

Study 2

Getting a Good Start in School:
Differential Effects of *INSIGHTS* on the Behaviors and Engagement
of Children with Challenging Temperaments

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Abstract Body

Background. Not all children begin kindergarten ready to learn. Young children who exhibit dysregulated or disruptive behavior in the classroom have fewer opportunities to learn and consequently achieve lower levels of academic skills (Arnold et al., 2006; Raver, Garner, & Smith-Donald, 2007). A growing body of literature has examined how children's temperament is related to their academic skills and classroom behaviors. Students with high maintenance or challenging temperaments are low in task persistence, and high in negative reactivity and motor activity, and have higher levels of behavior problems and lower levels of academic engagement (McClowry et al, 2010). These negative associations may be pronounced among low-income, urban children (Herman, Trotter, Reinke, & Jalongo, 2011).

Teachers are often frustrated with students who have high maintenance temperaments. The combination of low task persistence, high negative reactivity and high motor activity results in the need for more teacher attention and can compromise teacher/student relationships (Rudasill & Rimm-Kaufman, 2009).

Given the long-term consequences of early problems with behaviors and academic engagement, interventions in early childhood that target the school readiness skills of students with high-maintenance temperaments are necessary. Few interventions, however, exist that focus on enhancing school-based behaviors among these children. Yet research indicates that increasing the 'goodness-of-fit' between students and the school environment can promote their development, and may link to future academic success (Rothbart & Bates). The properties of many classroom environments and expectations, however, are often not in accord with temperamentally challenging students' behavior styles, leading to less close, more conflictual teacher-child relationships (Hamre & Pianta, 2001). These lower quality relationships are in turn related to academic and behavioral difficulties (Pianta, 1999). Enhancing student-teacher relationship quality among children with high maintenance temperaments may thus be a critical conduit for the effects of SEL interventions for temperamentally difficult students.

Focus of Study. In this study we examined the efficacy of a temperament-based SEL intervention, *INSIGHTS into Children's Temperament (INSIGHTS)*, in supporting the behaviors and academic engagement of children in urban, low-income schools during kindergarten and first grade. We were particularly interested in differential effects of *INSIGHTS* for students with high maintenance temperament. In addition, we tested whether an improvement in student-teacher relationship quality mediated effects of *INSIGHTS* on the behaviors and academic engagement of students with high maintenance temperaments.

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. Eleven of the schools were randomly assigned to *INSIGHTS*; the remaining schools participated in a supplemental reading program which served as the attention control condition.

Study participants. The participants included $N = 435$ low-income students and their parents as well as $N = 122$ teachers from kindergarten and first grade classrooms. See Table 1 for demographic information about the sample.

Intervention. *INSIGHTS* is a social-emotional learning program (SEL) that provides teachers and caregivers with a framework for supporting the individual differences of children and teaches them strategies for behavior management that match a child's temperament. In addition, the kindergarten and early elementary age students participate in classroom curricula designed to: (a) enhance empathy for students with different temperaments, and (b) use problem-solving techniques to handle daily dilemmas (see McClowry et al., 2005; McClowry, Snow, Tamis-LeMonda, & Rodriguez, 2010). One of the primary goals of *INSIGHTS* is to improve the goodness-of-fit between children and their classroom environment. Parents and teachers learn strategies for behavior management that match a child's

particular temperament. See Figure 1 for more details about the *INSIGHTS* curricula.

Research Design. After baseline data were collected when students were in kindergarten, a random numbers table was used to randomize schools to *INSIGHTS* or an attention control condition. Schools were used as the unit of random assignment to limit possible contamination effects which could threaten the internal validity of the study. Eleven schools were randomized to *INSIGHTS*; the remaining eleven schools hosted the supplemental reading program. Half of the children were in *INSIGHTS* ($n = 225$); the remaining child participants ($N = 210$) were enrolled in the attention-control condition. Similarly, approximately half of teachers ($N = 57$) participated in *INSIGHTS*; the remaining teachers ($n = 65$) were enrolled in the attention-control condition. An initial examination testing differences between the schools that hosted *INSIGHTS* and those that were in the attention control group showed no statistically significant differences in demographic school-level characteristics. In the current study, the main variables of interest are a dummy variable for Treatment (1 = *INSIGHTS*, 0 = control), and a dummy variable, measured pretreatment, describing whether a child is considered to have a high maintenance temperament, or not (see below for more information).

Data Collection and Analysis. 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 at baseline in the winter of the kindergarten year prior to the 10 weeks of kindergarten intervention. Time 2 (T2) data were collected following intervention in the late spring of the kindergarten year. Time 3 (T3) data were collected in the fall of first grade prior to the 10 weeks of first grade intervention. Time 4 (T4) data were collected after the first grade intervention in the winter of the first grade year, followed by Time 5 (T5) data in late spring. See Figure 2 for a flow chart of recruitment and enrollment.

Measures collected at each time point are discussed in more detail below.

Child temperament. Three dimensions of child temperament (task persistence, motor activity, and negative reactivity) were measured with the parent-reported 38-item School-aged Temperament Inventory (SATI; McClowry, 2002; $\alpha = .77$ to $.87$). A high maintenance temperament is defined as a child who has high levels (greater than 1 SD above the mean) of negative reactivity, low levels of task persistence (less than 1 SD below the mean), and high levels of motor activity (greater than 1 SD above the mean) (McClowry, 2002; Lyons-Thomas & McClowry, 2012). Twelve percent of the study sample, were identified as high maintenance, which is similar in proportion to previous studies that have examined children with high maintenance temperaments (McClowry, 2002; O'Connor et al., 2011).

Child behavior problems. Behavior problems were measured with the 36-item Sutter-Eyberg Student Behavior Inventory (SESBI), the teacher version of the Eyberg Child Behavior Inventory (Eyberg & Pincus, 1999, $\alpha = .96$ across 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 *INSIGHTS* study. Classrooms were observed by a single data collector blind to intervention condition. Reliability procedures included: (a) a four-hour lab-based training, (b) three segments of video practice 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 Kappa coefficients ranged from 0.82 to 0.93 ($M = 0.86$; $SD = 0.04$). Momentary time sampling measured the presence or absence of active and passive engagement (which were mutually exclusive codes). Partial interval recording indicated the presence of off-task motor and verbal behaviors. The percentage of intervals students spent actively or passively engaged, as well as the percentage of intervals students spent in off-task motor or verbal behaviors, were calculated during two 15-minute observations and averaged across the two days. The averaged scores of active and passive engagement were summed for an overall rate of student engagement. The averaged scores for off-task motor and verbal behaviors (which were not mutually exclusive) were averaged for an overall

percentage.

Teacher–child relationship quality. The 15-item teacher-reported Student–Teacher Relationship Scale (STRS; Pianta, 1992, $\alpha = .94$ across time points) was used to assess teacher perceptions of the quality of the teacher–child relationship. Similar to Maldonado-Carreno and Votruba-Drzal (2011) and O’Connor and McCartney (2007), we chose to work with the Total Student–Teacher Relationship Score. We summed the mean of the conflict (reversed coded) and closeness subscales; scores thus ranged from 2 (lowest quality teacher–child relationship) to 10 (highest quality teacher–child relationship).

Background characteristics. Parents reported on a series of family and child-level demographic characteristics, including gender, age, race/ethnicity (Black, Hispanic, White, Other), and free lunch eligibility, used as baseline covariates in this study.

Analytic Approach

Missing data analysis. Missing values for continuous variables (< 20% of sample) were imputed (20 datasets) using a Markov chain Monte Carlo (MCMC) method in SAS PROC MI.

Growth curve modeling. Individual growth modeling was used to examine change over time in behavior problems, behavioral engagement, and off-task behaviors (Singer & Willett, 2003). Models were fitted with STATA 12, using a maximum likelihood estimator (Rabe-Hesketh & Skrondal, 2008). Time was measured using the assessment point and centered at Time 5. 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, which was subsequently included in all predictive analyses. Although examination of three and four level models did suggest some variation in outcomes attributed to contextual differences at the classroom and school level, these differences were not statistically significant and did not improve model fit. School fixed effects were added to increase the precision of the impact estimates.

Next, a conditional model (Model 1; see Table 3) was run in which the Level 2 independent variables for high maintenance temperament and treatment were entered into models predicting behavior problems, behavioral engagement, and off-task behaviors. In addition, (a) child female, (b) child Black, (c) child Hispanic, (d) baseline behavior problems, (e) baseline behavioral engagement, (f) baseline off-task behaviors, and (g) and cohort fixed effects were added as Level 2 time-invariant predictors to account for between-child variation in outcomes. We controlled for pre-intervention characteristics to increase the power of the randomized study design. Continuous predictors at Level 2 were centered around their grand mean. Categorical variables (female, child Black, child Hispanic) were not centered.

A final model (Model 2) was run in which cross-level interactions between time (Level 1), treatment (Level 2) and high maintenance temperament (Level 2) were added to Model 1. The main effects in this model highlight average effects of treatment and high maintenance temperament on outcomes, adjusting for student characteristics. The within-child interaction terms indicate differential growth in outcomes over time for students with high maintenance temperaments in the treatment group compared to students with high maintenance temperaments in the control condition. Effect sizes for statistically significant findings were calculated following procedures by Feingold (2009) for growth model analysis.

Using a mediation framework developed by Zhang et al. (2009), we then examined the mediating role of student-teacher relationships in explaining the effects of INSIGHTS on outcomes for students with high maintenance temperaments. Having already established the c path in the prior step, we then assessed the effects of treatment on the mediator (student-teacher relationship quality) (path a). In the final step, we assessed effects of treatment condition and the Level 2 group mean of the mediator (student-teacher relationship quality) on the outcomes, adjusting for student characteristics (paths b and c'). We examined whether the coefficient for any of the statistically significant interaction terms from Model 2 (INSIGHTS x high maintenance temperament x time) decreased with the addition of the group

mean for student-teacher relationship quality as a predictor. Such an observation would suggest partial mediation of student-teacher relationship quality of *INSIGHTS* on the outcomes (Zhang et al., 2009).

Findings / Results:

Descriptive Statistics. Means and standard deviations for continuous variables and percentages for dichotomous variables (by treatment/control) are presented in Table 2.

Time 1 intervention versus control condition. Independent samples t-tests showed no significant pre-treatment differences between children enrolled in *INSIGHTS* and the control group with respect to continuous variables used in analyses. No significant differences were detected between *INSIGHTS* and the control condition for the subgroup of students with high maintenance temperaments. Chi-square analyses, however, indicated that there were more Hispanic children enrolled in *INSIGHTS* compared to the control condition. There were no significant differences in the proportion of black children, gender, or free lunch eligibility.

Model 1. Main effect analyses (see Table 3) demonstrated that students in *INSIGHTS* showed slower growth in behavior problems than students in the control condition ($\gamma = -.16, p < .01, E.S. = .54$). However, there were no significant effects of *INSIGHTS* on behavioral engagement or off-task behaviors, for both the intercept and slope.

Model 2. Analyses specifically examining students with high maintenance temperaments (see Table 4) revealed a significant effect of *INSIGHTS* on reducing behavior problems ($\gamma = -.49, p = .04, E.S. = .42$), increasing behavioral engagement ($\gamma = 0.07, p = .01, E.S. = .35$), and reducing off-task behaviors ($\gamma = -.04, p = .04, E.S. = .33$). In addition, we found significant growth effects of *INSIGHTS* on reducing behavior problems ($\gamma = -.12, p = .04, E.S. = .58$) and off-task behaviors ($\gamma = -.02, p = .04, E.S. = .67$) for students with high maintenance temperaments.

Mediation analyses. As illustrated in Figure 3, mediation analyses suggested that effects of *INSIGHTS* in reducing behavior problems and off-task behaviors were partially mediated through improvements in student-teacher relationship quality. However, there was no evidence to suggest that effects of *INSIGHTS* on behavioral engagement were mediated through improvements in student-teacher relationship quality.

Conclusions:

Children with high maintenance temperaments are at risk for developing a number of negative outcomes including disruptive behavioral problems and attentional difficulties (Rudasill, Reio, Stipanovic, & Taylor, 2010). Interventions that can disrupt their trajectory for deleterious outcomes are needed. Our results indicate that a social-emotional learning program can support high-maintenance children during the critical kindergarten and first grade years in both reducing their behavior problems, as well as supporting their academic engagement. Mediation analyses indicate that teacher-child relationships are a critical mechanism through which such SEL programs promote positive classroom behaviors for these children. More specifically, results indicate that a universal intervention has the power to impact outcomes for children who are targeted due to behavioral risks. Future research is needed to determine whether universal SEL programs would work as targeted interventions or whether such a program would need to be a universal intervention in order to effect changes for children.

Appendix A. Reference

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Appendix B. Tables and Figures

Table 1
Demographic Characteristics about INSIGHTS Sample

Characteristic	Mean or Percentage	SD
Student age	5.38	0.61
Student male	0.52	-
Eligible for free/reduced lunch	0.87	-
Student Black, non-Hispanic	0.75	-
Student Hispanic	0.16	-
Student Biracial	0.09	-
Parent married	0.40	-
Parent education, less than HS diploma	0.28	-
Parent education, HS diploma	0.26	-
Parent education, some college	0.24	-
Parent education, college graduate	0.22	-
Teacher female	0.96	-
Teacher Black, non-Hispanic	0.61	-
Teacher Hispanic	0.10	-
Teacher White	0.23	-
Teacher Asian or biracial	0.06	-
Teacher education, master's degree	0.96	-

Table 2

Descriptive Statistics for Key Variables, by Treatment and Control

Variable	<u>Baseline (Pre-Test)</u>				<u>Time 5 (Final Post-Test)</u>			
	<u>Treatment</u>		<u>Control</u>		<u>Treatment</u>		<u>Control</u>	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Behavior problems	2.28	1.24	2.21	1.18	2.28	1.36	2.46	1.42
Behavioral engagement	0.68	0.20	0.70	0.20	0.73	0.20	0.71	0.24
Off-task behaviors	0.19	0.12	0.18	0.12	0.19	0.11	0.20	0.12
High maintenance temperament	0.09	-	0.10	-	-	-	-	-
Negative reactivity	2.86	0.85	2.88	0.90	-	-	-	-
Task persistence	3.81	0.75	3.78	0.82	-	-	-	-
Withdrawal	2.43	0.86	2.39	0.91	-	-	-	-
Activity	2.89	0.94	2.83	1.01	-	-	-	-
Child female	0.47	-	0.49	-	-	-	-	-
Child Black	0.77	-	0.75	-	-	-	-	-
Child Hispanic	0.20	-	0.15	-	-	-	-	-

Note: $N = 435$; Significant treatment/control differences in percentage of Hispanic children. Information on four dimensions of temperament are given to describe variation in these measures. Data on withdrawal were not used in predictive analyses.

Table 3

Model 1: Growth Models Predicting Behavior Problems, Behavioral Engagement, and Off-Task Behaviors from Treatment

Fixed effects	<u>Behavior problems</u>		<u>Behavioral engagement</u>		<u>Off-task behaviors</u>	
	γ	SE	γ	SE	γ	SE
<u>Between-student variables</u>						
Treatment	-0.16	0.62	0.06	0.09	0.04	0.05
High maintenance temperament	-0.09	0.13	0.03	0.02	-0.02 †	0.01
Behavior problems at baseline	0.58 **	0.03	-0.01 **	0.01	0.01 **	0.01
Behavioral engagement at baseline	-0.24	0.17	0.25 **	0.03	-0.04 **	0.01
Off-task behaviors at baseline	0.93 **	0.28	-0.11 **	0.04	0.23 **	0.02
Female	-0.12 *	0.06	0.02 *	0.01	-0.01 †	0.01
Black	-0.01	0.08	0.01	0.01	0.02 **	0.01
Hispanic	-0.16 †	0.09	0.01	0.01	-0.01	0.01
<u>Within-student variables</u>						
Time	0.08 **	0.02	0.02 **	0.01	0.01 *	0.01
Treatment x time	-0.16 **	0.03	-0.01	0.01	-0.01	0.01
<u>Random effects</u>						
Student-level variance	0.200 **	0.020	0.013 **	0.001	0.003 **	0.001
Time variance	0.010	0.010	0.001	0.001	0.001	0.001
Residual variance	0.760 **	0.030	0.036 **	0.001	0.020	0.001

** $p < .01$; * $p < .05$; † $p < .10$

Note: N = 435; Models adjust for school fixed effects and cohort fixed effects.

Table 4

Model 2: Growth Models Predicting Behavior Problems, Behavioral Engagement, and Off-Task Behaviors from Treatment and High Maintenance Status

Fixed effects	<u>Behavior problems</u>		<u>Behavioral engagement</u>		<u>Off-task behaviors</u>	
	γ	SE	γ	SE	γ	SE
<u>Between-student variables</u>						
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
Tx x high maintenance temperament	-0.49 *	0.21	0.07 *	0.03	-0.04 *	0.02
Behavior problems at baseline	0.60 **	0.03	-0.01 **	0.01	0.01 **	0.01
Behavioral engagement at baseline	-0.26	0.17	0.25 **	0.02	-0.04 **	0.01
Off-task behaviors at baseline	0.05 **	0.28	-0.11 **	0.04	0.23 **	0.02
Female	-0.15 *	0.06	0.02 *	0.01	-0.01 †	0.01
Black	0.01	0.09	-0.01	0.01	0.02 **	0.01
Hispanic	-0.15 †	0.09	0.01	0.01	-0.01	0.01
<u>Within-student variables</u>						
Time	0.08 **	0.02	0.02 **	0.01	0.01 *	0.01
Tx x time	-0.09 **	0.03	-0.01	0.01	-0.01	0.01
Tx x time x high maintenance temperament	-0.12 *	0.06	0.02	0.01	-0.02 **	0.01
<u>Random effects</u>						
Student-level variance	0.200 **	0.020	0.013 **	0.001	0.003 **	0.001
Time variance	0.010	0.010	0.001	0.001	0.001	0.001
Residual variance	0.760 **	0.030	0.036 **	0.001	0.020	0.001

** $p < .01$; * $p < .05$; † $p < .10$

Note: N = 435; Models adjust for school fixed effects and cohort fixed effects.

Figure 1

INSIGHTS Curriculum Overview

<p>Teachers' and Parents' Content</p>	<p>Children in the Classrooms</p>
<p>The 3Rs: Recognize, Reframe, and Respond</p> <ul style="list-style-type: none"> • Recognize differences in children's temperaments; • Reframe their perspectives so that each temperament has strengths and conversely areas of concerns; • Differentiate caregiver responses that are optimal, adequate, and counter-productive. 	<p>Enhance Empathy Skills</p> <p>With the help of puppets, understand that people have different temperaments which make some situations easy to handle while others are challenging.</p>
<p>The 2Ss: Scaffold and Stretch</p> <ul style="list-style-type: none"> • Scaffold a child when he/she encounters a temperament-challenging situations; • If manageable with support, gently stretch the child so that he/she can better regulate emotional, attentional, and behavioral reactions. 	<p>Learn How to Resolve Dilemmas</p> <p>Work with puppets, facilitator, and teacher to learn self-regulation strategies by resolving hypothetical dilemmas using a stoplight (<i>red</i>: recognize dilemma; <i>yellow</i>: think and plan; <i>green</i>: try it out)</p>
<p>The 2Cs: Gain Compliance and Competence</p> <ul style="list-style-type: none"> • Apply disciplining strategies for non-compliant behavior; • Contract with individual children who have repetitive behavior problems; and • Foster social competencies. 	<p>Resolve Real Dilemmas</p> <p>Apply the same problem-solving process and self-regulation strategies to dilemmas that the children experience in their daily lives.</p>

Figure 2

INSIGHTS School-Randomized Trial Classroom-Level Participant Flow Chart

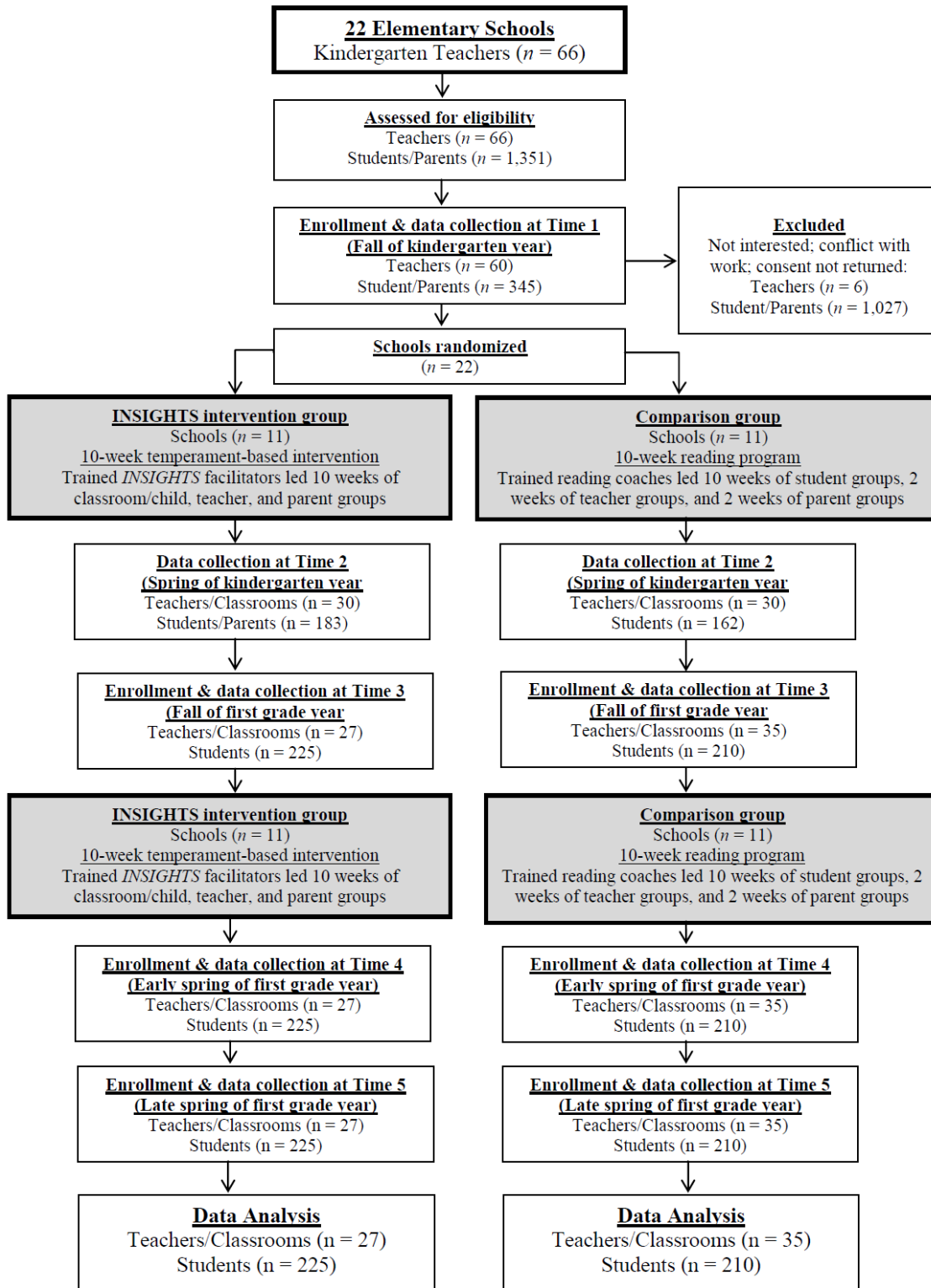


Figure 3
Treatment Predicting Behavior Problems, Behavioral Engagement, and Off-Task Behaviors, Mediated by Student-Teacher Relationship Quality, for Students with High Maintenance Temperaments

