

## **Abstract Title Page**

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**Title:** The Impact of School Improvement Grants on Practices and Student Outcomes:  
Findings from a National Evaluation Using a Regression Discontinuity Design

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## **Abstract Body**

*Limit 1,000 words*

### **Background / Context:**

*Prior research and its intellectual context.*

The School Improvement Grants (SIG) program received over \$3 billion through the American Recovery and Reinvestment Act of 2009. Through grants to states, SIG focused on turning around the nation's persistently lowest-achieving schools using one of four school intervention models, with the aim of substantially improving student achievement. Prior research on SIG has documented the implementation of SIG and assessed the effectiveness of the program. However, rigorous evidence of the program's impact on student outcomes has been limited to a few studies that focus on individual states or cities (Dee 2012, Gold et al. 2012, LiCalsi et al. 2015). Thus, previous studies do not provide rigorous, large-scale evidence on whether SIG improved student outcomes.

### **Purpose / Objective / Research Question:**

*Description of the focus of the research.*

Did receipt of SIG funding to implement a school intervention model have an impact on the number of SIG-promoted practices used by low-performing schools and student outcomes? Consistent with the conference theme, we answered this question using a novel research design—a regression discontinuity design (RDD)—and a large sample of schools from many states to provide rigorous evidence on the effectiveness of SIG. This design exploited cutoff values on the continuous variables used to define the SIG eligibility tiers, comparing outcomes in schools that just met the eligibility cutoff to outcomes in schools that just missed the eligibility cutoff (while controlling for the variable used to determine tier assignment).

### **Setting:**

*Description of the research location.*

Low-performing schools in 22 states.

### **Population / Participants / Subjects:**

*Who, how many, key features or characteristics.*

We focused on the effect of SIG awards made in 2010, when over \$3 billion in awards were made to all 50 states and DC. We selected a sample of 22 states and approximately 60 districts that were geographically diverse, and able to support estimating impacts using a regression discontinuity design (RDD). To efficiently support the RDD analysis, we prioritized states and districts that had the largest number of schools eligible for SIG, and that had a high proportion of SIG-eligible schools actually receiving SIG funds to implement an intervention model.

The characteristics of states in our sample did not differ significantly from states nationwide (see Table 1). Our sample districts had a higher percentage of non-Hispanic black students

and were more likely to be in an urban area than all districts in which SIG schools were located (see Table 2).

**Intervention / Program / Practice:**

*Should including details of administration and duration.*

The treatment was defined as receiving SIG funds for implementing one of four school intervention models. States categorized low-performing schools into three eligibility tiers defined by ED. ED required each SIG-awarded school in Tier I or II to implement one of four school intervention models over the course of three school years (2010-2011 through 2012-2013). Each model prescribed specific practices (see Exhibit 1). Schools in Tier III were permitted but not required to implement a model. Table 3 shows award amounts and the distribution of SIG grantees across tiers and models.

**Significance / Novelty of study:**

*Description of what is missing in previous work and the contribution the study makes.*

To our knowledge, this is the first large-scale RDD that rigorously assesses the effectiveness of SIG using a large sample of schools from many states. The RDD tackles a host of methodological issues simultaneously (including multiple sites, multiple assignment variables, fuzziness, clustering of individuals within schools, and standard errors that take into account the bandwidth selection method). Although many of these issues are not new to the field, this study is the first to face them all at once. Because our analysis methods are based on simulation work and consultation with RDD experts, we think other education researchers will benefit from learning about how they were used to obtain the findings in this study.

**Research Design:**

*An essential element in a SREE abstract.*

We used an RDD to estimate the impact of SIG-funded intervention models on student outcomes, taking advantage of RDD opportunities created by ED rules about the prioritization of SIG funds, which use cutoffs on continuous school-level assignment variables such as achievement and graduation rates. The definitions of SIG eligibility tiers are in Table 4 and the opportunities they create to estimate RDD impacts are in Table 5. Schools in Tiers I and II form the treatment group; schools in Tier III and ineligible schools form the comparison group.

**Data Collection and Analysis:**

*Methods utilized in collecting and analyzing data.*

We collected assignment variable values for each school from states. We collected data on schools' use of SIG-promoted practices using web-based surveys of school administrators in spring 2012 and spring 2013. We collected student-level outcomes for school years 2010–2011 through 2012–2013—including standardized test scores on state math and reading assessments, high school graduation, and college enrollment—from administrative data maintained by states and districts.

Our analytic approach included the following features (see Appendix B for more detail): local linear impact estimation, bandwidth selection based on the Imbens-Kalyanaraman (2012) method, aggregation of impacts across grades, use of covariates to increase precision, bootstrapped standard errors, and estimation of “fuzzy” RDD impacts.

**Findings / Results:**

*An essential element in a SREE abstract.*

Findings will be available in roughly 2-3 months (December 2016 or January 2017), after IES releases the report focused on the impacts of SIG.

**Conclusions:**

*May include recommendations and limitations based on findings.*

Conclusions will be available in roughly 2-3 months (December 2016 or January 2017), after IES releases the report focused on the impacts of SIG.

## Appendices

*Not included in page count.*

### Appendix A. References

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

Dee, T. (2012, April). *School turnarounds: Evidence from the 2009 stimulus*. (Working paper 17990.) Cambridge, MA: National Bureau of Economic Research. Retrieved from <http://www.nber.org/papers/w17990>

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Hurlburt, S., Carlson Le Floch, K., Bowles Therriault, S., & Cole, S. (2011). *Baseline analyses of SIG applications and SIG-eligible and SIG-awarded schools*. (NCEE 2011-4019.) Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance.

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U.S. Department of Education. (2012). *Guidance on fiscal year 2010 School Improvement Grants under Section 1003(g) of the Elementary and Secondary Education Act of 1965*. Washington, DC: Office of Elementary and Secondary Education, U.S. Department of Education. Retrieved from <http://www2.ed.gov/programs/sif/sigguidance05242010.pdf>

## Appendix B. Analytic Approach

Our analytic approach included the following features:

***Local linear impact estimation.*** We estimated impacts within a bandwidth around the cutoff value, adjusting for the assignment variable using a linear functional form. The coefficient on the assignment variable was estimated separately above and below the cutoff.

***Bandwidth selection based on the Imbens-Kalyanaraman (2012) (IK) method.*** We estimated impacts using schools with values of the assignment variable that fell within a bandwidth around the cutoff values. To select the bandwidth, we first standardized the outcome and assignment variable from each grade using the statewide mean and standard deviation for each grade. We centered outcome variables at their means and the assignment variable at its cutoff value. We divided both by their standard deviations. We then pooled the standardized variables and applied the Imbens-Kalyanaraman (IK) procedure to the pooled data (Imbens and Kalyanaraman 2012). We estimated impacts locally in each grade within the single globally selected bandwidth (that is, the coefficient on the assignment variable varied across grade, but we used a single bandwidth studywide). We chose this method because, in simulations, it produced impact estimates with less bias and smaller standard errors relative to alternative methods (such as cross-validation).

***Aggregation of impacts across grades.*** For each outcome measure, we estimated impacts separately for each grade—3 to 12—so that the relationship between the assignment variable and outcome was modeled separately across grades. We then calculated an aggregate impact that was a sample size weighted average of the grade-specific impacts, where the sample size was the number of students in study schools within the bandwidth. In calculating the weighted average of these impacts and the corresponding standard errors, we accounted for impact covariance due to overlapping samples between impacts.

***Use of covariates to increase precision.*** We included pre-intervention test scores and demographic characteristics as covariates to increase precision. We included indicator variables for states, districts, and RDD opportunity types to control for variation across these levels in the relationship between the assignment variable and the outcome.

***Bootstrapped standard errors.*** We estimated standard errors through residual bootstrapping to account for clustering of students within unique values of the assignment variable (Lee and Card 2008), fuzziness (described below), correlations among grade impacts due to overlapping samples (for example, schools that met the requirement for inclusion in more than one eligibility tier), and variance introduced by the bandwidth selection method.

***Fuzzy RDD impacts.*** This study was a “fuzzy” RDD, meaning that not all schools below the cutoff implemented a SIG-funded intervention model, and some schools above the cutoff did. We calculated the impact of SIG-funded intervention models on outcomes by estimating the local average treatment effect (LATE). The LATE equals the RDD impact on the outcome divided by the RDD impact on the proportion of schools implementing a SIG-funded intervention model.

## Appendix C. Tables and Figures

**Table 1. Baseline (2009–2010) characteristics of study states and all states**

	Study States	All States <sup>a</sup>
<b>Average percentage of students by racial/ethnic category</b>		
White, non-Hispanic	55.3	61.8
Black, non-Hispanic	19.5	15.8
Hispanic	18.3	13.7
Asian	3.8	4.6
Other	3.1	4.1
<b>Percentage of students eligible for free or reduced-price lunch</b>		
	48.0	45.5
<b>Percentage of schools that are Title I eligible</b>		
	68.1	67.8
<b>Percentage of schools by location:</b>		
Urban	30.0	23.3
Suburban	25.7	22.5
Town	14.3	16.0
Rural	30.0	38.2
<b>Number of States</b>	<b>22</b>	<b>51</b>

Source: Common Core of Data, 2009–2010.

Note: Data from 2008–2009 were used for states with data missing in 2009–2010. Data from 2007–2008 were used for states with data missing in both 2009–2010 and 2008–2009. Data from 2009–2010 were used whenever possible because that was the school year just before the first year of implementation of the American Recovery and Reinvestment Act-funded SIG models. Percentages of students and schools are unweighted state-level averages. There were no statistically significant differences between study states and all states at the 0.05 level using a two-tailed test.

<sup>a</sup> Includes 50 states and the District of Columbia, all of which contained schools implementing a SIG-funded intervention model in 2010–2011.

**Table 2. Baseline (2009–2010) characteristics of study districts and all U.S. districts with schools implementing a SIG-funded model**

	Study Districts	Districts in the United States with at Least One School Implementing a SIG-Funded Intervention Model in 2010–2011
<b>Average percentage of students by racial/ethnic category</b>		
White, non-Hispanic	19.5*	33.8
Black, non-Hispanic	38.7	30.3
Hispanic	32.0	24.4
Asian	3.3	2.7
Other	6.5	8.9
<b>Percentage of students eligible for free or reduced-price lunch</b>		
	72.4	68.3
<b>Percentage of schools that are Title I eligible</b>		
	81.4	81.3
<b>Percentage of districts by location:</b>		
Urban	68.2*	39.6
Suburban	17.3	18.7
Town	5.7	12.0
Rural	8.8*	29.7
<b>Number of Districts</b>	<b>60</b>	<b>420</b>

Source: Common Core of Data, 2009–2010; IES database of SIG grantees.

Note: Data from 2008–2009 were used for districts with data missing in 2009–2010. Data from 2007–2008 were used for districts with data missing in both 2009–2010 and 2008–2009. Data from 2009–2010 were used whenever possible because that was the school year just prior to the first year of implementation of the American Recovery and Reinvestment Act-funded SIG models. Percentages of students and schools are unweighted district-level averages. The percentages of districts with at least one school implementing a SIG-funded model are based on schools' planned implementation as of 2009–2010 for cohort 1 grantees, and only include Tier I and Tier II schools.

\*Significantly different from districts in the United States with at least one school implementing a SIG-funded intervention model in 2010–2011 at the 0.05 level, two-tailed test.

## **Exhibit 1. SIG Intervention Models as Described by the U.S. Department of Education SIG Guidance (2012)**

### **I. Turnaround Model**

A turnaround model is one in which a local education agency (LEA) must do the following:

- 1) Replace the principal and grant the principal sufficient operational flexibility (including in staffing, calendars/time, and budgeting) to implement fully a comprehensive approach in order to substantially improve student achievement outcomes and increase high school graduation rates
- 2) Use locally adopted competencies to measure the effectiveness of staff who can work within the turnaround environment to meet the needs of students:
  - A. Screen all existing staff and rehire no more than 50 percent
  - B. Select new staff:
    - (1) Implement such strategies as financial incentives, increased opportunities for promotion and career growth, and more flexible work conditions that are designed to recruit, place, and retain staff with the skills necessary to meet the needs of the students in the turnaround school.
    - (2) Provide staff with ongoing, high-quality, job-embedded professional development that is aligned with the school's comprehensive instructional program and designed with school staff to ensure that they are equipped to facilitate effective teaching and learning and have the capacity to successfully implement school reform strategies.
    - (3) Adopt a new governance structure, which may include, but is not limited to, requiring the school to report to a new "turnaround office" in the LEA or state education agency (SEA), hire a "turnaround leader" who reports directly to the superintendent or chief academic officer, or enter into a multiyear contract with the LEA or SEA to obtain added flexibility in exchange for greater accountability.
    - (4) Use data to identify and implement an instructional program that is research-based and vertically aligned from one grade to the next as well as aligned with state academic standards.
    - (5) Promote the continuous use of student data (such as from formative, interim, and summative assessments) to inform and differentiate instruction in order to meet the academic needs of individual students.
    - (6) Establish schedules and implement strategies that provide increased learning time.
    - (7) Provide appropriate social-emotional and community-oriented services and supports for students.

(U.S. Department of Education, 2012, pp. 27–28)

### **II. Restart Model**

A restart model is one in which an LEA converts a school or closes and reopens a school under a charter school operator, a charter management organization (CMO), or an education management organization (EMO) that has been selected through a rigorous review process. A restart model must enroll, within the grades it serves, any former student who wishes to attend the school (see C-6).

(U.S. Department of Education, 2012, p. 31)

### **III. Closure Model**

School closure occurs when an LEA closes a school and enrolls the students who attended that school in other schools in the LEA that are higher achieving. These other schools should be within reasonable proximity to the closed school and may include, but are not limited to, charter schools or new schools for which achievement data are not yet available.

(U.S. Department of Education, 2012, p. 34)

### **IV. Transformation Model**

An LEA implementing a transformation model must:

- 1) Replace the principal who led the school prior to commencement of the transformation model.
- 2) Use rigorous, transparent, and equitable evaluation systems for teachers and principals that —

- A. Take into account data on student growth as a significant factor as well as other factors, such as multiple observation-based assessments of performance and ongoing collections of professional practice reflective of student achievement and increased high school graduation rates.
  - B. Are designed and developed with teacher and principal involvement.
- 3) Identify and reward school leaders, teachers, and other staff who, in implementing this model, have increased student achievement and high school graduation rates and identify and remove those who, after ample opportunities have been provided for them to improve their professional practice, have not done so.
  - 4) Provide staff with ongoing, high-quality, job-embedded professional development that is aligned with the school's comprehensive instructional program and designed with school staff to ensure they are equipped to facilitate effective teaching and learning and have the capacity to successfully implement school reform strategies.
  - 5) Implement such strategies as financial incentives, increased opportunities for promotion and career growth, and more flexible work conditions that are designed to recruit, place, and retain staff with the skills necessary to meet the needs of the students in a transformation model.

(U.S. Department of Education, 2012, pp. 27–28)

Source: U.S. Department of Education. "Guidance on Fiscal Year 2010 School Improvement Grants Under Section 1003(g) of the Elementary and Secondary Education Act of 1965." Washington, DC: Office of Elementary and Secondary Education, U.S. Department of Education, 2012. Available at <http://www2.ed.gov/programs/sif/sigguidance05242010.pdf>. Accessed May 30, 2014.

**Table 3. SIG funding awarded in 2010 and number of schools implementing each intervention model**

	School intervention model					Total
	Transformation	Turnaround	Restart	Closure	Tier III strategies <sup>a</sup>	
<b>Number of schools implementing each intervention model</b>						
Tier I	354	138	24	8	0	524
Tier II	255	40	9	8	0	312
Tier III	14	0	0	0	403	417
Total	623	178	33	16	403	1,253
<b>Distribution of award amounts (over three years)</b>						
10th percentile	\$942,892	\$1,236,632	\$1,187,500	\$31,935	\$60,190	n.a.
50th percentile	\$2,100,000	\$2,684,490	\$2,167,965	\$50,000	\$300,000	n.a.
90th percentile	\$5,114,190	\$5,190,000	\$5,490,491	\$254,323	\$900,405	n.a.

Source: IES database of SIG grantees; Hurlburt et al. (2011).

Note: The SIG awards summarized in this table are from the round of state applications due to the U.S. Department of Education on February 8, 2010. The award amount percentiles are based on the total award amount per school.

<sup>a</sup> Tier III strategies refer to all school improvement strategies used by SIG-awarded Tier III schools. Federal rules did not require Tier III schools to implement one of the four ED-specified school intervention models.

n.a. = not applicable.

**Table 4. Eligibility requirements for implementing SIG-funded intervention models<sup>a</sup>**

	Original Tier Definitions	Expanded Eligibility
Tier I	<p>Any school receiving Title I funds for improvement, corrective action, or restructuring that falls into one of the following categories:</p> <ul style="list-style-type: none"><li>• The lowest-achieving 5 percent of Title I schools in improvement, corrective action, or restructuring, or the lowest-achieving five Title I schools in improvement, corrective action, or restructuring in the state, whichever number of schools is greater</li><li>• High schools that have had a graduation rate of less than 60 percent over a number of years</li></ul>	<p>Title I-eligible elementary schools<sup>b</sup> that are no higher achieving than the highest achieving school that meets the original Tier I definition <i>and</i> fall into one of the following categories:</p> <ul style="list-style-type: none"><li>• The bottom 20 percent of all schools in the state based on proficiency rates</li><li>• Schools that have not made AYP for two consecutive years</li></ul>
Tier II	<p>Any secondary school that is eligible for but does not receive Title I funds and that falls into one of the following categories:</p> <ul style="list-style-type: none"><li>• The lowest-achieving 5 percent of secondary schools or the lowest-achieving five secondary schools in the state that are eligible for but do not receive Title I funds, whichever number of schools is greater</li><li>• High schools with a graduation rate that is less than 60 percent over a number of years</li></ul>	<p>Title I-eligible secondary schools<sup>b</sup> that are (1) no higher achieving than the highest-achieving school that meets the original Tier II definition or (2) high schools that have had a graduation rate of less than 60 percent over a number of years <i>and</i> fall into one of the following categories:</p> <ul style="list-style-type: none"><li>• The bottom 20 percent of all schools in the state based on proficiency rates</li><li>• Schools that have not made AYP for two consecutive years</li></ul>
Tier III	<p>Schools receiving Title I funds for improvement, corrective action, or restructuring that are not in Tier I</p>	<p>Title I-eligible schools<sup>b</sup> that do not meet the requirements to be in Tier I or Tier II <i>and</i> that fall into the following categories:</p> <ul style="list-style-type: none"><li>• The bottom 20 percent of all schools in the state based on proficiency rates</li><li>• Schools that have not made AYP for two years</li></ul>

Source: U.S. Department of Education.

<sup>a</sup>The original tier definitions were published in the Federal Register on December 10, 2009. The expanded tier definitions were published in the Appropriations Act on December 16, 2009.

<sup>b</sup>Title I-eligible schools include all schools eligible to receive Title I funds, including both those that do and do not actually receive the funds.

AYP = adequate yearly progress.

**Table 5. Opportunities to conduct an RDD based on SIG eligibility tier definitions<sup>a</sup>**

Opportunity	Intervention Group	Comparison Group	Assignment Variable
1	Original tier I elementary	Original tier III elementary	Achievement
2	Original tier I secondary	Original tier III secondary	Achievement
3	Original tier I secondary	Original tier III secondary	Graduation rate
4	Original tier II secondary	Original tier II secondary, but above the cutoff <sup>b</sup>	Achievement
5	Original tier II secondary	Original tier II secondary, but above the cutoff <sup>c</sup>	Graduation rate
6	Expanded tier I elementary	Expanded tier III elementary	Achievement
7	Expanded tier II secondary	Expanded tier III secondary	Achievement
8	Expanded tier II secondary	Expanded tier III secondary	Graduation rate

Source: State administrative records.

<sup>a</sup> The original tiers were based on the definitions published in the Federal Register on December 10, 2009. The expanded tiers were based on the definitions published in the Appropriations Act on December 16, 2009.

<sup>b</sup> Schools that were eligible for but did not receive Title I funding and were above the 5 percent achievement cutoff.

<sup>c</sup> Schools that were eligible for but did not receive Title I funding and were above the 60 percent graduation rate cutoff.

RDD = regression discontinuity design.