



Getting a good start in school: Effects of *INSIGHTS* on children with high maintenance temperaments

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ABSTRACT

This study investigated the efficacy of *INSIGHTS into Children's Temperament (INSIGHTS)* in supporting the behaviors and engagement of low-income kindergarten and first-grade children with high-maintenance temperaments. *INSIGHTS* is a temperament-based social-emotional learning intervention that includes teacher, parent, and classroom programs. Participants in the study included $N=435$ children ($Mean\ age = 5.38\ SD = 0.61$) from 22 under-resourced, urban elementary schools who were randomly assigned to *INSIGHTS* or a supplemental after-school reading program. Sixty-nine children were identified as having a high-maintenance temperament, characterized by low levels of task persistence and high levels of motor activity and negative reactivity. Individual growth modeling showed that children with high-maintenance temperaments in *INSIGHTS* evidenced faster reductions in disruptive behaviors and off-task behaviors across kindergarten and first grade than their peers in the supplemental reading program. Such children in *INSIGHTS* also had lower overall levels of both disruptive behaviors and off-task behaviors and higher levels of behavioral engagement than children in the comparison group at the end of first grade. Intervention effects for children with high-maintenance temperaments were partially mediated through improvements in their relationships with their teachers. Implications for social-emotional learning intervention for high-risk children and early educational policy are discussed.

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Introduction

Young children who exhibit disruptive behaviors and are disengaged in the classroom have fewer opportunities to learn. Consequently, they are at-risk to achieve lower levels of academic skills than their engaged, non-disruptive peers (Raver, Garner, & Smith-Donald, 2007). Given evidence that up to one third of students fail to learn because of psychosocial problems, behavioral issues in early elementary school settings have widespread implications (Epstein, Atkins, Cullinan, Kutsch, & Weaver, 2008). One group of children at special risk for disruptive behaviors and poor behavioral engagement are children with high-maintenance temperaments (Connor, Rodriguez, Cappella, Morris, & McClowry, 2012). As described by McClowry (2002), such children have temperaments low in task persistence and high in negative reactivity and motor activity. Negative associations between these

temperamental characteristics and classroom engagement may be particularly problematic for low-income, urban children who are already at substantial risk for poor social-emotional development (Herman, Trotter, Reinke, & Jalongo, 2011).

Early intervention is needed to support children at risk for academic problems (Bossaert, Doumen, Buysse, & Verschueren, 2011). Social-emotional learning (SEL) programs intervene on an inter-related set of children's cognitive, affective, and behavioral skills known to be critical for successful academic performance (Zins & Elias, 2007). While some SEL programs focus directly on students, others – particularly those targeting young children – also support teachers in being more responsive to their students (Bierman et al., 2014; Webster-Stratton, Reid, & Stoolmiller, 2008). Providing emotional support in the classroom can assist children in meeting the new environmental demands imposed by school (Curby, Rimm-Kaufman, & Ponitz, 2009).

Temperament theory is a helpful framework for understanding why and how children differ in their responses to school. Temperament is a rubric that refers to the consistent reaction style that an individual exhibits across a number of settings, particularly in response to stress or change (McClowry, 2014). Intervention based

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on temperament theory seeks to enhance the fit between a child's temperament and the environment. Responsive teaching and parenting strategies are implemented to assist children in meeting environmental expectations. In other words, although temperament itself is not the target of intervention, the environment is modified to appropriately respond to a child's temperament.

INSIGHTS into Children's Temperament (INSIGHTS) is a universal SEL intervention with behavioral supports that integrates theory, research, and clinical strategies in its teacher, parent, and classroom programs. The curricula for the programs are summarized in Appendix A and explained more fully in O'Connor, Cappella, McCormick, & McClowry, 2014. In brief, using a temperament interventionist perspective, *INSIGHTS* aims to enhance the fit between children's temperaments and their immediate environments at school and at home. *INSIGHTS* has shown evidence for efficacy in three prevention trials (O'Connor, Rodriguez, Cappella, Morris, & McClowry, 2012; O'Connor et al., 2014). In the most recent study, we found evidence of positive effects on teaching practices and classroom behavioral engagement (Cappella et al., in press) as well as student attention and math and reading achievement (O'Connor, Cappella, McCormick, & McClowry, in press). The effects of the intervention were consistent across children. However, because *INSIGHTS* is temperament-based, the next logical step in testing the intervention theory is to examine differential effects based on various temperament types. Indeed, we already found that kindergarten children with shy temperaments in *INSIGHTS* demonstrated more rapid growth in math and critical thinking skills than their peers who were not shy (O'Connor et al., in press). Magnified effects were partially mediated by increases in behavioral engagement – a behavior that is particularly challenging for children with shy temperaments.

The next step for this work is to consider whether children with high-maintenance temperaments benefit differentially from the *INSIGHTS* intervention. A high-maintenance temperament is similar to Thomas and Chess (1977) description of a difficult child, but reframed with a more neutral label. Using data on the temperament styles of 883 school-aged children, McClowry (2002) conducted a series of factor analyses that identified the high-maintenance temperament typology, characterized by high levels of negative reactivity (intensity and frequency with which the child expresses negative affect) and motor activity (high levels of physical motor activity), and low levels of task persistence (degree of self-direction that a child exhibits in fulfilling task responsibilities). Importantly, previous research has linked the temperamental dimensions included in a high-maintenance temperament with behavioral difficulties (Eisenberg et al., 2001; Frick & Morris, 2004; Sanson, Hemphill, & Smart, 2004). For example, O'Connor and colleagues (2012) found that low-income urban elementary school children with high-maintenance temperaments exhibited higher levels of disruptive behaviors and more growth in disruptive behaviors over time, relative to children with temperaments high in task persistence and low in activity and negative reactivity. Disruptive behavior problems (e.g., rule breaking, defiance, acting out) in early elementary school are of primary concern, as they put children at higher risk for poor adjustment to the school environment and lower achievement in the future (Masten et al., 2005; McClelland, Cameron, Wanless, & Murray, 2007).

Due to their low task persistence, children with high-maintenance temperaments are also at-risk for low behavioral engagement (listening to instruction, participation in academic activities, on-task) and elevated off-task behaviors in school (calling out, fidgeting) (Brock, Rimm-Kaufman, Nathanson, & Grimm, 2009; Valiente, Swanson, & Lemery-Chalfant, 2012). Low behavioral engagement is associated with poor academic skill

development (DuPaul et al., 2004). Moreover, transactional theories of development suggest that early disruptive behaviors and poor engagement can cause disruption in multiple life domains over time, thus, increasing the risk for negative life outcomes such as aggression and delinquency (Bradshaw, Schaeffer, Petras, & Jalongo, 2010).

There is evidence that teacher–child relationship quality may help explain part of the association between high-maintenance temperament and maladaptive behaviors in school (Leflot, van Lier, Verschueren, Onghena, & Colpin, 2011). Rooted in attachment theory, teacher–child relationship quality can be conceptualized as the presence of closeness (i.e., consistent warm, positive interactions that encourage communication) and the absence of conflict (i.e., consistent antagonistic, disharmonious interactions) between teachers and students (O'Connor & McCartney, 2007). Temperament and ecological theories suggest that when children form close and non-conflictual relationships with teachers, there is likely to be goodness of fit between their temperament and the relational environment of the classroom and school (Bronfenbrenner & Morris, 1998; Zentner & Shiner, 2012). Recent work demonstrates that, regardless of child temperament, teacher–child relationship quality in early elementary school is associated with fewer problem behaviors (O'Connor, Dearing, & Collins, 2011) and more adaptive behavioral engagement (Roorda, Koomen, Spilt, & Oort, 2011) within and across time. Wu, Hughes, and Kwok (2010) found that longitudinal associations between teacher–child relationship quality and behaviors are particularly critical for high-risk students in urban elementary schools.

Additionally, in a recent study using the NICHD Study of Early Child Care and Youth Development, Rudasill, Niehaus, Buhs, and White (2013) found that teacher–child relationship conflict in early elementary school fully mediated the effect of having a difficult temperament (defined as high motor activity, high anger/frustration, low approach, and low inhibitory control) on aggressive behaviors, peer victimization, relational aggression, and prosocial peer interactions in third grade. Taken together, empirical findings suggest that the goodness of fit between the student and his or her environment can be enhanced by improving teacher–child relationship quality for children with high-maintenance temperaments.

Given a wide body of research demonstrating that children with high-maintenance temperaments are at high risk for school-related problems, theory from prevention science suggests that such children may benefit from an SEL intervention with behavioral supports (Hamre & Pianta, 2005; Howes et al., 2008). In urban low-income schools, where there are relatively high percentages of children exhibiting disruptive behaviors and a distinct focus on classroom management (Raver et al., 2011), interventions can be leveraged to improve goodness of fit, student–teacher relationship quality, and, in turn, adaptive student behavior and engagement.

INSIGHTS into Children's Temperament

INSIGHTS is rooted in temperament theory. Although temperament definitions and measurement vary in the literature, consensus is mounting that temperament traits are “early emerging dispositions in the domains of activity, affectivity, attention, and self-regulation, and these dispositions are the product of complex interactions among genetic, biological, and environmental factors across time” (Shiner et al., 2012: pp. 1–2). Rather than attempting to change temperament traits, temperament-based intervention recommends accepting a child's temperament and reframing one's perception to acknowledge its related strengths and challenges. Reframing is important because studies have shown that teachers'

negative perceptions of their students' temperaments are related to lower academic outcomes (Rudasill & Rimm-Kaufman, 2009). For example, while children's temperament, particularly task persistence, has a small to moderate relationship with children's achievement on standardized tests, the associations between student temperament and teacher-reported assessments such as grades are moderate to large (Al-Hendawi, 2013). Reframing is especially important for teachers working with students with high-maintenance temperaments. Teachers tend to underestimate the intelligence of students with challenging temperaments (Martin, 1994). Over time, they provide such students with high levels of negative feedback and little positive feedback (McClowry, 2014).

As alluded to earlier, *INSIGHTS* seeks to enhance goodness of fit, which was defined by Thomas and Chess (1977) as the consonance of a child's temperament to the demands, expectations, and opportunities of the environment. The concept of goodness of fit has recently been expanded for application to school-age children who often encounter situations that are temperamentally challenging but consistent with developmental expectations (Shiner et al., 2012). In such cases, a responsive teacher or parent can apply strategies that scaffold and gently stretch a child's temperamental tendencies. With repeated and concerted practice by the child, the relevant emotional, attentional, or behavioral repertoire can be expanded and become more automatic. For example, children with high-maintenance temperaments may still react intensely to minor situational stressors. *INSIGHTS*, however, encourages teachers and parents to ignore minor expressions of negative reactivity rather than responding in ways that are counterproductive and further escalate interactions. Children also learn to recognize their own negative reactivity and practice ways to express their distress in more socially competent ways such as speaking in a quieter and calmer voice. In this study we examined the effectiveness of *INSIGHTS* in enhancing the behaviors and engagement of children with high maintenance temperaments in urban, low-income schools during kindergarten and first grade. In doing so, we asked two research questions:

- (1) Did *INSIGHTS* reduce disruptive behaviors and increase behavioral engagement for children with high-maintenance temperaments? and
- (2) For children with high-maintenance temperaments, were the effects of *INSIGHTS* mediated by improvements in teacher–child relationship quality?

The answers to these questions will extend understanding of whether and how SEL programs reduce the significant behavioral risks faced by children with high maintenance temperaments.

Method

Participants and setting

Twenty-two elementary schools were partners in conducting this study. All schools served families with comparable socio-demographic characteristics in low-income urban neighborhoods. Participants included 435 children and their parents as well as 122 teachers from kindergarten and first-grade classrooms. Eleven schools hosted the *INSIGHTS* program; the remaining schools participated in a supplemental reading program, referred to in this study as the attention-control condition. Most parent/child dyads ($n = 329$) enrolled in the study when the child was in kindergarten. Remaining dyads ($n = 106$) enrolled when the child was in first grade. Although there was variation by time of enrollment, 92% of children participated in the intervention in both kindergarten and first grade because schools implemented the intervention for all children, even if they did not consent to participate in the study.

There was a moderate amount of attrition; 8% of children who provided study information in kindergarten ($N = 26$) did not participate in first grade due to a change in school or other extenuating circumstance.

Eighty-six percent of children were five years old when they enrolled in the study ($M = 5.38$ $SD = 0.61$). Half (52%) of children were male and 87% percent qualified for free or reduced lunch programs. Approximately 75% of children were black, non-Hispanic, 16% were white, Hispanic; the remaining children were biracial. A majority of the parents were the children's biological mothers (84%); others included fathers (8%), kinship guardians (7%), and a category designated as other (1%). Approximately 28% of adult respondents had education levels less than a high school degree; 26% had at least a high school degree or GED diploma; 24% had at least some college experience; and the remaining 22% had graduated from a two- or four-year college. Based on findings from independent samples *t*-tests and chi square difference tests, we found that children enrolled in the study were demographically similar to the students at the schools who were invited to join the study but did not participate.

Recruitment and randomization procedures

Recruitment for this study was conducted by a racially and ethnically diverse team of field staff. The recruitment strategies were approved by university and school system research boards. Principals serving low-income students in three urban school districts were the first to be contacted. Team members explained the purpose of the study and its related logistics including randomization to one of two intervention conditions: *INSIGHTS* or the attention-control. Twenty-three schools were invited and initially agreed to participate. Prior to randomization, one school withdrew from the study due to a principal transition.

Teachers at participating schools were recruited in small group or individual meetings. In all, 96% of the kindergarten and 1st grade teachers consented to participate. All consented teachers continued to participate for the duration of the study. Teachers reported on each participating student's behaviors and their own relationship with each student, and received a \$50 gift card to purchase classroom supplies. Parents from participating teachers' classrooms were also recruited during the fall. After consenting to participate, parents provided demographic information and reported on their child's temperament via audio-enhanced computer-assisted self-interviewing software (Audio-CASI). Parents received \$20 for their time. After a parent consented, child assent was acquired. Due to resource limitations and concerns about teacher burden, recruitment stopped after all possible efforts to recruit students had been made and at least four students in each classroom were enrolled.

After baseline data were collected, a random numbers table was used to randomize 11 schools to *INSIGHTS* and 11 schools to the attention-control. Half of the children participated in the *INSIGHTS* program ($N = 225$); the remaining child participants ($N = 210$) were enrolled in the attention-control condition. Approximately half of teachers ($N = 57$) participated in *INSIGHTS* program; remaining teachers ($N = 65$) were enrolled in the attention-control.

Independent samples *t*-tests revealed a significant difference in reading achievement between *INSIGHTS* and the attention-control group at baseline. A chi-square test also revealed there were more Hispanic children enrolled in *INSIGHTS* than the attention-control condition. Statistical modeling addressed pretreatment differences. Importantly, however, there were no significant pretreatment differences between the children with high-maintenance temperaments enrolled in *INSIGHTS* and the attention control condition.

Measures

Demographic characteristics

Parents reported on their child's demographic characteristics – gender, race, ethnicity, and eligibility for free or reduced lunch – when they enrolled their child in the study. All demographic characteristics were collected at the beginning of the year in either kindergarten or first grade, depending on when children enrolled. Gender, and race are pretreatment covariates in all predictive models given their documented links to disruptive behaviors and behavioral engagement (Gershoff, Lansford, Sexton, Davis-Kean, & Sameroff, 2012; Tremblay, Duchesne, Vitaro, & Tremblay, 2013).

Child temperament

The *School-aged Temperament Inventory* (SATI; McClowry, 2002) was used to measure child temperament. The SATI is a parent-reported 38-item 5-point Likert-type scale (ranging from never to always) that was standardized with a racially/ethnically and socioeconomically diverse sample of 883 parents reporting on their children and reported to be reliable and valid (McClowry, 2002). The SATI measures four dimensions of child temperament – task persistence (11 items; degree of self-direction that a child exhibits in fulfilling task responsibilities), motor activity (6 items; large motor activity), negative reactivity (12 items; intensity and frequency with which the child expresses negative affect), and withdrawal (9 items; shyness, slow to warm). Examples of negative reactivity items include “gets upset when he can't find something” and “moody when corrected for misbehavior.” Examples of task persistence are “returns to responsibilities after friends call or visit” and “stays with homework until finished.” The activity dimension is comprised of items similar to “runs to get where he wants to go” and “is in a hurry most of the time.” Withdrawal is described by items similar to “When meeting new children, acts bashful” and “Approaches children his/her age even if he/she doesn't know them.” Three dimensions of child temperament (task persistence, motor activity, and negative reactivity) were used to identify children with high-maintenance temperaments. Note that although withdrawal is a dimension of temperament, it was not used to determine whether a child had a high-maintenance temperament. In this study, Cronbach's alphas for the SATI were activity: $\alpha = 0.77$; withdrawal: $\alpha = 0.81$; task persistence: $\alpha = 0.85$; negative reactivity: $\alpha = 0.87$.

A high-maintenance temperament was a child who had high levels (greater than 1 *SD* above the mean) of negative reactivity and motor activity and low levels of task persistence (less than 1 *SD* below the mean) (McClowry, 2002). Sixteen percent of the study sample ($N = 34$ *INSIGHTS*; $N = 35$ attention-control) were identified as high maintenance, which is similar in proportion to previous studies examining low-income urban children with high-maintenance temperaments (McClowry, 2002). Schools ranged from having two to four children with high maintenance temperaments enrolled in the study.

Child disruptive behaviors

Disruptive behaviors were measured with the 36-item *Sutter-Eyberg Student Behavior Inventory* (SESBI), the teacher version of the Eyberg Child Behavior Inventory (Eyberg & Pincus, 1999). The scale has documented evidence of reliability and validity (Querido & Eyberg, 2003). On a frequency scale ranging from 1 to 7 (1 = never, 3 = seldom, 5 = sometimes, 7 = always), teachers reported on the frequency that a student engaged in a range of disruptive behaviors, such as “acts defiant when told to do something,” “verbally fights

with other students,” and “is overactive and restless.” A mean score was calculated by averaging across the individual items for the full scale. The SESBI was collected at five time points. Cronbach's alpha in the current study ranged from 0.94 to 0.97 across the five time points.

Classroom engagement and off-task behaviors

The Behavioral Observation of Students in Schools (BOSS; Shapiro, 2004) was used to assess the frequency of behavioral engagement and off-task behaviors during academic activities for children enrolled in the study. Momentary time sampling measured the presence or absence of active engagement (e.g., raising one's hand, actively participating in classroom activity, asking/answering questions) and passive engagement (e.g., paying attention but not participating, listening to a classmate or the teacher). The BOSS also uses partial interval recording procedures to observe off-task behaviors. This process involves coding the presence or absence of one or more of the following behaviors during an identified duration of time: motor (e.g., getting out of seat, distracting other students with movements), verbal (e.g., calling out, whispering), or passive (e.g., staring off, sleeping with head on desk). Momentary time sampling and partial interval recording procedures reliably assess the frequency of behaviors in context (Hintze, Volpe, & Shapiro, 2002).

Because of the children's young age and school schedules, all observations occurred during the morning period of academic instruction. Depending on classroom schedules, observations took place on two school days across a 1–2 week period. Each observation comprised 60 15-s intervals of momentary time sampling (the first second of each interval) and partial interval recording (the remaining 14 s of each interval). Because active and passive engagement codes are mutually exclusive (i.e., a student cannot be both actively and passively engaged at the same time), a behavioral engagement score was calculated by summing active and passive engagement, divided by the total number of intervals observed, averaged across the two observation days, and multiplied by 100 to get a percentage of time spent engaged. In contrast, off-task behaviors are not mutually exclusive, meaning a student could be off-task motor and off-task verbal in the same interval. Thus, each student's overall percentage of off-task behaviors was calculated by dividing the *average* of the off-task motor, verbal, and passive behaviors by the total number of intervals observed, averaged across the two days, and multiplied by 100 to get a % of time off-task.

Data collectors, blind to intervention condition, conducted BOSS observations (BOSS; Shapiro, 2004). Reliability procedures included: (a) a four-hour lab-based training, (b) three segments of video coding, (c) a two-hour live training, and (d) achieving 80% or above agreement with a master coder. Interobserver agreement was assessed prior to each wave of data collection. Mean Kappas ranged from 0.82 to 0.93 ($M = 0.86$; $SD = 0.04$).

Teacher–child relationship quality

The 15-item teacher-reported Student–Teacher Relationship Scale (STRS; Pianta, 2001) was used to assess teacher–child relationship quality. The 15-item scale is a short version of the full 28-item STRS and only includes questions to measure teacher–child closeness and conflict. The closeness scale consists of eight items and is an index of the amount of warmth and open communication present in the relationship (e.g., “I share an affectionate, warm relationship with this child”). The conflict subscale consists of seven items and measures the extent to which the relationship is marked by antagonistic, disharmonious interactions (e.g., “This child and I always seem to be struggling with each other”). Using a 5-point

Likert scale that ranged from 1 (definitely does not apply) to 5 (definitely applies), teachers rated how applicable statements were to their current relationship with a particular child.

The STRS has been widely used in studies with preschool and elementary school children. It is associated with children's and teachers' classroom behaviors and correlates with observational measures of teacher–child relationship quality (Birch & Ladd, 1997). Similar to O'Connor and McCartney (2007), we chose to work with the Total Teacher–Child Relationship Score rather than examine the closeness and conflict dimensions separately. The subscales were moderately correlated ($r=0.48$) and we had no theoretical reason to expect that closeness and conflict would reveal different mediating pathways linking *INSIGHTS* and outcomes. The STRS total score is made up of the mean of all the items in the closeness subscale plus the mean of all the items in the reverse-coded conflict subscale, with that number divided by two (to account for the two subscales). Possible scores ranged from 1 (lowest quality teacher–child relationship) to 5 (highest quality teacher–child relationship). The STRS was collected at all five time points. Cronbach's alpha ranged from 0.91 to 0.94 across five time points.

Data collection

Researchers and field staff were provided group training on all procedures and measures prior to each of the five data collection periods. Time 1 (T1) data were collected in the winter of the kindergarten year prior to 10 weeks of kindergarten intervention. Time 2 (T2) data were collected following intervention in the late spring. Time 3 (T3) data were collected in the fall of first grade prior to 10 weeks of intervention. Time 4 (T4) data were collected after the first grade intervention in the late winter of first grade, followed by Time 5 (T5) data in late spring.

INSIGHTS intervention procedures

Facilitator training

INSIGHTS facilitators had graduate degrees in Psychology, Education, and Educational Theater, and had previous experience working with children. Facilitators varied in their racial/ethnic backgrounds. All facilitators attended a graduate-level course to learn the underlying theory and research of the *INSIGHTS* intervention. New facilitators were also trained by more experienced staff. Each facilitator conducted the comprehensive intervention in the school to which s/he was assigned.

Program delivery

Teachers and parents attended 10 weekly two-hour sessions based on a structured curriculum that included didactic content and professionally produced vignettes as well as handouts and group activities. One session was attended by parents and teachers together; others were conducted separately. Teachers and parents were given assignments to practice program content between sessions. Make-up sessions were offered. Parents received \$20 and teachers received professional development credit and \$40 gift cards for each session attended.

During the same 10 weeks, the classroom program was delivered in 45-min lessons to all students in the classrooms of participating teachers. Kindergarten and first-grade students who were not enrolled in the study still participated in the classroom program. Curriculum materials included puppets, workbooks, flash cards, and videotaped vignettes. Teachers were engaged in the sessions, especially when the students practiced resolving dilemmas. No make-up sessions were conducted although teachers practiced lessons with students who missed a session.

Fidelity

To maintain model fidelity, facilitators followed scripts, used material checklists, documented sessions, and received on-going training and supervision. Deviations or clinical concerns were discussed weekly in meetings with the program developer (see O'Connor et al., 2012). Supervision focused on challenges related to conducting sessions, implementation logistics, and participant concerns. Parent and teacher sessions were also videotaped and reviewed for coverage of content and effectiveness of facilitation (Hulleman & Cordray, 2009). Fidelity coding of tapes conducted by an experienced masters-level psychiatric nurse revealed that 94% of the curriculum was covered in the teacher sessions and 92% of curriculum was covered in parent sessions. On a 5-point scale (1 = poor, 2 = mediocre, 3 = adequate, 4 = better than most, 5 = exceptional), mean ratings of facilitator skills were 3.71 (question asking), 3.92 (quality of praise), 3.54 (validation), and 3.83 (limit setting).

INSIGHTS dosage

The average number of teacher sessions attended was 9.44 ($SD=0.91$). Most teachers attended all 10 sessions (70.6%), and another 26.5% attended eight or nine sessions. Enrolled children attended 8.30 sessions on average ($SD=2.25$). Thirty-two percent of enrolled children were present for all classrooms sessions and 46.3% were present for eight or nine sessions. Teacher and student attendance varied little across schools: over 85% of teachers and students in all 22 schools participated in at least 80% of the curriculum sessions. 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. Parent participation varied across schools, ranging from 23% of parents attending more than 80% of sessions to 66% attending more than 80% of sessions. Importantly, attendance in parent and child sessions for students with high-maintenance temperaments was similar to attendance rates among all participants.

Attention-control condition

A supplemental reading program served as the attention-control condition. The rationale for having an attention-control condition was to provide some comparability with the treatment variables that were likely to influence the outcomes. In addition, the program provided the schools in low-income neighborhood with additional literacy-related resources and allowed for a conservative estimate of intervention effects. There was little overlap in content covered in the supplemental reading program and the *INSIGHTS* intervention.

Students whose parents consented in the control schools participated in a 10-week, 45-minute after school, supplemental reading program. Their teachers and parents attended two separate workshops, each two hours long, in which strategies to enhance literacy were presented and reading materials for the children were provided. Twenty-four percent of children who were enrolled in the attention-control participated in the full 10 sessions; an additional 19% took part in eight or nine sessions. Thirty percent of parents and 83% of teachers attended both sessions. Parents received \$20 and teachers received professional development credit and \$40 for classroom resources for each workshop. Reading program facilitators had weekly meetings with the project director to ensure that all components of the program were being implemented each week. Review of checklists completed by reading coaches indicates curriculum fidelity was high; 95–100% of topics were covered across the ten-week program.

Analytic approach

Missing data analysis

For the child-level variables, there was 0–20% missing data across study variables. In order to achieve maximum power given the sample size, individual students who were missing data points were compared to students who were not missing data points on all baseline characteristics. Little's MAR test (Little & Rubin, 1987) was used to find exploratory evidence that data were missing at random. A multiple data imputation method was employed and $N=20$ separate datasets were imputed by chained equations, using SAS PROC MI in SAS version 9.2. Final parameter estimates were generated by calculating the mean of the twenty estimates using the SAS PROC MI ANALYZE command.

Growth curve modeling

Individual growth modeling was used to examine change over time in disruptive behaviors, behavioral engagement, and off-task behaviors (Singer & Willett, 2003). All child study participants ($N=435$) were included in all predictive models. Models were fitted with SAS, using a maximum likelihood estimator. Assessment point (T1–T5) was used as a measure of time. Time was centered at the final time point (T5) so the intercept would represent the treatment/control difference at the end of the study. Unconditional means models suggested significant between-individual variation in each outcome. As such, a random effect was included at level 2 in all models, allowing the intercept to vary for this level of nesting (Raudenbush, 2009). Examination of unconditional growth models suggested the need for a random slope for each of the outcomes, which was subsequently included in all predictive analyses. Examination of three- and four-level models did suggest some variation in outcomes attributed to contextual differences at the classroom and school level. However, including random intercepts at Levels 3 and 4 did not improve model fit. Even so, to account for any time-invariant characteristics at the school level and increase the precision of the impact estimates (Bloom, Richburg-Hayes, & Black, 2007), we included school fixed effects in all models. Fixed effects capture all time-invariant, school-level differences (Bloom et al., 2007).

Research question 1

Did INSIGHTS reduce disruptive behaviors and increase behavioral engagement for children with high-maintenance temperaments? (see Fig. 1a for the conceptual model). We ran a baseline conditional model in which the Level-2 independent variables for high-maintenance temperament (1 = high maintenance; 0 = not high maintenance) and treatment (*INSIGHTS* = 1; attention-control = 0) were entered into models predicting disruptive behaviors, behavioral engagement, and off-task behaviors. Because all children were included in predictive models, the coefficient for high-maintenance temperament represents the average difference in the outcome across time between children with and without high-maintenance temperaments. In predictive models, (a) child female, (b) child Black, (c) child Hispanic, (d) baseline disruptive behaviors, (e) baseline behavioral engagement, (f) baseline off-task behaviors, and (g) and cohort fixed effects were also added as Level-2 predictors. School fixed effects were also included in these models. Continuous predictors at Level 2 were centered around their grand mean.

Interactions between treatment (Level 2) and high-maintenance temperament (Level 2) and time (Level 1), treatment (Level 2), and high-maintenance temperament (Level 2) were then added to the models. The treatment \times high maintenance interaction tests whether high-maintenance children assigned to *INSIGHTS* show an overall difference in the study outcomes at the final time point, relative to high-maintenance children enrolled in the attention-control condition. Significant time \times high maintenance \times treatment

interaction terms indicate differential growth in outcomes over time for students with high-maintenance temperaments in the treatment group relative to students with similar temperaments in the attention-control group. We calculated effect sizes for statistically significant findings following procedures by Feingold (2009) for growth curve analysis. These effect sizes are calculated to be comparable to Cohen's d .

Research question 2

For children with high-maintenance temperaments, were the effects of *INSIGHTS* mediated by improvements in teacher–child relationship quality? (see Fig. 1b for conceptual model). We then examined the mediating role of teacher–child relationships in explaining the moderated effects of *INSIGHTS* on overall levels of the outcomes (e.g., effects on the intercept) for students with high-maintenance temperaments. We used a multilevel mediation framework developed by Zhang, Zyphur, and Preacher (2009) that allows one to test mediation at multiple levels in a style similar to the classic Baron and Kenny (1986) paradigm, using hierarchical linear modeling (as opposed to a structural equation modeling framework). We used a variant on a mediated moderation approach where we maintained all 435 study participants in analyses, but were specifically interested in mediation on the moderated impacts of *INSIGHTS* for children with high-maintenance temperaments. Thus, in our first step of this model we were able to test the C path, examining a relationship between receiving the *INSIGHTS* intervention and changes in behaviors, behavioral engagement, and off-task behaviors for children with high-maintenance temperaments. We then assessed the moderated effects of treatment on the theorized mediator (teacher–child relationship quality) for children with high-maintenance temperaments (path A). Assuming a statistically significant path A, we examined the joint effects of treatment condition and the Level-2 group mean of the mediator (teacher–child relationship quality) on the outcomes for children with high-maintenance temperaments, adjusting for student characteristics (paths B and C'). In this step, we were interested in whether the coefficient for any of statistically significant interaction terms from Model 2 (*INSIGHTS* \times high-maintenance temperament) decreased with the addition of the group mean for teacher–child relationship quality as a predictor. Such an observation would suggest partial mediation of teacher–child relationship quality of *INSIGHTS* on the outcomes for children with high maintenance temperaments (Zhang et al., 2009).

Results

Below we present descriptive statistics for the study variables, and then show the results for research questions 1 and 2.

Descriptive statistics

Although all study participants are included in predictive analyses, we present means and standard deviations for continuous variables and percentages for dichotomous variables (by treatment/control) specifically for children with high-maintenance temperaments in Tables 1a and 1b. Time-varying measures are included for both the first (Time 1; Table 1a) and last (Time 5; Table 1b) time points specifically for children with high-maintenance temperaments. As illustrated in Tables 1a and 1b, disruptive behaviors decreased over time for children with high-maintenance temperaments in the *INSIGHTS* condition, and increased over time for children with high-maintenance temperaments in the attention-control group. Behavioral engagement increased over time for children with high-maintenance temperament enrolled in *INSIGHTS* but remained relatively stable for children in the attention-control group. Off-task behaviors decreased

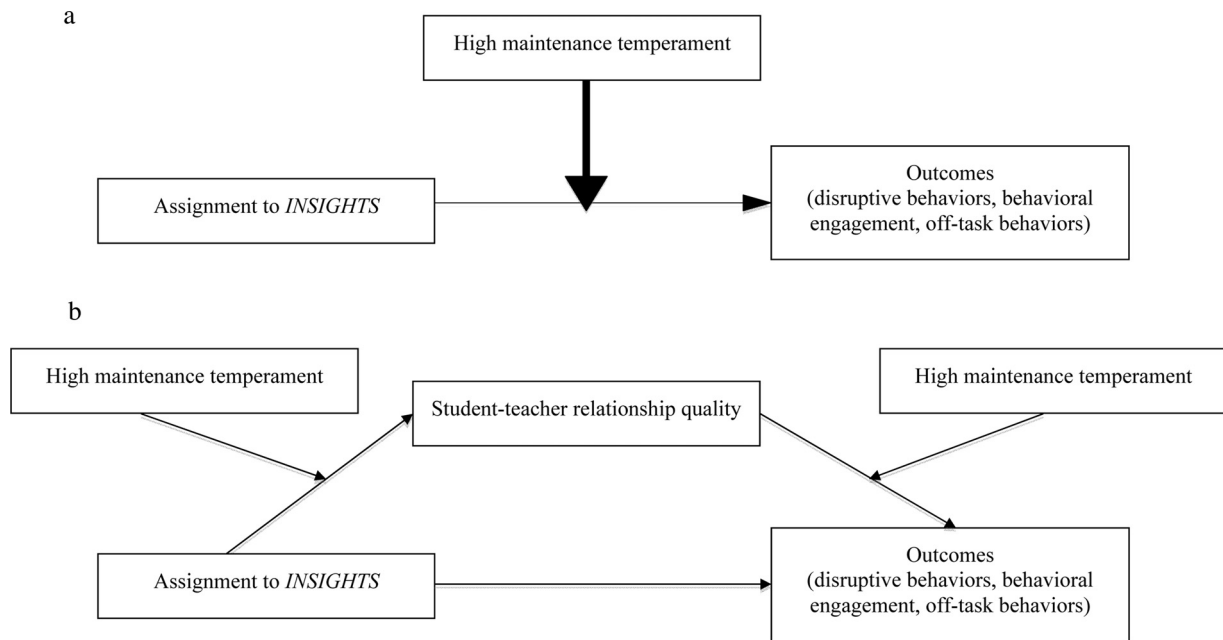


Fig. 1. (a) Conceptual Model for Research Question 1: Did *INSIGHTS* reduce disruptive behaviors and increase behavioral engagement for children with high maintenance temperaments, compared to their counterparts in a supplemental reading program? (b) Conceptual Model for Research Question 2: For children with high maintenance temperaments, were the effects of *INSIGHTS* mediated through improvements in teacher–child relationship quality?

Table 1a

Descriptive statistics for key variables for high maintenance students at baseline.

Variable	Treatment			Control			Tx/control difference
	M	SD	Range	M	SD	Range	
Disruptive behaviors (1–7)	2.33	1.03	1.87–6.13	2.23	1.08	1.68–6.42	
Behavioral engagement (%)	0.58	0.19	0.31–0.71	0.63	0.17	0.35–0.74	
Off-task behaviors (%)	0.18	0.09	0.11–0.45	0.15	0.09	0.12–0.51	
Student–teacher relationship (1–5)	2.32	0.91	1.20–3.98	2.36	1.01	1.34–4.10	
Child age (years)	5.71	0.71	4–7	5.57	0.67	4–6	
Child black (%)	0.74	–		0.69	–		
Child Hispanic (%)	0.28	–		0.26	–		
Child female (%)	0.29	–		0.31	–		

$N = 69$; No significant differences between treatment and control group members at baseline; ** $p < 0.01$; * $p < 0.05$.

Note: Assignment to *INSIGHTS* (Treatment) in models is coded as 1; assignment to the attention-control is coded as 0.

for children with high-maintenance temperaments in *INSIGHTS*, and remained relatively stable for the attention-control group. Finally, there were gains in teacher–child relationship quality for the children with high-maintenance temperaments in *INSIGHTS*; teacher–child relationship quality declined over time for the comparison children. Post-test differences favoring the *INSIGHTS* condition were significant across all outcomes and the mediator.

Research question 1

Analyses (see Table 2) revealed a significant moderated effect of *INSIGHTS* on reducing overall levels of disruptive behaviors

($\gamma = -0.49$, $p = 0.04$, $ES = 0.42$; Fig. 2a), increasing overall levels of behavioral engagement ($\gamma = 0.07$, $p = 0.01$, $ES = 0.35$; Fig. 2b), and reducing overall levels of off-task behaviors ($\gamma = -0.04$, $p = 0.04$, $ES = 0.33$; Fig. 2b) for children with high-maintenance temperaments enrolled in *INSIGHTS* relative to children with high-maintenance temperaments in the attention-control group. In addition, children with high-maintenance temperaments enrolled in *INSIGHTS* exhibited slower growth in disruptive behaviors ($\gamma = -0.12$, $p = 0.04$, $ES = 0.58$), relative to children with high-maintenance temperaments in the control condition, and slower growth in the percentage of off-task behaviors ($\gamma = -0.02$, $p = 0.04$, $ES = 0.67$). There were no moderated impacts on growth

Table 1b

Descriptive statistics for key variables for high maintenance students at final time point.

Variable	Treatment			Control			Tx/control difference
	M	SD	Range	M	SD	Range	
Disruptive behaviors (1–7)	1.89	0.94	1.51–5.85	2.82	1.64	2.01–6.30	**
Behavioral engagement (%)	0.74	0.24	0.48–0.91	0.66	0.22	0.40–0.89	*
Off-task behaviors (%)	0.12	0.06	0.08–0.39	0.15	0.06	0.07–0.45	**
Student–teacher relationship (1–5)	2.60	1.19	1.87–4.23	2.01	1.62	1.65–3.69	**

$N = 69$; Significant differences between treatment and control at follow-up denoted by ** $p < 0.01$; * $p < 0.05$.

Note: Assignment to *INSIGHTS* (Treatment) in models is coded as 1; assignment to the attention-control is coded as 0.

Table 2
Growth models predicting disruptive behaviors, behavioral engagement, and off-task behaviors from treatment and high maintenance temperament.

Fixed effects	Disruptive behaviors		Behavioral engagement		Off-task behaviors	
	γ	SE	γ	SE	γ	SE
Between-student variables						
Treatment	-0.15	0.61	0.05	0.09	0.04	0.05
High maintenance temperament	0.10	0.16	-0.01	0.02	-0.01	0.01
Treatment \times high maintenance temperament	-0.49	0.21	0.07	0.03	-0.04	0.02
Disruptive behaviors at baseline	0.60	0.03	-0.01	**	0.01	**
Behavioral engagement at baseline	-0.26	0.17	0.25	**	-0.04	**
Off-task behaviors at baseline	0.05	0.28	-0.11	**	0.23	**
Child female	-0.15	0.06	0.02	*	-0.01	0.01
Child black	0.01	0.09	-0.01	0.01	0.02	**
Child Hispanic	-0.15	0.09	0.01	0.01	-0.01	0.01
Child age	0.09	0.05	0.01	0.01	-0.01	0.01
Within-student variables						
Time	0.08	**	0.02	**	0.01	*
Treatment \times time	-0.09	**	0.03	0.01	-0.01	0.01
Treatment \times time \times high maintenance temperament	-0.12	*	0.06	0.02	0.01	**
Random effects						
Student-level variance	0.20	**	0.02	0.01	**	0.00
Time variance	0.01	0.01	0.00	0.00	0.00	0.00
Residual variance	0.76	**	0.03	0.04	**	0.00

N = 435; Models adjust for school fixed effects and cohort fixed effects.
 Note: Assignment to *INSIGHTS* (Treatment) in models is coded as 1; assignment to the attention-control is coded as 0.
 * $p < 0.05$.
 ** $p < 0.01$.

in behavioral engagement for children with high-maintenance temperaments enrolled in *INSIGHTS*, relative to those in the attention-control. Detailed information about the effects of the model covariates and variance components for all outcomes are included in Table 2.

Research question 2

As illustrated in Fig. 3, multilevel moderated mediation analyses suggested that effects of *INSIGHTS* in reducing overall levels of disruptive behaviors and off-task behaviors for children with high-maintenance temperaments were partially mediated through

improvements in overall levels of teacher–child relationship quality for these children, relative to the attention-control condition. Specifically, moderation analyses showed that children with high-maintenance temperaments enrolled in *INSIGHTS* evidenced higher quality teacher–child relationships, relative to children with high-maintenance temperaments in the control condition by the final time point ($\gamma = 0.62, p = 0.03$). In addition, the effect of *INSIGHTS* on the overall levels of the outcomes for children with high-maintenance temperaments were significantly reduced after accounting for the group mean of teacher–child relationship quality in predicting disruptive behaviors and off-task behaviors. Results suggest that 76% of the effect of *INSIGHTS* on disruptive behaviors was explained by teacher–child relationship quality, while 50% of the effect of *INSIGHTS* on off-task behaviors was explained by teacher–child relationship quality. However, there was no evidence to suggest that effects of *INSIGHTS* on behavioral engagement for children with high-maintenance children were mediated through improvements in teacher–child relationship quality.

Discussion

This study examined the causal impact of *INSIGHTS* on the behaviors and engagement of low-income kindergarten and first-grade children with high-maintenance temperaments. Given challenges posed by socioeconomic disadvantage and a challenging temperament, this subgroup faces risk for a host of poor developmental outcomes. We found moderate impacts of *INSIGHTS* on the behaviors of students with high-maintenance temperaments, including reductions in disruptive behaviors ($ES = 0.42$) and off-task behaviors ($ES = 0.33$) and increases in behavioral engagement ($ES = 0.35$). In a recent meta-analysis of all social-emotional learning programs, Durlak and colleagues (2011) found the overall average effect size of SEL programs on conduct problems (similar in conceptualization to disruptive behaviors) to be 0.22, with a confidence interval from 0.16 to 0.29. The larger effect sizes identified in the current study may reflect previous researchers' conclusion that students at the highest level of risk are most likely to benefit from intervention (Hamre & Pianta, 2005; Howes et al., 2008). Regardless, the change in behavior

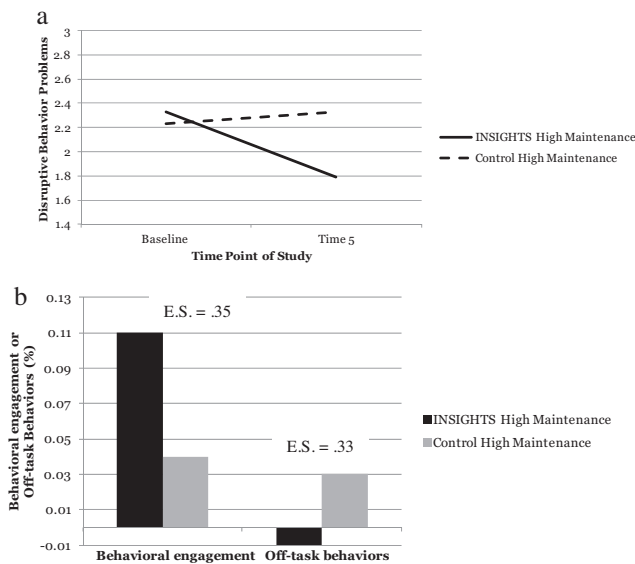


Fig. 2. (a) Effects of *INSIGHTS* on the Disruptive Behaviors of Low-income Children with High Maintenance Temperaments. Note: Time 5 refers to the end of first grade; models control for baseline levels of the outcomes, gender, age, race, and school, and cohort fixed effects. (b) Effects of *INSIGHTS* on the Behavioral Engagement and Off-Task Behaviors of Low-income Children with High Maintenance Temperaments. Note: Models control for baseline levels of the outcomes, gender, age, race, and school, and cohort fixed effects.

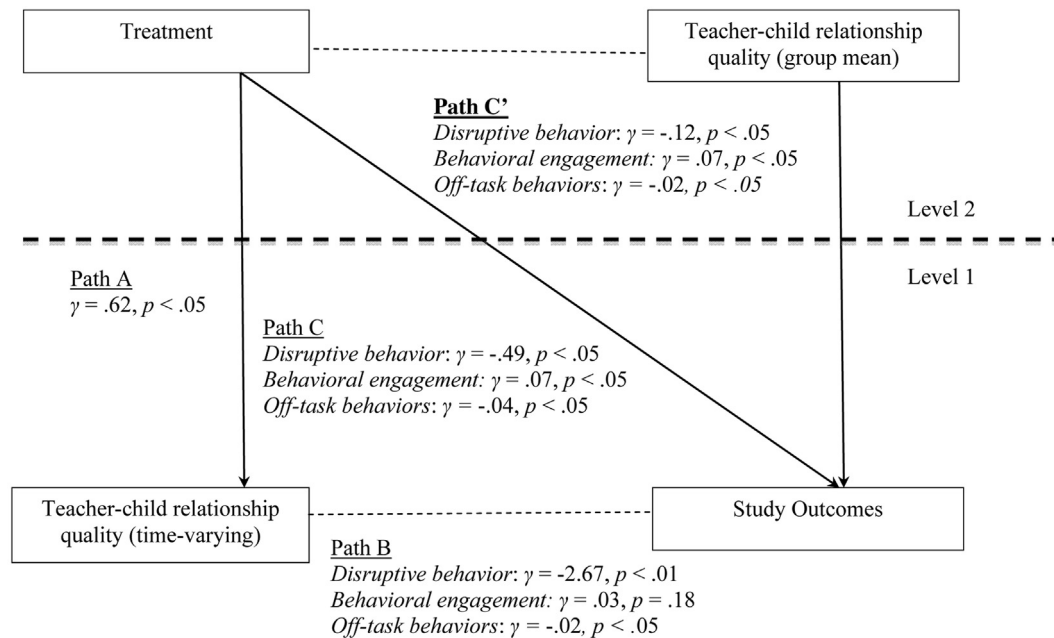


Fig. 3. Treatment Predicting Disruptive behaviors, Behavioral Engagement, and Off-Task Behaviors, Mediated by Teacher–child Relationship Quality, for Students with High Maintenance Temperaments. *Note:* Multi-level mediation is somewhat different than a typical Baron and Kenny (1986) mediation approach. The top part represents Level 2 and the bottom section is for Level 1. In this model, the C path represents the direct effect of Treatment on the Study Outcomes. Path B is the direct effect of the Time-varying teacher–child relationship predicting the time-varying outcomes. After establishing evidence for those paths, Path C' is the effect of Treatment on the time-varying study outcomes, adjusting for the group mean of the mediator (teacher–child relationship quality), which is a Level 2 variable.

is important. If disruptive behaviors and behavioral disengagement can be reversed in kindergarten and first grade, adaptive development across multiple domains is likely to occur (Dishion et al., 2014; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011).

The study results have other implications for the academic learning context. Teachers working in urban public schools report that managing disruptive behaviors is a source of job stress and a reason for leaving the profession (Reinke, Stormont, Herman, Puri, & Goel, 2011; Shernoff, Mehta, Atkins, Tork, & Spener, 2011). By reducing the disruptive behaviors of children with high-maintenance temperaments, teachers can create a classroom more conducive to learning (Cappella et al., 2012). This may be especially true in low-income elementary schools, which have higher levels of disruptive and inattentive behaviors, greater teacher stress, and fewer resources to address student need (Bierman et al., 2014).

By the end of first grade, children with high-maintenance temperaments enrolled in *INSIGHTS* also evidenced higher levels of behavioral engagement and lower levels of off-task behaviors relative to children in the attention-control condition. This is a compelling finding, given links between behavioral engagement in early schooling and positive academic development (Fredricks, Blumenfeld, & Paris, 2004; Greenwood, Horton, & Utley, 2002; Sabol & Pianta, 2012). Moreover, because children with high-maintenance temperaments are reactive and active in the classroom environment, they are likely to be highly visible to their peers and potentially influential in the classroom. Taken together with findings that *INSIGHTS* generally improves classroom behavioral engagement (Cappella et al., *in press*), it may be that the improved behavioral engagement of children with high-maintenance temperaments benefits the classroom as a whole.

Additionally, improvement in the quality of the teacher–child relationship was a critical mechanism through which *INSIGHTS* affected disruptive behaviors and off-task behaviors of children with high-maintenance temperaments. This finding supports the

theory that the intervention initially improves the goodness of fit between a child's temperament and the academic learning context. Yet, it is possible that other mechanisms (e.g., social difficulties, poor executive functioning, parent–child relationships) may also partially explain links between *INSIGHTS*, disruptive behaviors, and off-task behaviors.

Strengths, limitations, and future research

This study has a number of methodological strengths. First, the rigor of its design facilitates causal interpretations of study findings. Second, data were collected at five time points, thus providing power to detect overall intervention effects as well as effects on differential growth in outcomes. Third, high-maintenance temperament was measured pre-treatment, protecting against the concern that *INSIGHTS* affected parents' understanding of temperament and thus their ratings of their children. And fourth, multiple data collection methods – direct observation, teacher-report, and parent-report – protected against mono-method biases.

However, there are several limitations. First, although the sample represents a population prioritized for early intervention – low-income urban schools – the generalizability of the findings is limited. Next, because of limited power at Level 2 (student level), we operationalized treatment effects at Level 2 (student level). Similarly, there were relatively few high-maintenance students in the full study, potentially limiting power. The study is further limited by the attention-control participants receiving fewer services than the treatment condition, limiting comparability of the conditions. Fifth, both teacher–child relationship quality and disruptive behaviors were measured using a teacher-report, posing a risk for mono-method bias in the mediation analysis. In addition, the mediation results cannot be interpreted causally. Finally, it should also be noted that *INSIGHTS* participants, particularly parents, took part in the program at varying levels. A future analysis examining whether

effects of *INSIGHTS* differed by parent participation is in preparation.

Implications for policy and practice

SEL programs that support all children in regular classroom settings reduce the need for expensive individualized educational and mental health referral services. Better cost-effectiveness is particularly important in under-resourced schools like those in this study. Previous studies of *INSIGHTS* identifying program impacts on academic achievement, sustained attention, and parent reports of disruptive behaviors, have shown that a universal interven-

settings without extensive resources and still produce the same outcomes.

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Appendix A.

Appendix A *INSIGHTS Curriculum Overview*

Teacher & Parent Programs

The 3Rs: Recognize, Reframe, & Respond

- Recognize differences in children's reactions
- Reframe perspectives so that each reaction style has strengths and areas of concerns
- Differentiate caregiver responses that are optimal, adequate, and counter-productive.

The 2Ss: Scaffold and Stretch

- Scaffold a child when he/she encounters challenging situations
- If manageable with support, gently stretch the child so that he/she can better regulate emotional, attentional, and behavioral reactions.

The 2Cs: Gain Compliance and Competence

- Apply discipline strategies for non-compliant behavior
- Contract with individual children who have repetitive behavior problems
- Foster social competencies



Student Program

Enhance empathy skills

- With the help of puppets, understand that people have different temperaments that make some situations easy to handle while others are challenging.

Learn How to Resolve Dilemmas

- Work with puppets, facilitator, and teacher to learn self-regulation strategies by resolving hypothetical dilemmas using a stoplight (*red*: recognize dilemma; *yellow*: think and plan; *green*: try it out)

Resolve Real Dilemmas

- Apply the same problem-solving process and self-regulation strategies to dilemmas that the children experience in their daily lives.

tion can enhance the development of children with a variety of temperaments (O'Connor et al., 2012, 2014). The results from the current study revealed added behavioral benefits for children with high-maintenance temperaments who are at-risk for poor academic outcomes and disruptive disorders including attention deficit with hyperactivity disorder (Foley, McClowry, & Castellanos, 2008). Taken together, the findings support that universal intervention, coupled with targeted elements that acknowledge differences among children, may address outcomes that are relevant for all students (attention, achievement). In addition, such interventions can impact outcomes that may only be relevant to high-risk children (disruptive behaviors, off-task behaviors, behavioral engagement). As consistent with other efficacy studies, the facilitators in this study had graduate degrees and received intensive training and supervision. Thus, the next step for this work is to consider broader dissemination efforts and scale-up. Future studies can then test whether the intervention can be implemented with fidelity in

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