

**Abstract Title Page**  
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**Title:** Adolescent Literacy on the Margin: Regression-Discontinuity Evidence from a “Double Dose” Middle Grades Literacy Intervention

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## **Abstract Body**

*Limit 4 pages single-spaced.*

### **Background / Context:**

*Description of prior research and its intellectual context.*

Students who do not develop adequate literacy skills by the end of elementary school are at higher risk of dropping out of school and face inferior labor-market options (National Governor's Association, 2005; Vignoles, De Coulon, & Marcenaro-Gutierrez, 2011). Though fourth graders' reading scores on the National Assessment of Educational Progress have been trending higher, Snow and Moje (2010) point out that score trends are flat among 8<sup>th</sup> and 12<sup>th</sup> graders, (Lee, Grigg, & Donohue, 2007, p.3). These trends underscore the need for literacy support at the critical transition between elementary and secondary schooling (Chall & Jacobs, 2003).

One widely-used though under-evaluated method for improving student outcomes is through providing a "double dose" of instruction in subject areas tested for the purposes of NCLB, most notably, reading and mathematics. Recent evidence from Chicago suggests that these double-dose strategies with algebra instruction can have positive short-term impacts on student's academic performance, as well as positive longer-run impacts on high-school graduation and post-secondary enrollment. (Nomi & Allensworth, 2009; Cortes, Goodman, & Nomi, 2012). However, little is known about the effectiveness of the double dose strategy for boosting literacy outcomes despite evidence that double-dose strategies have been and are used throughout the country (Cavanagh, 2006; Mazzolini & Morley, 2006; Paglin, 2003; Wanzek & Vaughn, 2008; Durham Public Schools, n.d). The paucity of good evidence on the effectiveness of literacy interventions at the crucial transition from elementary to middle grades is particularly notable in that the little evidence that exists is not causal.

### **Purpose / Objective / Research Question / Focus of Study:**

*Description of the focus of the research.*

In this paper provide causal evidence to answer the question, does the application of a double dose of literacy instruction in middle school improve student performance on subsequent academic outcomes. I focus on an intervention where the second dose of literacy instruction uses research-based instructional strategies, and I show that this instruction leads to systematic improvement in adolescent reading comprehension. I also consider how differences in the fidelity of implementation of this policy may impact the effects of the intervention both at the school-level and in aggregate.

This district-designed literacy intervention used 5<sup>th</sup>-grade scores on the Iowa Test of Basic Skills to determine student eligibility for a double dose of literacy instruction in middle school. Students who scored at the 60<sup>th</sup> percentile or lower on the ITBS reading test were assigned, by rule, to be eligible for this literacy program. Using a regression-discontinuity design I found in early work that there was a positive aggregate effect of the policy for students who were just eligible for the intervention compared to those who were not.

### **Setting:**

*Description of the research location.*

My study is situated in a large (roughly 90,000 students Pre-K through grade 12) suburban school district in the southeastern United States. The district is comprised of schools classified as traditional, charter, converted charter, and alternative schools. Both traditional and conversion charter schools are subject to district policies while alternative and other charters are exempt. I restrict my analysis to students who go through one of the 20 traditional or conversion charter middle schools that serve HCPS students in grades 6 through 8. My sample includes all students from the seven cohorts who took the 5<sup>th</sup> grade ITBS reading test in the school years 2002-2003 through 2008-2009. The students I retain in my sample are representative of the students in both the traditional and conversion charter schools.

**Population / Participants / Subjects:**

*Description of the participants in the study: who, how many, key features, or characteristics.*

HCPS resembles the changing demographic structure of many suburban settings, with substantial racial and socioeconomic variation. The student population is 43% white, 36% African American, 10% Latino/a, 8% Asian, and 3% other race. Forty-three percent of students receive free- or reduced-price lunch, 8% are English-Language Learners, and 18% have an Individualized Education Program. My analytic sample of roughly 7,000 students is drawn from a larger pool of over 30,000 students giving me statistical power to estimate modest effect sizes.

**Intervention / Program / Practice:**

*Description of the intervention, program, or practice, including details of administration and duration.*

Students in HCPS were assigned to receive supplementary reading instruction in middle school based on how they scored on the Iowa Test of Basic Skills (ITBS) in reading during their 5<sup>th</sup> grade year. Students who scored below the nationally-defined 60<sup>th</sup> percentile on ITBS in reading were assigned, by rule, to complete the supplementary reading program in middle school. The HCPS policy was designed to enroll students in the supplementary reading course for all three (grades 6,7, and 8) years of middle school, with the goal of preparing students to meet proficiency requirements on the criterion-referenced 8<sup>th</sup> grade state test in reading (used in making decisions about grade promotion), and on the norm-referenced 8<sup>th</sup> grade administration of the ITBS in reading.

The theory of change employed by HCPS is that enrolling students who have demonstrated a need for additional literacy support in a course that was designed to employ research-proven strategies is likely to improve literacy outcomes for those students. Specifically, this district drew on research from Dole, Duffy, Roehler, and Pearson (1991), and designed the supplementary reading class to explicitly dwell on seven “basic” reading strategies: activating background knowledge, questioning the text, drawing inferences, determining importance, creating mental images, repairing understanding when meaning breaks down, and synthesizing information. In addition, the district also encouraged the use of writing activities to support each of these seven reading strategies.

Though the research from Dole and colleagues is more than twenty years old, more recent research continues to substantiate the use of these strategies, particularly with adolescents. A meta-analysis on the effectiveness of reading interventions for struggling readers in grades six through twelve revealed that many of the same strategies suggested by Dole and colleagues were used across the thirteen studies that could be included in that meta-analysis (Edmonds, Vaughn,

Wexler, Reutebuch, Cable, Klinger Tackett, Schnakenberg, 2009). This meta-analysis found a large effect size of 0.89 SD for reading comprehension outcomes. Evidence from another recent meta-analysis on writing to read, further supports the strategies employed by HCPS. Graham & Hebert (2012) found that writing to read strategies improve student reading comprehension by about 0.37 SD. In yet another teacher-delivered intervention, Vaughn, Klingner, Swanson, Boardman, Roberts, Mohammed, & Stillman-Spisak (2011) performed an experimental evaluation of collaborative strategic reading (CSR) with middle school students, where English-language arts teachers provided a multicomponent reading comprehension instruction twice a week for 18 weeks, and found modest positive effects on reading comprehension. All of this more recent evidence suggests that the research used to design the supplementary reading class continues to be valid and relevant.

### **Research Design:**

*Description of the research design.*

In the district, student assignment to the supplemental reading class was made using a cutoff rule based on a student's 5<sup>th</sup> grade test score, allowing me to use a regression-discontinuity approach to obtain an unbiased estimate of the causal impact of the intervention on student outcomes. The student's position relative to this cutoff provided an indicator of intent-to-treat, which I used to instrument for their "take-up" of the supplementary reading intervention. Thus, I was able to identify the causal impact of enrollment in the program for students near, but on opposite sides of the cutoff. I employ a two-stage least squares approach where a student's 5<sup>th</sup>-grade ITBS reading score and a dichotomous indicator of receiving an offer of supplementary predict the exogenous portion of enrollment in the intervention. I then use the fitted probabilities of enrolling from the first-stage to predict the impact of enrollment on later outcomes.

### **Data Collection and Analysis:**

*Description of the methods for collecting and analyzing data.*

My data are drawn from a comprehensive administrative data set covering all students enrolled in the district during the school years of 1999-2000 through 2009-2010. This dataset contains test scores and enrollment data for students in middle school and follows them longitudinally within the district into high school. The data include course enrollment data, mandated state accountability test scores in reading, literature and mathematics, ITBS scores from grades five and eight, high school end-of-course examinations, and SAT scores.

### **Findings / Results:**

*Description of the main findings with specific details.*

I find that there was a positive and statistically significant improvement in student reading state test scores in 6<sup>th</sup> grade, for students in the immediate vicinity of the cut-off, with smaller effects in 7<sup>th</sup> grade, and complete fade out of the effect by 8<sup>th</sup> grade. In addition, I find that the intervention had a small positive impact on student percentile rank on the Iowa Test of Basic Skills in grade 8, indicating that the measured learning gains suggest real learning and not an artifact of potential teaching to the test (see Figure A1).

## **Conclusions:**

*Description of conclusions, recommendations, and limitations based on findings.*

My findings suggest that a research-based supplementary reading course in middle school can, on average, boost short-term measures of student's reading comprehension. These findings are particularly impressive in that they were achieved by deploying this "double dose" strategy across twenty individual middle schools, and taught by more than twenty individual teachers. These aggregate effects can, however, mask the potential for heterogeneity in the delivery of this intervention. In particular, the ability to provide a strong evaluation under this policy design may suggest that adopting assignment rules when deciding who to assign to support courses could be fruitful in other school districts (Schlotter, Schwerdt, & Woessmann, 2011). Such rules allow for the estimation of causal estimates and can reduce the continuation of ineffective program, and help districts develop or switch to interventions that have been proven to be effective.

These benefits are not without several potential pitfalls. Districts and researchers must responsibly examine the potential for mixed effects across individual school settings, to ensure both the proper fidelity of implementation, as well as to examine potentially differential degrees of success with the policy. In addition, changing the threshold used to make assignment to supplementary courses can allow for the examination of the effectiveness of the program at different margins, but no assumption should be made that all margins will be similarly impacted. Cutoff scores must be chosen, and interventions designed, in such a way as to be consistent with the needs of the population it is intended to impact. In HCPS, all students scoring below the 60<sup>th</sup> percentile were eligible for supplementary reading however, this evaluation only addresses the impact of those who were eligible but near the cutoff. Other means of evaluation, and perhaps interventions tailored to learners who scored in lower percentiles, is necessary if we are to achieve equitable outcomes in education. It bears further note that simply because a program is successful on one margin, it need not necessarily maintain its impact when extended to students on other margins and of different abilities.

Further research into "double dose" literacy interventions like the one in HCPS is warranted. This research should have the goal of collecting data on additional cohorts of students, and following those already represented in the data over longer time periods so that we may learn whether there are longer-term impacts of the supplementary reading course; such as on SAT scores, high school graduation, or decisions to apply to or attend college. Establishing the effectiveness of similar supplementary coursework should be pursued in other research contexts as well, since our ultimate concern is with long-term outcomes that we believe are associated with measures of adolescent literacy.

## Appendices

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### Appendix A. References

*References are to be in APA version 6 format.*

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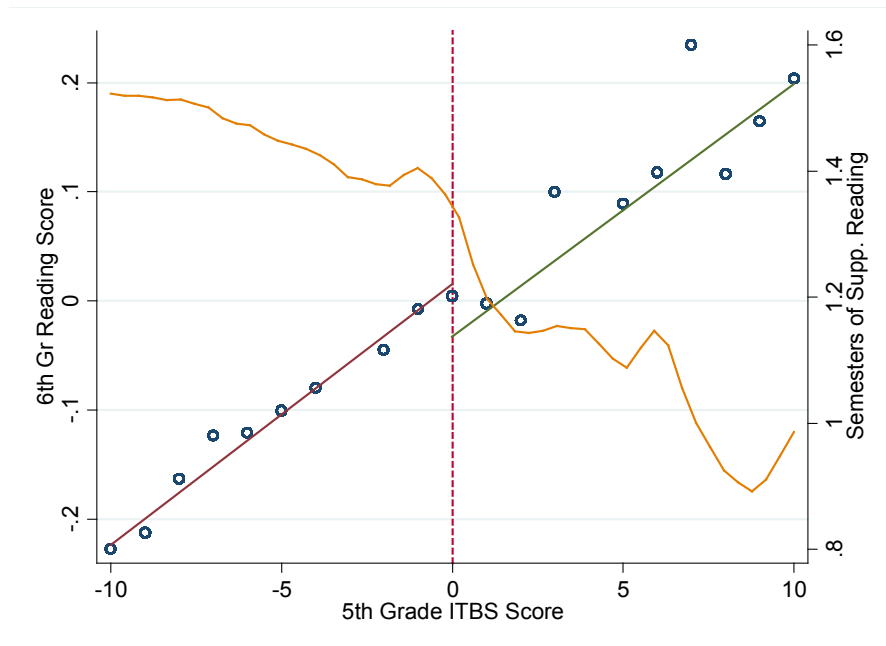
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## Appendix B. Tables and Figures

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Figure 3: Fitted effects of an additional semester of treatment on 6<sup>th</sup>-grade reading and 8<sup>th</sup>-grade ITBS percentile overlaid on evidence of discontinuity in exposure to treatment.

Panel A: 6<sup>th</sup>-grade Reading



Panel B: 8<sup>th</sup>-grade ITBS Percentile

