Title: Scaling up the provision of an information program: Evidence from a regression discontinuity analysis

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Background/Context

Parents need accurate information about their children's academic achievement, behaviors, and skills in order to optimally allocate educational investments. However, parents often do not have access to accurate information, particularly in low-income contexts, leading to suboptimal investments (Avvisate et al., 2014; Bergman, 2015; Berlinski et al., 2016, Houtenville & Conway, 2007). A growing body of literature demonstrates effectiveness of interventions that seek to close the information gap by providing information to families about their children's academic performance and behaviors (Bergman, 2015; Berlinski et al., 2016; Dizon-Ross, 2019; Rogers & Feller, 2018).

A related literature also points to the use of text messaging and collaboration with local administrators and institutions as a means of implementing information programs at scale (Castleman & Page, 2015; Doss, Fahle, Loeb & York, 2018; Mayer, Kalil, Oreopolous & Gallegos, 2018; York, Loeb & Doss, 2018). Information interventions are well-suited to scaling up via local implementation since they frequently utilize existing the existing resources of schools and municipalities (Weixlar et al., 2019), and provide an opportunity to scale interventions through capacity-building (Radner et al., 2018). However, there is scarce evidence about the effectiveness of these interventions when they are implemented at scale by schools and municipalities, rather than external researchers.

Objective

We evaluate the impact of an information intervention implemented at scale by the Secretary of Education in a mid-size city in central Colombia. The Secretary designed and implemented a program that provided parents with information via text message about students' performance on a math and reading assessment. We evaluate the impact of this policy on students' subsequent math and reading performance. First, we examine the impact of providing parents with personalized information about student math and reading performance, rather than generic information about education engagement, on subsequent student achievement. Second, we examine the impact of providing parents with generic information, as compared with no information, on student math and reading performance. Third, we examine the extent to which impacts vary by grade.

Data and Context

The city of Manizales is a mid-size city in the Department of Caldas in central Colombia. The policy evaluated in the present study was designed, in part, based on the earlier results of an information intervention implemented and evaluated by researchers in partnership with the city (Barrera-Osorio et al., 2019). Based on these findings, the Secretary subsequently designed and implemented a scaled-up information program, including students and parents in 40 schools in the city.

The city assigned students and parents into three groups, based on the results of a reading and math assessment administered at beginning of the year. Parents of 2,107 low-performing students were assigned to receive information about their children's academic performance bi-

weekly via phone texts ("personalized information"). Messages provided information about the student's performance on the assessment and the performance of a typical student in the city. Messages also contained suggestions for how parents could engage with their children's education. Parents of 2,108 mid-performing students received only the suggestions about how to engage with their children's education ("generic information"). Parents of an additional 4,212 high-performing students received no information. All information was provided via a sequence of text messages sent over the school year.

At the end of the school year, the city conducted a follow-up administration of the math and reading assessments. Student math and reading performance at both the beginning and end of the year was measured using the Early Grade Reading Assessment (EGRA) and Early Grade Mathematics Assessment (EGMA).

Analytic Approach

We use a regression discontinuity (RD) design to estimate the effect of receiving personalized or generic information on students' academic performance. We utilize the discontinuities in students' likelihood of being assigned to receive personalized or generic information caused by the city's policy of targeting lower-performing students for the information intervention. Specifically, students who were below the 25th percentile on a composite math and reading score (within each grade) received personalized information. Students between the 25th and 50th percentile received generic information. Students above the 50th percentile received no information.

To identify the effect of personalized information, we estimated a series of local-linear regressions around the baseline test score cutoff at the 25th percentile using a triangular kernel. Student math and reading performance are the key outcomes of interest; the key running variable is the composite math and reading scores from the beginning of the year. We use the bandwidth selection process recommended by Calonico, Cattaneo, and Titiunik (2014). Although a separate test score cutoff was used in each grade, in order to increase power in our primary analysis we pool across all four grade categories in order to estimate the average impact across grades.

To identify the effect of personalized information, we estimate a similar local-linear regression around the baseline test score cutoff at the 50th percentile. We then estimated the models separately for students in each grade in order to examine whether impacts varied by grade.

Preliminary Results

Overall, we find little evidence that the receipt of information led to improvements in student math and reading performance. Although point estimates are positive for the composite math and reading score, and for most of the math and reading subtests, impacts are small in magnitude and imprecisely estimated. However, when we examine impacts separately by grade we observe on math and reading scores among students in grade two, suggesting that the information may have had a larger impact among younger students.

Additionally, results do not indicate that the receipt of generic information led to improvements in students' math and reading performance. We similarly see little evidence of impacts when we break conduct analyses separately by grade.

Conclusion

Our findings indicate that the provision of personalized information had a positive impact on the academic achievement of the youngest students in the sample – students in grade two – but had null effects among older students in the same. Additionally, our results provide evidence regarding the pathway through which small-scale, researcher-designed interventions can be taken to scale.

References

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Tables and Figures

Table 1. Impacts of personalized information on student performance on the end-of-year assessment.

	Composite score	Reading	Subtractions	Sums	Problems
All grades					
Treatment	0.123	0.018	-0.048	0.176	0.130
	(0.105)	(0.094)	(0.081)	(0.111)	(0.103)
Total N	3,729	3,730	3,730	3,729	3,730
Effective N	1,021	1,704	1,564	880	1,311

Note: Standard errors in parentheses and clustered at the school level. Treatment = Below 25th percentile on the baseline assessment and assigned to receive personalized information. Estimated discontinuity based on local linear regression with a triangular kernel and including grade fixed effects. *$p < .10$ ** $p < .05$ *** $p < .01$.

Table 2. Impacts of personalized information on student performance on the end-of-year assessment, separately by grade

	Composite score	Reading	Subtractions	Sums	Problems
Grade 2					
Treatment	0.565*	0.379	0.393*	0.639**	0.197
	(0.290)	(0.313)	(0.204)	(0.293)	(0.199)
Total N	774	774	774	774	774
Effective N	160	254	145	151	175
Grade 3					
Treatment	-0.115	-0.156	-0.110	0.280	-0.121
	(0.174)	(0.166)	(0.187)	(0.181)	(0.193)
Total N	897	897	897	897	897
Effective N	221	250	225	248	179
Grade 4					
Treatment	0.227	0.004	-0.153	-0.006	0.976***
	(0.192)	(0.231)	(0.138)	(0.174)	(0.282)
Total N	976	977	977	976	977
Effective N	231	250	412	349	177
Grade 5					
Treatment	-0.069	-0.065	-0.030	-0.075	-0.102
	(0.167)	(0.175)	(0.181)	(0.187)	(0.251)
Total N	1082	1082	1082	1082	1082
Effective N	342	306	378	419	367

Note: Standard errors in parentheses and clustered at the school level. Treatment = Below 25th percentile on the baseline assessment and assigned to receive personalized information. Estimated discontinuity based on local linear regression with a triangular kernel and including grade fixed effects. *$p < .10$ ** $p < .05$ *** $p < .01$.

Table 3. Impacts of generic information on student performance on the end-of-year assessment.

	Composite score	Reading	Subtractions	Sums	Problems
All grades					
Treatment	0.049	0.040	0.018	0.130	-0.052
	(0.090)	(0.132)	(0.080)	(0.108)	(0.089)
Total N	5,643	5,645	5,643	5,645	5,645
Effective N	1,223	1,250	1,322	1,213	1,308

Note: Standard errors in parentheses and clustered at the school level. Treatment = Between the 25th and 50th percentile on the baseline assessment and assigned to receive generic information. Estimated discontinuity based on local linear regression with a triangular kernel and including grade fixed effects. *$p < .10$ ** $p < .05$ *** $p < .01$.

Table 4. Impacts of generic information on student performance on the end-of-year assessment.

	Composite score	Reading	Subtractions	Sums	Problems
Grade 2					
Treatment	0.003	0.247	0.078	0.053	-0.378**
	(0.160)	(0.192)	(0.180)	(0.179)	(0.184)
Total N	1,205	1,205	1,205	1,205	1,205
Effective N	210	315	198	207	247
Grade 3					
Treatment	0.100	0.286	0.089	0.106	-0.186
	(0.192)	(0.208)	(0.168)	(0.214)	(0.173)
Total N	1,342	1,343	1,342	1,343	1,343
Effective N	291	258	353	338	429
Grade 4					
Treatment	-0.009	-0.236	-0.008	-0.024	0.241
	(0.134)	(0.163)	(0.167)	(0.175)	(0.201)
Total N	1,482	1,482	1,482	1,482	1,482
Effective N	496	372	356	399	403
Grade 5					
Treatment	0.080	-0.303	0.004	0.402**	0.074
	(0.141)	(0.216)	(0.151)	(0.189)	(0.206)
Total N	1,614	1,615	1,614	1,615	1,615
Effective N	311	245	318	334	416

Note: Standard errors in parentheses and clustered at the school level. Treatment = Between the 25th and 50th percentile on the baseline assessment and assigned to receive generic information. Estimated discontinuity based on local linear regression with a triangular kernel and including grade fixed effects. *$p < .10$ ** $p < .05$ *** $p < .01$.