Supplemental Educational Services and Student Achievement: Evidence from an Urban School District

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Outline

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Summary of Findings

- Few studies have attempted to estimate effect of SES on student outcomes.
- A relatively small percent of eligible students from our district enroll in and attend SES.
- We find consistently significant and positive average effects of SES on test score gains in mathematics. Results in reading tend to be positive but insignificant.
- We find measurable differences in the expected direction when accounting for the content area of tutoring and number of hours tutoring received.

1. SES Background and Basics

1.1. Roots of SES

- After-school programming during 1980s and 1990s.
- Focus shifted from social skill development to academic achievement.
  - "...must be high quality, research-based, and specifically designed to increase student academic achievement of eligible children on academic assessments."
- Political compromise.
  - Exit vouchers written into law as SES.
  - Private school vouchers abandoned.

1.2. Educational Accountability and SES

Year 1: Target Status	*Year 2: School Improve 1*	*Year 3: School Improve 2*	*Year 4: Corrective Action*	*Year 5: School Restruct I*	*Year 6: School Restruct II*
School labeled Target	**Technical Assistance**	**Technical Assistance**	**Technical Assistance**	**Technical Assistance**	**Technical Assistance**
	School Choice	**School Choice**	**School Choice**	**School Choice**	**School Choice**
		Supplemental Services*	**Supplemental Services**	**Supplemental Services**	**Supplemental Services**
		Implement School Improvement Plan	**Corrective Action Plan**	**Implement Corrective Action Plan**	**Implement Restructuring Plan**
				Create Restructuring Plan	**In Restructuring Until 2 Years of AYP**

1.3. Current Context

- Almost 13 percent of Title 1 eligible schools required to offer SES during the 2007-08 school year.
- While the number of districts required to offer SES has remained stable, the proportion of schools within these districts has increased nearly 2.5 times (23% to 65%).
- Less than 1/3 of Title 1 schools located in urban district, yet more than half of all urban Title 1 schools required to offer SES.
- Low student enrollment rates (20% nationally), and even lower attendance.

2. Prior Research

2.1.1. Prior Research

Location *Study Period* *Authors*	**Analytic Strategy**	**Comparison Group**	**Results**
Milwaukee, WI *2004-05 – 2005-06* *Heinrich et al, 2007*	PSM (radius caliper matching) Student FE	Matched sample of eligible students that did not enroll. Students enrolled in SES but attended different hours.	+/- effects in reading. +/- effects in math.
Minneapolis, MN *2001-02 – 2005-06* *Heistad, 2007*	PSM	Matched sample of students who did not receive SES. Variation in SES provider characteristics	+ effects in reading (small). +/- effects in reading among SES providers. +/- effects in math.

Source: Springer, M.G., Pepper, M.J., Gardner, C.D., and Bower, C.B. (2009). Supplemental Educational Services Under No Child Left Behind. In *Handbook of Research on School Choice*. Routledge.

2.1.2. Prior Research

Location *Study Period* *Authors*	**Analytic Strategy**	**Comparison Group**	**Results**
Pittsburgh, PA 2001-02 – 2005-06 Zimmer et al, 2007	Student FE	Student gains before and after SES. Variation in SES provider characteristics	+ effects in reading (small). + effects in reading when grouping students by skill level (moderate).
			+ effects in math (large). + effects in math when grouping students by skill level (moderate).
Multiple School Districts 2002-03 – 2004-05 *Zimmer et al, 2006*	Student FE	Student gains before and after SES.	+ effects in reading in 5 of 7 districts (small). + effects in reading among Black and Hispanic students (moderate).
			+ effects in math in 5 of 7 districts (small). + effects in math among Black and Hispanic students (moderate).

Source: Springer, M.G., Pepper, M.J., Gardner, C.D., and Bower, C.B. (2009). Supplemental Educational Services Under No Child Left Behind. In *Handbook of Research on School Choice*. Routledge.

3. Research Questions

3.1. Research Questions

- What is the effect of SES on student test score gains?
- Do particular subgroups of students benefit more from SES?
- Does SES have a cumulative effect on student test score gains?

4. Data and Sample

4.1. Study Location

- Large, urban school district in the south.
  - 136 schools serving approximately 70,000 students.
  - 72 percent qualify for FRL, 13 percent receive special education services, and 10 percent identified as ELL.
  - 47 percent Black, 36 percent White, and 13 percent Hispanic.

4.2. Data

- Longitudinal, student-level test score, demographic, and federal program data for five-year period comprising the 2003-2004 through 2007-2008 school years.
- Vertically equated scale scores from state-mandated assessment in mathematics and English language arts.
- Demographic data on student enrollment history, grade, DOB, gender, race/ethnicity, FRPL status, hours of special education services received each week, ELL status (t1 and t2 status), etc.
- Federal program data on the **number of cumulative hours** a student attended SES and the **subject area of tutoring**.

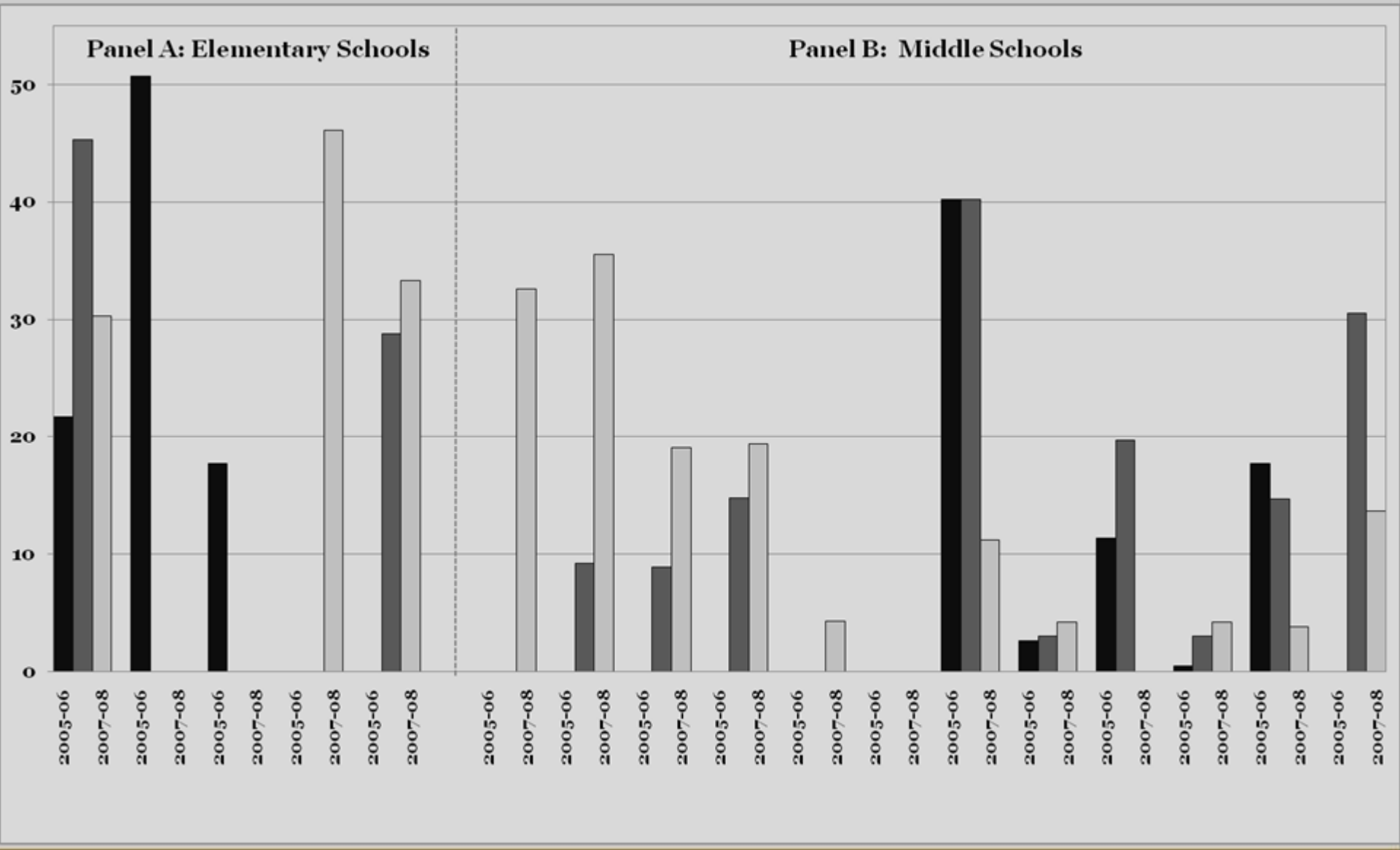
4.3.1. Select District and Provider Information

	2005-06	2006-07	2007-08	All Years (2003-04 – 2007-08)
# of Students in District (3-8)	28,484	28,862	29,075	143,801
# of Schools Required to Offer SES	6	12	14	17
# of SES Providers	8	13	14	20
Top 50% of Providers has x% of Market	85.1%	90.3%	89.9%	90.5%

4.3.2. Eligibility, Enrollment, and Attendance

	2005-06	2006-07	2007-08		All Years (2003-04 – 2007-08)
# of Eligible Students	1,432	3,904	4,422		9,758
% of Total Students who are Eligible	5.0%	13.5%	15.2%		11.3%
# of Students Signed-Up	264	897	893		2,054
% of Eligible Students Signed-Up	18.4%	23.0%	20.2%		21.0%
# of Students Receiving SES	194	583	657		1,434
% of Signed-Up Students Attended	73.5%	65.0%	73.6%		69.8%

4.5. Percent of Eligible School Population Attending At Least 1 Hour of SES Tutoring



5. Analytic Strategy

5.1 Summary of Analytic Strategies

- Implemented three strategies
  - Student fixed effects
  - Propensity score analysis
  - Current vs. future participants

- Conducted a series of analyses
  - Average effect
  - Effect of SES by *content area*
  - Effect of SES by *SES attendance*
  - Moderators of the effect of SES
  - Cumulative effects of SES

6. Results

6.1 Comparator Effect Sizes

- Comprehensive School Reform:[1] .13 - .18
- Class-size reduction:[2] .11 - .22
- Labels suggested by Lipsey (1990):[3] Small = .15
  Medium = .45
  Large = .90

[1] Borman, Geoffrey D., Gina M. Hewes, Laura T. Overman, and Shelly Brown. (2003). "Comprehensive School Reform and Achievement: A Meta-Analysis." *Review of Educational Research, 73* (2):,125-230.

[2] Nye, Barbara, Larry V. Hedges and Spyros Konstantopoulos. (1999). "The Long-Term Effects of Small Classes: A Five-Year Follow-up of the Tennessee Class Size Experiment." *Educational Evaluation and Policy Analysis, 21* (2), 127-142.

[3] Lipsey, Mark W. (1990). *Design for Sensitivity: Statistical Power for Experimental Research*. Newbury Park, California: Sage Publications.

6.2.2 Registered vs. Attended SES

	Panel A: Mathematics			Panel B: Reading		
(model)	(1)	(2)	(3)	(4)	(5)	(6)
Registered	0.0766	0.0769	0.0880	0.0613	0.0617	0.0758
	(.0246) ***	(.0246) ***	(.0251) ***	(.0258)**	(.0258)**	(.0265)***
(model)	(7)	(8)	(9)	(10)	(11)	(12)
Attended	.0769	.0696	.0879	.0294	.0297	.0385
	(.0294)**	(.0294)**	(.0299)***	(.0306)	(.0306)	(.0313)
Stud. controls		√	√		√	√
Sch. controls			√			√
Stud. FE	√	√	√	√	√	√
*Grade*Year FE*	√	√	√	√	√	√

6.2.3 Evolution of Modeling

Model	Mathematics	Reading
Attended (Baseline #1)	.09***	.04
Controlling for Content		
Control for Attendance, Avg # of Hours		
Control for Attendance, 95th %'tile		
New Baseline, Content & Attendance		
LEP		
SWD		
Male		
Female		
Two Years		

*, **, *** indicates confidence at the 10%, 5%, and 1% level, respectively
No asterisks indicates too much variation in the data to say anything definitive.

6.2.4 Content Area of Tutoring

	Panel A: Mathematics				Panel B: Reading			
(covariate)	*Baseline*	*Math only*	*Read only*	*Both*	*Baseline*	*Math only*	*Read only*	*Both*
(model)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Attended	.0879 (.0299) ***	-.0129 (.0527)	.0960 (.0576) *	.0442 (.0392)	.0385 (.0313)	.0854 (.0558)	-.0028 (.0600)	.0444 (.0412)
Attended * Covariate (column)	... ...	.1236 (.0785)	-.1001 (.0783)	.1003 (.0584) *	... ...	-.0816 (.0825)	.0969 (.0823)	-.0134 (.0609)

6.2.5 Evolution of Modeling

Model	Mathematics	Reading
Attended (Baseline #1)	.09***	.04
Controlling for Content	.11 - .14*	.03 - .09
Control for Attendance, Avg # of Hours		
Control for Attendance, 95th %'tile		
New Baseline, Content & Attendance		
LEP		
SWD		
Male		
Female		
Two Years		

*, **, *** indicates confidence at the 10%, 5%, and 1% level, respectively
No asterisks indicates too much variation in the data to say anything definitive.

6.2.6 Evolution of Modeling

Model	Mathematics	Reading
Attended (Baseline #1)	.09***	.04
Controlling for Content	.11 - .14*	.03 - .09
Control for Attendance, Avg # of Hours	**.10*** **	**.07**
Control for Attendance, 95th %'tile	**.25*** **	**.16**
New Baseline, Content & Attendance		
LEP		
SWD		
Male		
Female		
Two Years		

***, **, *** indicates confidence at the 10%, 5%, and 1% level, respectively**
No asterisks indicates too much variation in the data to say anything definitive.

6.2.7 Evolution of Modeling

Model	Mathematics	Reading
Attended (Baseline #1)	.09***	.04
Controlling for Content	.11 - .14*	.03 - .09
Control for Attendance, Avg # of Hours	.10***	.07
Control for Attendance, 95th %'tile	.25***	.16
New Baseline, Content & Attendance	**.14*** **	**.07***
LEP		
SWD		
Male		
Female		
Two Years		

*, **, *** indicates confidence at the 10%, 5%, and 1% level, respectively
No asterisks indicates too much variation in the data to say anything definitive.

6.2.8 Subgroups – LEP and Special Education

	Panel A: Mathematics			Panel B: Reading		
(covariate)	*New Baseline*	*LEP*	*Spec. Educ.*	*New Baseline*	*LEP*	*Spec. Educ.*
(model)	(1)	(2)	(3)	(4)	(5)	(6)
Attended	.1433	.1394	.1257	.0666	.0863	.0491
	(.0332)***	(.0347)***	(.0360)***	(.0340)*	(.0355)**	(.0367)
Attended * Covariate (column)	...	.0433	.1159	...	-.2371	.1201
	...	(.1158)	(.0918)	...	(.1220)*	(.0954)

6.2.9 Evolution of Modeling

Model	Mathematics	Reading
Attended (Baseline #1)	.09***	.04
Controlling for Content	.11 - .14*	.03 - .09
Control for Attendance, Avg # of Hours	.10***	.07
Control for Attendance, 95th %'tile	.25***	.16
New Baseline, Content & Attendance	.14***	.07*
LEP	**.18**	**-.15***
SWD	**.24**	**.15**
Male		
Female		
Two Years		

*, **, *** indicates confidence at the 10%, 5%, and 1% level, respectively
No asterisks indicates too much variation in the data to say anything definitive.

6.2.10 Subgroups - Gender

	Panel A: Mathematics				Panel B: Reading			
(covariate)	*New Baseline*	*Male*	*Female*	*Female Int.*	*New Baseline*	*Male*	*Female*	*Female Int.*
(model)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Attended	.1433	.1064	.1762	.1025	.0666	.0567	.0727	.0498
	(.0332) ***	(.0509) **	(.0431) ***	(.0481) **	(.0340) *	(.0517)	(.0444)	(.0482)
Attended * Covariate (column)	...	...	...	.0774	...	...	...	.0302
	...	...	...	(.0661)	...	...	...	(.0676)

6.2.11 Evolution of Modeling

Model	Mathematics	Reading
Attended (Baseline #1)	.09***	.04
Controlling for Content	.11 - .14*	.03 - .09
Control for Attendance, Avg # of Hours	.10***	.07
Control for Attendance, 95th %'tile	.25***	.16
New Baseline, Content & Attendance	.14***	.07*
LEP	.18	-.15*
SWD	.24	.15
Male	**.10****	**.06**
Female	**.18*****	**.08**
Two Years		

*, **, *** indicates confidence at the 10%, 5%, and 1% level, respectively
No asterisks indicates too much variation in the data to say anything definitive.

6.2.12 Years of Participation

	Panel A: Mathematics			Panel B: Reading		
(covariate)	*New Baseline*	*1st Year*	*2nd Year*	*New Baseline*	*1st Year*	*2nd Year*
(model)	(1)	(2)	(3)	(4)	(5)	(6)
Attended	.1433 (.0332) ***	.1235 (.0344) ***	.1237 (.0344) ***	.0666 (.0340) *	.0390 (.0351)	.0390 (.0351)
Attended * Covariate (column)	... ...	... ...	.2657 (.1261) **	... ...	... ...	.4459 (.1403) ***

6.2.13 Evolution of Modeling

Model	Mathematics	Reading
Attended (Baseline #1)	.09***	.04
Controlling for Content	.11 - .14*	.03 - .09
Control for Attendance, Avg # of Hours	.10***	.07
Control for Attendance, 95th %'tile	.25***	.16
New Baseline, Content & Attendance	.14***	.07*
LEP	.18	-.15*
SWD	.24	.15
Male	.10**	.06
Female	.18***	.08
Two Years	**.39****	**.49****

*, **, *** indicates confidence at the 10%, 5%, and 1% level, respectively
No asterisks indicates too much variation in the data to say anything definitive.

6.3.1 Robustness Checks – Modeling Strategy

	Panel A: Mathematics				Panel B: Reading			
(covariate)	*New Baseline*	*Current / Future*	*PSM (weight)*	*PSM (stratif)*	*New Baseline*	*Current / Future*	*PSM (weight)*	*PSM (stratif)*
(model)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Attended	.1433	.1789	.0919	.0494	.0666	.1004	-.0303	-.0041
	(.0332)	(.0775)	(.0175)	(.0252)	(.0340)	(.0995)	(.0205)	(.0284)
	***	**	***	**	*			

6.3.2 Comparison of Analytical Strategies

Model	Mathematics	Reading
Attended (Baseline #1)	.09***	.04
-- Zimmer et al, 2006	.09**	.08**
New Baseline, Content & Attendance	.14***	.07*
Current vs. Future, Content & Attendance	.18**	.10
Propensity Score (weight)	.09***	-.03
Propensity Score (stratif)	.05**	.00

***, **, *** indicates confidence at the 10%, 5%, and 1% level, respectively**
No asterisks indicates too much variation in the data to say anything definitive.

7. Summary and Policy Implications

7.1. Policy Summary

- Large number of students eligible for SES. Relatively small share take advantage of SES. This is true both nationally and within the district under study.
- Few studies have attempted to estimate effect of SES on student outcomes.
- Important to account for content area of tutoring and number of hours attended.

7.2 Revisited Research Questions

- What is the effect of SES on student test score gains?
  - *small to medium statistically significant effects in mathematics, smaller, statistically insignificant effects in reading*
- Do particular subgroups of students benefit more from SES?
  - *SWD, Females, 2+ Year Attendees*
  - *No disproportionate impact by race*
- Does SES have a cumulative effect on student test score gains?
  - *Yes*

QUESTIONS

To access a copy of the working paper, please visit

http://peabody.vanderbilt.edu/Documents/pdf/lpo/Springer-Pepper-Ghosh.pdf

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