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Title:
The *How* and *For Whom* of Program Effectiveness: Dissecting the *Responsive Classroom*® Approach in Relation to Academic Achievement

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Abstract Body

Background / Context:

Current legislation such as No Child Left Behind emphasizes the use of evidence-based practices to raise achievement scores and close the achievement gap. As such, establishing the effectiveness of school-based interventions to enhance academic achievement is essential to support their integration in classrooms. The *Responsive Classroom*® Efficacy Study, a randomized controlled trial of the *Responsive Classroom* (*RC*) approach, provides a first step in understanding the effectiveness of *RC*. Preliminary results, reported elsewhere, show no main effects of *RC* on academic achievement, but do show effects on teachers' mathematics instructional quality (Ottmar, Rimm-Kaufman, & Berry, 2011). Additional findings suggest that teachers' fidelity of implementation of *RC* practices is associated with improved teacher-student interaction quality and student achievement (Abry, Rimm-Kaufman, Larsen, Brewer, 2011a, 2011b). Such results point to the importance of a second step—to extract key ingredients from the intervention and examine *how* and *for whom* the practices work, with the ultimate goal of improving upon the existing intervention. In this study, we examine teachers' use of several components of the *RC* approach and their relation to students' academic achievement. We then test the extent to which student characteristics moderate these associations.

Ample research from the past three decades establishes the ways in which teachers' practices are linked to student achievement (Brophy & Good, 1986; Pianta, Hamre, & Stuhlman, 2003). Such practices include the extent to which teachers create a socially and emotionally supportive climate, establish structures that help prevent misbehavior and promote productivity, and provide students with developmentally appropriate opportunities to exercise autonomy and choice. *RC* practices offer teachers a structured approach to interacting with students that span these social, organizational, and instructional domains. We offer several illustrations below.

Morning Meeting is an *RC* practice designed to foster classroom community. Close relationships between teachers and children are associated with better academic achievement in early grades (Birch & Ladd, 1997). In middle grades, relationships translate into greater academic effort on behalf of students (Wentzel, 1997), which may ultimately lead to achievement gains (Klem & Connell, 2004). Furthermore, an emotionally supportive classroom may be most salient for children with low achievement or from low socioeconomic backgrounds (Brophy & Everston, 1976; Hamre & Pianta, 2005).

The *RC* practices of Rule Creation, Interactive Modeling, and Guided Discovery provide a structured approach to classroom organization and management. Effective management – including proactive discipline strategies that prevent misbehavior and maximize learning time (Brophy, 1983) – facilitates students' ability to capitalize on learning opportunities by supporting self-control and behavioral engagement (Rimm-Kaufman, Curby, Grimm, Nathanson, & Brock, 2009). In turn, students in well-structured classrooms show greater achievement gains compared to students in classrooms with higher levels of chaos, and boys may be especially likely to benefit from a calmer climate (Ponitz, Rimm-Kaufman, Brock, & Nathanson, 2009).

The *RC* practice of Academic Choice offers students opportunities to plan, execute, and reflect on academic work of their own choosing. Teachers can support student autonomy in varied ways, including how to organize their work, the content and product of their work, or opportunities for problem-solving and self-reflection (Stefanou, Perencevich, DiCintio, & Turner, 2004), all of which are embedded in the Academic Choice practice. Extant research supports the relation between autonomy supportive practices and students' self-regulation and

intrinsic motivation (Perry, 1998). However, less work has examined autonomy supportive practices in relation to academic achievement.

Purpose / Objective / Research Question / Focus of Study:

In the context of an experimental trial, we examined variability in treatment and control teachers' use of several *RC* practices to predict students' 4th grade academic achievement. Further, we examined the extent to which use of the *RC* practices is differentially important for subgroups of students. We conducted analyses corresponding to two research questions. First, what is the relative contribution of practice-specific indices of teachers' use of *RC* practices on 4th grade students' mathematics and reading achievement? Second, to what extent are these associations moderated by student characteristics including initial achievement and gender?

Setting:

Twenty-four demographically diverse schools in a mid-Atlantic school district were randomly assigned to treatment or wait-list control conditions after stratifying on percentage of students eligible for free/reduced lunch and minority student composition. Randomization resulted in 13 schools assigned to the experimental group and 11 to the control group. Proportion of students eligible for free /reduced lunch ranged from 2% to 72% (M = 26%) and minority student composition ranged from 17% to 86% (M = 55%). T-tests showed no difference between treatment and control schools on these variables.

Population / Participants / Subjects:

The teacher sample included 92 4th grade teachers from the 24 schools, representing a 96% response rate across treatment and control groups. Table 1 provides teacher demographic characteristics according to group assignment. Comparison tests revealed no significant differences between the teacher groups on the tabled characteristics with the exception of race.

The student sample included 1,606 4th grade students, including all students eligible for plain English state standards testing. Student demographic characteristics by group are provided in Table 2. Comparison tests revealed significantly more females in the treatment group.

Intervention / Program / Practice:

The *RC* approach is a school-based intervention designed to create classroom conditions optimal for students' social and academic development. Education research and theory have informed the development of seven guiding principles emphasizing the importance of social development, understanding students as individuals, and school-family relationships (NEFC, 2007). Ten practices emanate from the guiding principles and together provide the framework for the *RC* approach. We refer readers to www.responsiveclassroom.org for more information.

Fourth grade teachers in the experimental group attended one-week training institutes during two consecutive summers in 2008 and 2009. In addition, treatment teachers received coaching sessions with *RC* personnel throughout each of the 2008-09 and 2009-10 school years. Counterparts in the control group received no exposure to *RC* training or coaching support and continued "business as usual."

Research Design:

We examined data collected during the second year of the three-year *RC* efficacy study. In the context of this field experiment, there was variability in teachers' use of *RC* practices in

both treatment and control groups. Variability in implementation among treatment participants is common (Durlak & Dupre, 2008), whereas for control teachers use of *RC* practices may have been due to contamination or because many *RC* practices resemble teaching "best practices." We capitalized on this variability in both groups and examined it in relation to students' mathematics and reading achievement. We then tested the extent to which these associations differ according to student characteristics. Findings provide insight into *how* and *for whom RC* contributes to test score gains. However, because teachers were not randomly assigned to their level of use of *RC* practices, this design does not support causal inferences regarding these associations.

Data Collection and Analysis:

Data were collected from achievement tests, classroom observations, teacher surveys, and district records. The Stanford 10 Achievement Test in mathematics, administered in the spring of 2008 (at the end of students' 2nd grade year), served as a baseline measure of achievement. Virginia state standards of learning tests in mathematics and reading were collected in the spring of 2010 (at the end of students' 4th grade year) and served as the dependent variables. Model controls were drawn from district records acquired during the 2010 school year.

We collected data on teachers' use of *RC* practices from three sources during the 2009-10 school year. Teachers were observed on five separate 60 minute occasions using the *Classroom Practices Observation Measure* (Abry, Brewer, Nathanson, Sawyer, & Rimm-Kaufman, 2010; [CPOM]). The CPOM is an observational measure of teachers' use of *RC* practices ($\alpha = .89$) rated on a three-point likert scale. The *Classroom Practices Teacher Survey* (Nathanson, Sawyer, & Rimm-Kaufman, 2007a; [CPTS]) is a 46-item teacher-reported assessment of the use of *RC* practices ($\alpha = .93$). Teachers reflect on the year and report the extent to which each item was characteristic of their classroom on a one to five likert scale. A second teacher-reported measure, administered concurrently with the CPTS, is the *Classroom Practices Frequency Survey* (Nathanson, Sawyer, & Rimm-Kaufman, 2007b; [CPFS]). The CPFS ($\alpha = .89$) is an 11-item survey in which teachers reflect over the year and report on a one to eight likert scale the frequency with which they conducted each practice described.

The Independent variables of interest, referred to here as practice composites, were factor scores of teachers' use of different *RC* practices. Factor scores were derived using a three-tier confirmatory factor analytic approach. Practice-specific items from the three implementation measures described above served as indicators for three latent measure-specific factors. These three latent factors were then loaded on a higher-order factor that spanned across the three implementation measures but was still specific to a particular *RC* practice. The factor scores for the higher-order factor represent each teacher's use of the *RC* practice relative to the rest of the sample. Ultimately, we applied this approach to three separate models, and thus retained three sets of factor scores representing teachers' use of Morning Meeting (CFI = .96, TLI = .95, RMSEA = .10, SRMR = .06), Academic Choice (CFI = .95, TLI = .92, RMSEA = .09, SRMR = .06), and a conglomerate of Rule Creation, Interactive Modeling, and Guided Discovery, which we refer to as Proactive Approaches to Rules and Materials (CFI = .92, TLI = .90, RMSEA = .08, SRMR = .07). See Figure 1 for a graphic depiction of the approach.

Two-level models nesting students in classrooms were conducted in *Mplus* (Muthén & Muthén, 1998-2009) to test each research question. All models controlled for children's baseline mathematics achievement, gender, free/reduced lunch status, English language learner status, and special education/disability status at the child level. Teacher-level controls included years of teaching experience and treatment assignment. Main effects for the practice composites on

achievement were tested by simultaneously entering each practice composite into the model along with model controls. Interactions between the practice composites and child characteristics were then tested separately while controlling for the practice composites not in the interaction term. Within interaction terms, practice composites were grand-mean centered and initial achievement was group-mean centered to reduce multicollinearity and remove level-two variance. Continuous covariates were grand-mean centered to assist with interpretation. Missing data was handled using Full Information Maximum Likelihood.

Findings / Results:

Academic Choice emerged as a significant predictor of students' 4th grade mathematics achievement ($b = 8.32$, $p = .04$). Further, there was a significant interaction between Academic Choice and children's initial achievement ($b = -.14$, $p = .03$), such that the relation between Academic Choice and 4th grade mathematics achievement was stronger for students with lower initial mathematics achievement (Figure 2). The association between Academic Choice and mathematics achievement did not differ according to students' gender.

No significant main effects or interactions emerged when testing the practice composites in relation to 4th grade reading achievement.

Conclusions:

Two findings of interest emerged in the present study. First, our results indicated that allowing students opportunities to plan, execute, and reflect on work of their own choosing (i.e., Academic Choice) was associated with higher standardized test scores in mathematics. This finding is in accordance with the limited body of work examining the relation between autonomy supportive interventions and academic performance in elementary classrooms (DeCharms, 1976; Wang & Stiles, 1976). An explanation for this link may be rooted in self-determination theory, which, in the context of the classroom, focuses on students' perceived control over task selection (Stipek & Weisz, 1981). Autonomy supportive practices and students' interests have been linked to their perceived value and liking of academic lessons (Tsai, Kunter, Ludtke, Trautwein, & Ryan, 2008). Such task value may lead to achievement gains as engagement, persistence, and conceptual learning increase (Vansteenkiste, Lens, & Deci, 2006).

Second, the association between Academic Choice and mathematics scores was stronger for students with lower initial achievement. One possible explanation for this is that lower achieving students receive more individualized attention and equal access to the teacher and other resources in classrooms characterized by high task differentiation, high student autonomy, and varied grouping patterns (Bossert, 1979; Rosenholtz & Simpson, 1984), characteristics consistent with the practice of Academic Choice. Whereas in less differentiated contexts, such resources may be dominated by higher achieving students (Bidwell & Kasarda, 1980). Furthermore, less differentiated classrooms may promote ability stratification, positively reinforcing higher achieving students but negatively reinforcing lower achieving students. As such, classrooms higher in task differentiation may be more likely to provide reinforcement independent of students' achievement histories (Bidwell & Kasarda, 1980).

Together these findings point to the importance of Academic Choice relative to teachers' use of other *RC* practices in predicting mathematics achievement, and can serve to inform further development of the *RC* approach as well as other classroom interventions. Recommendations for future work include examination of potential mediators, including self-efficacy and engagement, and experimental manipulation of Academic Choice to assess the causal impact of the practice.

Appendices

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Appendix A. References

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Appendix B. Tables and Figures

Table 1
Teacher Demographics

Demographic characteristic	Treatment (n = 51)			Control (n = 41)		
	%	*M*	*SD*	%	*M*	*SD*
Female	86			96		
Age		40	12		40	13
Caucasian	79			93		
Years teaching experience		10	8		13	11
Has masters degree	72			71		

Table 2
Child Demographics

Demographic characteristic	Treatment (n = 805)			Control (n = 801)		
	%	*M*	*SD*	%	*M*	*SD*
Female	55			48		
Age		10	0.38		10	.38
Caucasian	44			48		
Child is free/reduced lunch eligible	30			25		
Child has ELL status	34			35		
Child has special education/disability status	9			10		

Figure 1. Brief description of the ten practices affiliated with the *RC* approach.

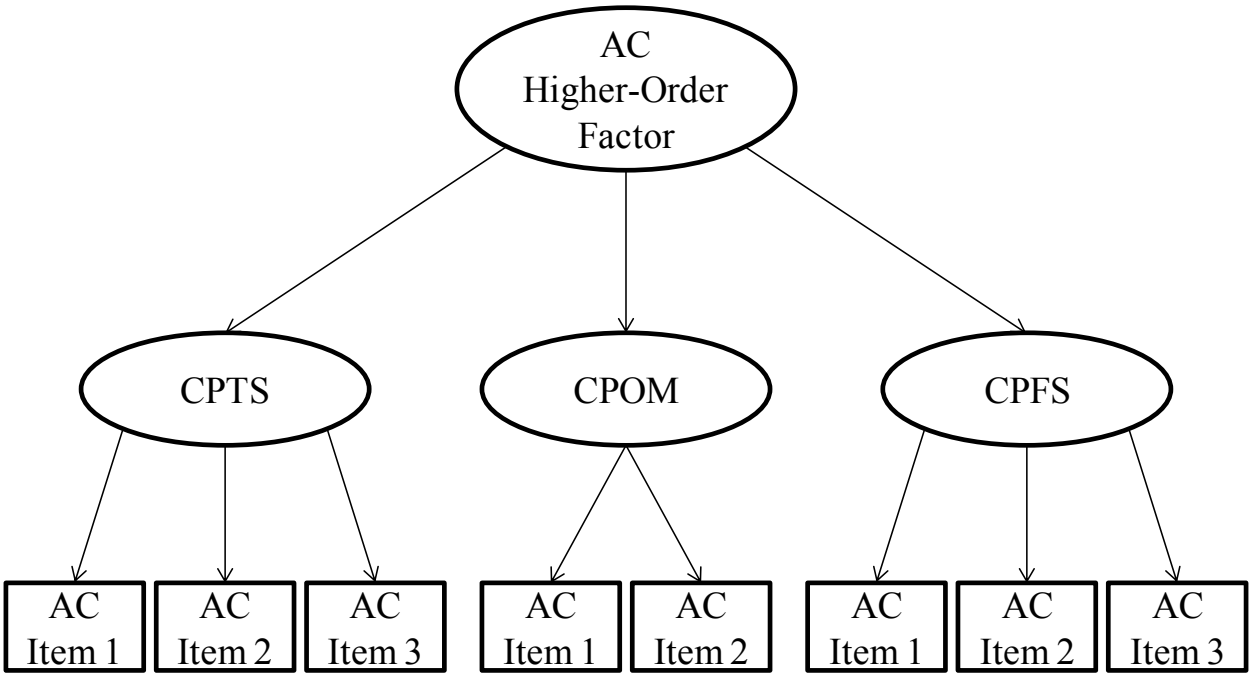

Figure 1. An example of the three-tier factor analytic approach to the creation of *RC* practice-specific factor scores spanning across three measures of implementation.
Note: AC = Academic Choice

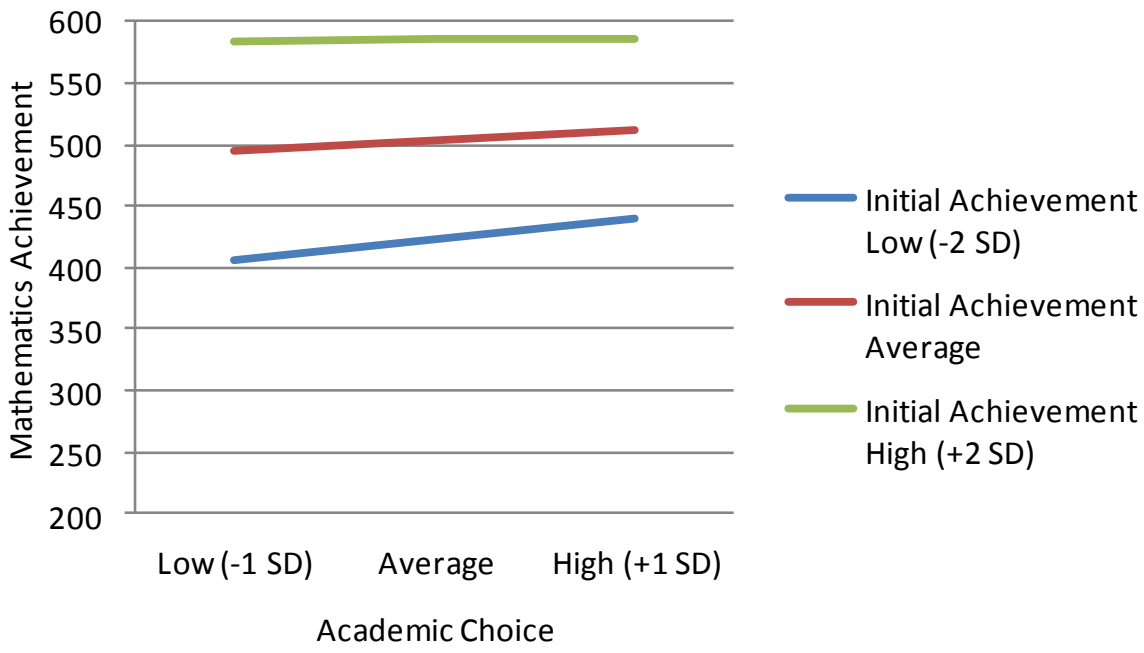

Figure 2. Interaction between teachers' use of Academic Choice and children's initial achievement.