, G. T. (2007). Teachers' education, classroom quality, and young children's academic skills: Results from seven studies of preschool programs. *Child Development*, 78(2), 558-580.
- Eggum-Wilkens, N. D., Lemery-Chalfant, K., Aksan, N., & Goldsmith, H. H. (2015). Self-conscious shyness: Growth during toddlerhood, strong role of genetics, and no prediction from fearful shyness. *Infancy*, 20(2), 160-188.
- Eggum-Wilkens, N. D., Reichenberg, R. E., Eisenberg, N., & Spinrad, T. L. (2016). Components of effortful control and their relations to children's shyness. *International Journal of Behavioral Development*, 40(6), 544-554.
- Elias, M. J., & Haynes, N. M. (2008). Social competence, social support, and academic achievement in minority, low-income, urban elementary school children. *School Psychology Quarterly*, 23(4), 474-495.

- Enders, C. K. (2013). Dealing with missing data in developmental research. *Child Development Perspectives*, 7(1), 27-31.
- Engel, M., Claessens, A., & Finch, M. A. (2013). Teaching students what they already know? The (mis) alignment between mathematics instructional content and student knowledge in kindergarten. *Educational Evaluation and Policy Analysis*, 35(2), 157-178.
- Entwisle, D. R., & Alexander, K. L. (1998). Facilitating the transition to first grade: The nature of transition and research on factors affecting it. *The Elementary school journal*, 98(4), 351-364.
- Entwisle, D. R., Alexander, K. L., & Olson, L. S. (2005). Urban teenagers: Work and dropout. *Youth & Society*, 37(1), 3-32.
- Evans, M. (2010). Language, performance, academic performance, and signs of shyness. In K. H. Rubin & R.J. Copland (Eds.), *The development of shyness and social withdrawal* (179-212). New York, NY: Guilford Press.
- Eyberg, S. M., & Pincus, D. (1999). *Eyberg child behavior inventory and sutter-eyberg student behavior inventory-revised: Professional manual*. Psychological Assessment Resources.
- Foster, M. A., Lambert, R., Abbott-Shim, M., McCarty, F., & Franze, S. (2005). A model of home learning environment and social risk factors in relation to children's emergent literacy and social outcomes. *Early Childhood Research Quarterly*, 20(1), 13-36.
- Gazelle, H. (2006). Class climate moderates peer relations and emotional adjustment in children with an early history of anxious solitude: A child x environment model. *Developmental Psychology*, 42(6), 1179-1192.
- Gazelle, H., & Rudolph, K. D. (2004). Moving toward and away from the world: Social approach and avoidance trajectories in anxious solitary youth. *Child Development*, 75(3), 829-849.
- Greenberg, M. T., Weissberg, R. P., O'Brien, M. U., Zins, J. E., Fredericks, L., Resnik, H., & Elias, M.

- J. (2003). Enhancing school-based prevention and youth development through coordinated social, emotional, and academic learning. *American Psychologist*, 58(6-7), 466-474.
- Grimm, K. J. (2008). Longitudinal associations between reading and mathematics achievement. *Developmental Neuropsychology*, 33(3), 410-426.
- Hagelskamp, C., Brackett, M. A., Rivers, S. E., & Salovey, P. (2013). Improving classroom quality with the ruler approach to social and emotional learning: Proximal and distal outcomes. *American Journal of Community Psychology*, 51(3-4), 530-543.
- Hamre, B. K., Justice, L. M., Pianta, R. C., Kilday, C., Sweeney, B., Downer, J. T., & Leach, A. (2010). Implementation fidelity of MyTeachingPartner literacy and language activities: Association with preschoolers' language and literacy growth. *Early Childhood Research Quarterly*, 25(3), 329-347.
- Hamre, B. K., & Pianta, R. C. (2001). Early teacher-child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development*, 72(2), 625-638.
- Hamre, B. K., & Pianta, R. C. (2005). Can instructional and emotional support in the first-grade classroom make a difference for children at risk of school failure? *Child Development*, 76(5), 949-967.
- Hamre, B. K., Pianta, R. C., Downer, J. T., DeCoster, J., Mashburn, A. J., Jones, S. M., ... & Brackett, M. A. (2013). Teaching through interactions: Testing a developmental framework of teacher effectiveness in over 4,000 classrooms. *The Elementary School Journal*, 113(4), 461-487.
- Hughes, K., & Coplan, R. J. (2010). Exploring processes linking shyness and academic achievement in childhood. *School Psychology Quarterly*, 25, 213-222.
- Hulleman, C. S., & Cordray, D. S. (2009). Moving from the lab to the field: The role of fidelity and achieved relative intervention strength. *Journal of Research on Educational Effectiveness*, 2(1),

88-110.

- Jones, S. M., & Bouffard, S. M. (2012). Social and emotional learning in schools: From programs to strategies. *Social Policy Report*, 26 (4), 2-31.
- Jones, S. M., Bub, K. L., & Raver, C. C. (2013). Unpacking the Black box of the Chicago School Readiness Project intervention: The mediating roles of teacher–child relationship quality and self-regulation. *Early Education & Development*, 24(7), 1043-1064.
- Kalil, A., Ziol-Guest, K. M., Ryan, R. M., & Markowitz, A. J. (2016). Changes in income-based gaps in parent activities with young children from 1988 to 2012. *AERA Open*, 2(3), 1-17.
- Kalutskaya, I. N., Archbell, K. A., Rudasill, K.M., & Coplan, R. J. (2015). Shy children in the classroom: From research to educational practice. *Translational Issues in Psychological Science*, 1(2), 149-157.
- Kellam, S. G., Wang, W., Mackenzie, A. C., Brown, C. H., Ompad, D. C., Or, F., ... & Windham, A. (2014). The impact of the Good Behavior Game, a universal classroom-based preventive intervention in first and second grades, on high-risk sexual behaviors and drug abuse and dependence disorders into young adulthood. *Prevention Science*, 15(1), 6-18.
- Korpershoek, H., Harms, T., de Boer, H., van Kuijk, M., & Doolaard, S. (2016). A meta-analysis of the effects of classroom management strategies and classroom management programs on students' academic, behavioral, emotional, and motivational outcomes. *Review of Educational Research*, 86(3), 643-680.
- Kunter, M., Klusmann, U., Baumert, J., Richter, D., Voss, T., & Hachfeld, A. (2013). Professional competence of teachers: Effects on instructional quality and student development. *Journal of Educational Psychology*, 105(3), 805-820.
- La Paro, K. M., Rimm-Kaufman, S. E., & Pianta, R. C. (2006). Kindergarten to 1st grade: Classroom

- characteristics and the stability and change of children's classroom experiences. *Journal of Research in Childhood Education*, 21(2), 189-202.
- Li, Y., Coplan, R. J., Wang, Y., Yin, J., Zhu, J., Gao, Z., & Li, L. (2016). Preliminary evaluation of a social skills training and facilitated play early intervention programme for extremely shy young children in China. *Infant and Child Development*, 25, 565-574.
- Lin, H. L., Lawrence, F. R., & Gorrell, J. (2003). Kindergarten teachers' views of children's readiness for school. *Early Childhood Research Quarterly*, 18(2), 225-237.
- LoCasale-Crouch, J., Konold, T., Pianta, R., Howes, C., Burchinal, M., Bryant, D., ... & Barbarin, O. (2007). Observed classroom quality profiles in state-funded pre-kindergarten programs and associations with teacher, program, and classroom characteristics. *Early Childhood Research Quarterly*, 22(1), 3-17.
- Mashburn, A. J., Pianta, R. C., Hamre, B. K., Downer, J. T., Barbarin, O. A., Bryant, D.,... Howes, C. (2008). Measures of classroom quality in prekindergarten and children's development of academic, language, and social skills. *Child Development*, 79(3), 732-749.
- McClowry, S. G. (2002). Transforming temperament profile statistics into puppets and other visual media. *Journal of Pediatric Nursing*, 17(1), 11-17.
- McClowry, S. G. (2014). *Temperament-based elementary classroom management*. Lanham, Maryland: Rowman & Littlefield.
- McClowry, S., & Collins, A. (2012). Temperament-based intervention: Reconceptualized from a response to intervention framework. In M. Zentner & R. L. Shiner (Eds.), *Handbook of temperament* (607-626). New York, NY: Guilford Press.
- McClowry, S. G., Snow, D. L., Tamis-LeMonda, C. S., & Rodriguez, E. T. (2010). Testing the efficacy of INSIGHTS on student disruptive behavior, classroom management, and student competence

in inner city primary grades. *School Mental Health*, 2(1), 23-35.

Mol, S. E., & Bus, A. G. (2011). To read or not to read: a meta-analysis of print exposure from infancy to early adulthood. *Psychological Bulletin*, 137(2), 267-296.

Morris, P., Mattera, S. K., Castells, N., Bangser, M., Bierman, K., & Raver, C. (2014). Impact Findings from the Head Start CARES Demonstration: National Evaluation of Three Approaches to Improving Preschoolers' Social and Emotional Competence. OPRE Report 2014 44. Washington, DC: OPRE, HHS.

Nastasi, B. K., & Hitchcock, J. (2009). Challenges of evaluating multilevel interventions. *American Journal of Community Psychology*, 43(3-4), 360-376.

Nelson, L. J., Rubin, K. H., & Fox, N. A. (2005). Social withdrawal, observed peer acceptance, and the development of self-perceptions in children ages 4 to 7 years. *Early Childhood Research Quarterly*, 20(2), 185-200.

O'Connor, E. E., Cappella, E., McCormick, M. P., & McClowry, S. G. (2014). An examination of the efficacy of INSIGHTS in enhancing the academic and behavioral development of children in early grades. *Journal of Educational Psychology*, 106(4), 1156-1169.

Pecora, G., Sette, S., Baumgartner, E., Laghi, F., & Spinrad, T. L. (2016). The moderating role of internalizing negative emotionality in the relation of self-regulation to social adjustment in Italian preschool-aged children. *Cognition and Emotion*, 30(8), 1512-1520.

Perry, K. E., Donohue, K. M., & Weinstein, R. S. (2007). Teaching practices and the promotion of achievement and adjustment in first grade. *Journal of School Psychology*, 45(3), 269-292.

Petriwskyj, A., Thorpe, K., & Tayler, C. (2005). Trends in construction of transition to school in three western regions, 1990–2004. *International Journal of Early Years Education*, 13(1), 55-69.

Pianta, R. C., Cox, M. J., & Snow, K. L. (Eds.). (2007). *School readiness and the transition to*

kindergarten in the era of accountability. Baltimore, MD: Brookes.

Pianta, R., Downer, J., & Hamre, B. (2016). Quality in early education classrooms: definitions, gaps, and systems. *The Future of Children*, 26(2), 119-137.

Pianta, R. C., Hamre, B. K., & Allen, J. P. (2012). Teacher-student relationships and engagement: Conceptualizing, measuring, and improving the capacity of classroom interactions. In S.L. Christenson, A.L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 365-386). Springer US.

Pianta, R. C., La Paro, K. M., & Hamre, B. K. (2008). Classroom Assessment Scoring System: Manual Pre-K. Baltimore, MD: Brookes Publications.

Piotrkowski, C. S., Botsko, M., & Matthews, E. (2001). Parents' and teachers' beliefs about children's school readiness in a high-need community. *Early Childhood Research Quarterly*, 15(4), 537-558.

Puma, M., Bell, S., Cook, R., Heid, C., Shapiro, G., Broene, P., ... & Ciarico, J. (2010). Head Start Impact Study. Final Report. *Administration for Children & Families*.

Rabe-Hesketh, S., & Skrondal, A. (2008). *Multilevel and longitudinal modeling using Stata*. STATA press.

Ramey, C. T., & Ramey, S. L. (2004). Early learning and school readiness: Can early intervention make a difference? *Merrill-Palmer Quarterly*, 50(4), 471-491.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods*. Thousand Oaks, CA: Sage Publications.

Reardon, S. F. (2011). The widening academic achievement gap between the rich and the poor: New evidence and possible explanations. In G. J. Duncan & R. J. Murnane (Eds.), *Whiter opportunity? Rising inequality, schools, and children's life chances* (pp. 91-116). New York,

NY: Russell Sage Foundation.

- Reyes, M. R., Brackett, M. A., Rivers, S. E., White, M., & Salovey, P. (2012). Classroom emotional climate, student engagement, and academic achievement. *Journal of Educational Psychology, 104*(3), 700-712.
- Roid, G. H., & Miller, L. (1997). Leiter international test of intelligence -Revised. *Chicago, IL: Stoelting.*
- Rothbart, M. K., & Bates, J. E. (1998). Temperament. In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (5th ed., pp. 105-176). Hoboken, NJ: Wiley.
- Rudasill, K. M., Hawley, L., Molfese, V. J., Tu, X., Prokasky, A., & Sirota, K. (2016). Temperament and teacher–child conflict in preschool: The moderating roles of classroom instructional and emotional support. *Early Education and Development, 27*(7), 859-874.
- Rudasill, K. M., & Rimm-Kaufman, S. E. (2009). Teacher–child relationship quality: The roles of child temperament and teacher–child interactions. *Early Childhood Research Quarterly, 24*(2), 107-120.
- Sette, S., Zava, F., Baumgartner, E., Baiocco, R., & Coplan, R. J. (2016). Shyness, Unsociability, and Socio-Emotional Functioning at Preschool: The Protective Role of Peer Acceptance. *Journal of Child and Family Studies, 26*(4), 1-10.
- Shapiro, E. S. (2004). *Academic skills problems: Direct assessment and intervention* (3rd ed.). New York, NY: Guilford.
- Shiner, R. L., Buss, K. A., McClowry, S. G., Putnam, S. P., Saudino, K. J., & Zentner, M. (2012). What is temperament now? Assessing progress in temperament research on the twenty-fifth anniversary of Goldsmith et al. *Child Development Perspectives, 6*(4), 436-444.

- Social and Character Development Research Consortium. (2010). *Efficacy of schoolwide programs to promote social and character development and reduce problem behavior in elementary school children* (NCER 2011-2001). Washington, DC: National Center for Education Research.
- Spere, K., & Evans, M. A. (2009). Shyness as a continuous dimension and emergent literacy in young children: Is there a relation? *Infant and Child Development, 18*(3), 216-237.
- Suprayogi, M. N., Valcke, M., & Godwin, R. (2017). Teachers and their implementation of differentiated instruction in the classroom. *Teaching and Teacher Education, 67*, 291-301.
- Tomlinson, C. A. (2014). *The differentiated classroom: Responding to the needs of all learners*. ASCD.
- Tomlinson, C. A., Brighton, C., Hertberg, H., Callahan, C. M., Moon, T. R., Brimijoin, K., ... & Reynolds, T. (2003). Differentiating instruction in response to student readiness, interest, and learning profile in academically diverse classrooms: A review of literature. *Journal for the Education of the Gifted, 27*(2-3), 119-145.
- Torgesen, J. K. (2002). The prevention of reading difficulties. *Journal of School Psychology, 40*(1), 7-26.
- Viljaranta, J., Aunola, K., Mulla, S., Virkkala, J., Hirvonen, R., Pakarinen, E., & Nurmi, J. E. (2015). Children's temperament and academic skill development during first grade: Teachers' interaction styles as mediators. *Child Development, 86*(4), 1191-1209.
- Volpe, R. J., DiPerna, J. C., Hintze, J. M., & Shapiro, E. S. (2005). Observing students in classroom settings: A review of seven coding schemes. *School Psychology Review, 34*(4), 454-474.
- Wilson, D. B., Gottfredson, D. C., & Najaka, S. S. (2001). School-based prevention of problem behaviors: A meta-analysis. *Journal of Quantitative Criminology, 17*(3), 247-272.
- Wilson, S. J., & Lipsey, M. W. (2007). School-based interventions for aggressive and disruptive behavior: Update of a meta-analysis. *American Journal of Preventive Medicine, 33*(2), S130-

S143.

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001). *Woodcock-Johnson Psychoeducational Battery – Third Edition*. Chicago, IL: Riverside Pub.

Yang, F., Chen, X., & Wang, L. (2015). Shyness-sensitivity and social, school, and psychological adjustment in urban Chinese children: A four-wave longitudinal study. *Child Development*, 86(6), 1848-1864.

Yoshikawa, H., Aber, J. L., & Beardslee, W. R. (2012). The effects of poverty on the mental, emotional, and behavioral health of children and youth: implications for prevention. *American Psychologist*, 67(4), 272-284.

Yoshikawa, H., Weiland, C., & Brooks-Gunn, J. (2016). When does preschool matter? *The Future of Children*, 26(2), 21-35.

Table 1
 Descriptive Statistics for Classroom and School Variables of Interest

Variables	PreT				PostT			
	Treatment		Control		Treatment		Control	
	% or Mean	SD	% or Mean	SD	% or Mean	SD	% or Mean	SD
Full sample descriptives (N = 90):								
Classroom instructional support	3.03	0.80	2.81	0.98	2.90	1.03	2.68	0.98
Classroom emotional support	4.72	0.81	4.91	0.85	4.85	0.84	4.37	0.79
Classroom organization	4.36	0.98	4.41	0.91	4.25	0.90	4.01	0.94
Mean classroom-level shyness scores	2.47	0.44	2.46	0.45	-	-	-	-
Teacher no. of years teaching	13.42	7.55	12.59	9.23	-	-	-	-
No. of adults in class	1.38	0.62	1.47	0.59	-	-	-	-
Class size	16.37	4.70	16.86	3.22	-	-	-	-
Sample sizes	N = 43		N = 47					
Kindergarten descriptives (N = 53):								
Classroom instructional support	3.05	0.87	2.82	1.01	2.78	1.01	2.33	1.47
Classroom emotional support	4.82	0.83	5.05	0.85	4.94	0.90	4.49	0.93
Classroom organization	4.37	1.12	4.44	0.91	4.28	0.97	4.05	1.08
Mean classroom-level shyness scores	2.43	0.48	2.49	0.52	-	-	-	-
Teacher no. of years teaching	12.98	7.29	11.57	7.27	-	-	-	-
No. of adults in class	1.40	0.66	1.55	0.57	-	-	-	-
Class size	14.93	3.04	15.70	3.02	-	-	-	-
Sample sizes	N = 26		N = 27					
First-grade descriptives (N = 37)								
Classroom instructional support	3.01	0.68	2.91	0.96	2.95	1.08	2.60	0.79
Classroom emotional support	4.71	0.81	4.73	0.83	4.68	0.77	4.46	0.55
Classroom organization	4.35	0.77	4.38	0.94	4.19	0.80	3.99	0.73
Mean classroom-level shyness scores	2.53	0.39	2.41	0.34	-	-	-	-
Teacher no. of years teaching	14.13	8.15	14.06	11.61	-	-	-	-
No. of adults in class	1.24	0.56	1.36	0.61	-	-	-	-
Class size	18.57	5.91	18.41	2.87	-	-	-	-
Sample sizes	N = 17		N = 20					
School-level variables (N = 22)								
% Black	79.11	-	73.53	-	-	-	-	-
% Hispanic	43.84	-	37.09	-	-	-	-	-
% Eligible free/reduced lunch	79.88	-	75.89	-	-	-	-	-
% Competent state ELA test	84.14	-	86.43	-	-	-	-	-
% Above avg. state ELA	9.70	-	11.45	-	-	-	-	-
% Competent state math test	89.23	-	90.98	-	-	-	-	-
% Above avg. state math test	15.47	-	15.19	-	-	-	-	-
% Avg. daily Attendance	85.00	-	83.00	-	-	-	-	-
School size	493.44	126.83	522.77	198.28	-	-	-	-
Sample sizes	N = 11		N = 11					

Table 2

Multi-level Models Showing Moderated Impacts of INSIGHTS on Instructional Support by Mean Classroom-Level Shyness Scores and Grade

Fixed effects	<u>Model 1</u>		<u>Model 2</u>		<u>Model 3</u>	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Intercept	2.53 **	0.88	2.54 **	0.98	2.53 **	0.98
<u>School characteristics</u>						
School percent eligible for free/reduced lunch	-3.70 **	1.27	-3.44 **	1.11	-3.50 **	1.23
School percent black	-3.33 *	1.52	-3.22 *	1.43	-3.16 *	1.49
School percent Hispanic	-0.49	0.46	-0.49	0.45	-0.49	0.44
Attendance	2.89 **	0.67	2.88 **	0.61	2.89 **	0.64
School size	0.00 **	0.00	0.00 *	0.00	0.00 *	0.00
% Competent state ELA test	-2.70	2.35	-2.28	2.19	-2.31	2.28
% Average state ELA test	1.41	1.59	1.63	1.51	1.62	1.54
<u>Classroom characteristics</u>						
Class size	0.03	0.04	0.03	0.04	0.04	0.04
First grade	-0.23	0.22	-0.24	0.27	-0.69	0.28
Avg. number of adults in class	0.52 **	0.17	0.52 **	0.18	0.52 **	0.17
Teacher number of years teaching	0.11	0.10	0.12	0.09	0.11	0.10
Classwide instructional support T1	0.27 *	0.13	0.24	0.13	0.23	0.13
Treatment	0.02	0.24	-1.46	1.07	-1.48	1.03
Mean classroom-level shyness scores	-0.12 *	0.05	-0.17	0.28	-0.18	0.29
Treatment x mean classroom-level shyness scores	-	-	0.24	0.33	0.49	0.42
Treatment x mean classroom-level shyness scores x first grade	-	-	-	-	0.35 *	0.15
Log likelihood	-115.78	-	-112.79	-	-111.99	-

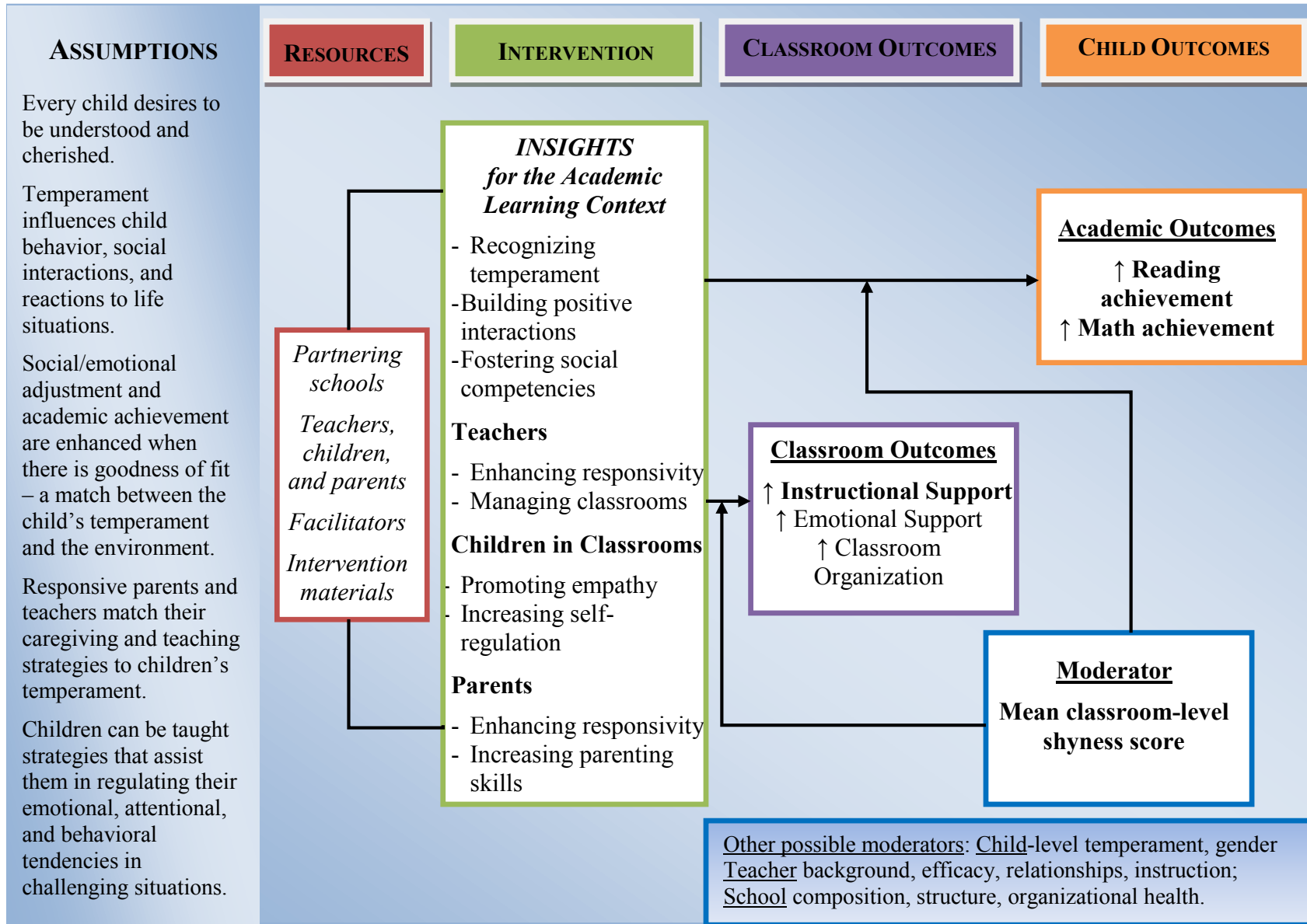
Note: $N = 90$ classrooms; ** $p < .01$, * $p < .05$

Table 3

Multi-level Models Showing Moderated Impacts of INSIGHTS on Math and Reading Skills, by Mean Classroom-Level Shyness Scores

	<u>Math skills</u>				<u>Reading skills</u>			
	<u>Model 1</u>		<u>Model 2</u>		<u>Model 1</u>		<u>Model 2</u>	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Fixed effects								
Intercept	16.92 **	3.98	22.74 **	4.75	16.28	13.57	16.29	16.43
<u>Child Demographic Predictors:</u>								
Female	0.16	0.60	0.14	0.59	-1.57	2.04	-1.60	2.03
Child black	-0.27	0.89	-0.26	0.87	0.93	3.26	0.95	3.01
Child Hispanic	-2.29 *	0.96	-2.40 *	0.94	-0.63	3.26	-0.75	3.26
Parent education, less than high school	-0.07	0.69	-0.08	0.68	-3.69	2.35	-3.70	2.35
Parent education, high school or more	-0.42	0.70	-0.26	0.69	-4.97 *	2.39	-4.78 *	2.40
Parent married	-0.12	0.59	0.01	0.58	-1.31	2.01	-1.16	2.02
Parent unemployed	0.45	0.54	0.29	0.54	4.41 *	1.85	4.23 *	1.86
<u>School Demographic Predictors:</u>								
School percent eligible for free/reduced lunch	-0.36	2.10	-0.58	2.07	1.02	7.17	0.77	7.16
School percent black	-2.93	2.69	-3.11	2.65	11.40	9.18	11.20	9.16
School percent Hispanic	3.02 *	1.36	3.18 *	1.33	-9.75 *	4.62	-9.57 *	4.62
WJ Applied Problems T1	0.35 **	0.08	0.35 **	0.08	0.32	0.26	0.31	0.26
WJ Letter Word T1	0.15 **	0.04	0.66 **	0.14	0.66 **	0.14	0.66 **	0.14
Child behavior problems T1	-0.54	0.29	-0.54	0.33	-1.85	0.99	-1.89	0.99
Classwide behavioral engagement T1	0.14	1.70	0.33	1.72	-7.98	5.79	-6.94	5.96
Sustained Attention T1	0.01	0.03	0.02	0.03	0.05	0.09	0.05	0.09
Avg. number of adults in class	0.21	0.18	0.22	0.17	0.17	0.16	0.17	0.20
Teacher number of years teaching	0.40	0.26	0.42	0.28	0.42	0.31	0.44	0.33
First grade	4.52 **	0.45	4.81 **	0.33	6.11 **	1.02	6.34 **	1.43
Treatment	1.29 *	0.61	-7.50	4.10	1.51	2.10	-8.49	14.21
Mean classroom-level shyness scores	0.09	0.91	-2.59	1.53	3.13	3.09	0.08	5.28
Treatment x mean classroom-level shyness scores	-	-	3.74 *	1.73	-	-	4.26	5.99
Log likelihood	-332.79	-	-330.49	-	-493.45	-	-493.20	-

Note: $N = 345$ children; ** $p < .01$, * $p < .05$



Note: Bolded items are explicitly examined in current study.

Figure 1. Logic Model Examining Impacts of INSIGHTS on Classroom Instructional Support and Students’ Academic Outcomes, Moderated by Mean Classroom-Level Shyness Scores

Here are helpful steps to use when your student encounters a temperamentally challenging situation.

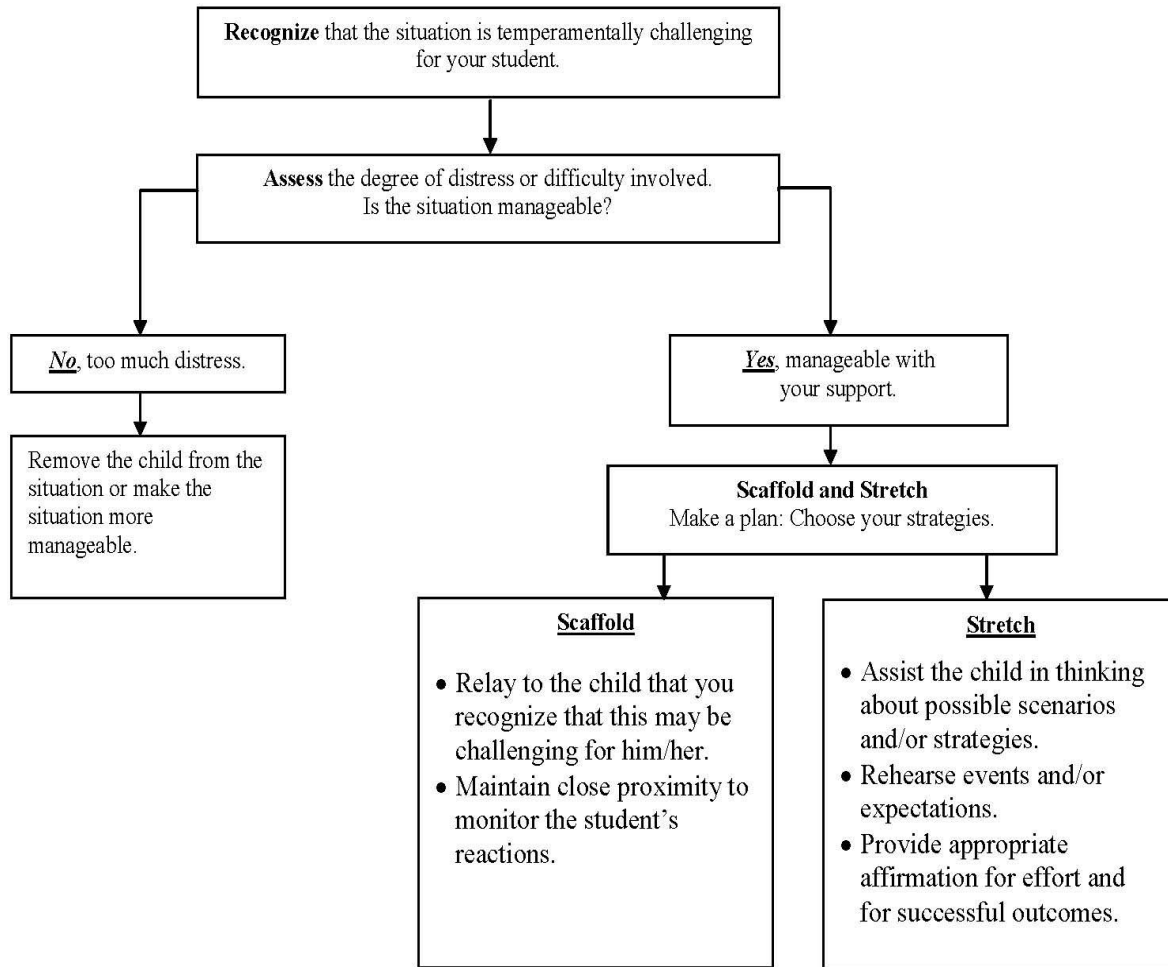
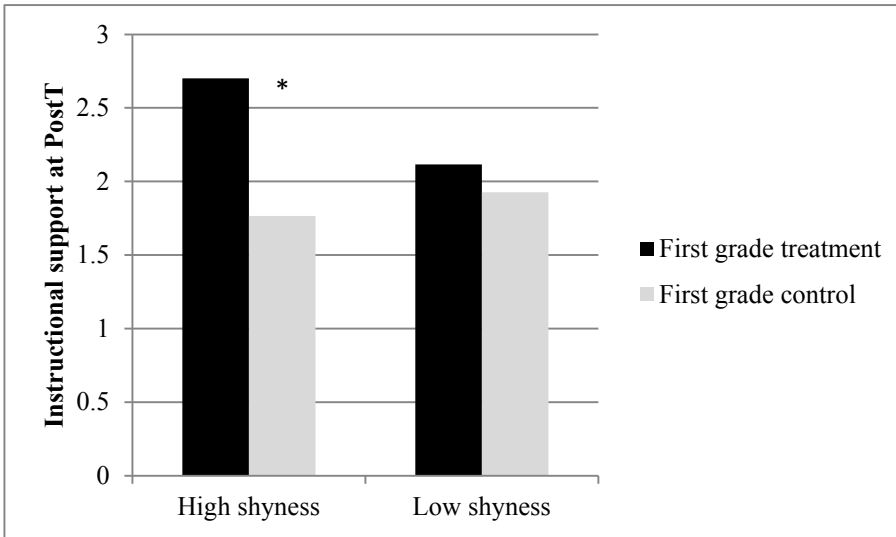
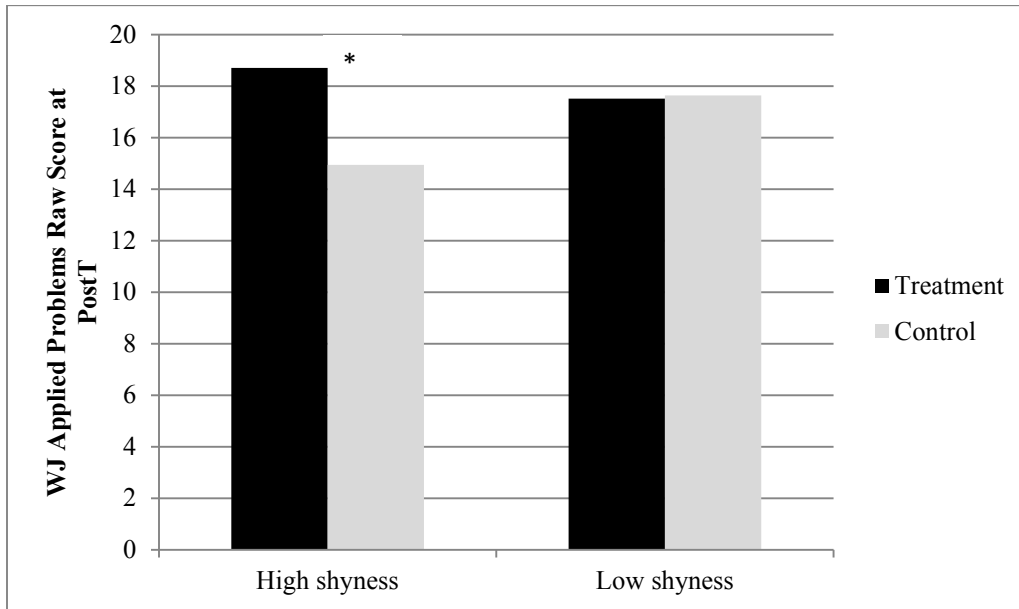


Figure 2. Overview of Scaffolding and Stretching



Note: High shyness was defined as a mean classroom-level shyness score 1 SD above the baseline control group mean and low shyness was defined as a mean classroom-level shyness score 1 SD below the baseline control group mean. Model adjusts for classroom and school-level covariates.

Figure 3. Effects of *INSIGHTS* on Instructional Support in First Grade, Moderated by Mean Classroom-level Shyness Scores



Note: High shyness was defined as a mean classroom-level shyness score 1 SD above the baseline control group mean and low shyness was defined as a mean classroom-level shyness score 1 SD below the baseline control group mean. Model adjusts for classroom and school-level covariates.

Figure 4. Effects of *INSIGHTS* on Math Skills, Moderated by Mean Classroom-level Shyness Scores