Abstract Title Page

Title:

The Results of a Randomized Control Trial Evaluation of the SPARK Literacy Program

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Background / Context

SPARK is an early grade literacy and family engagement program developed by Boys & Girls Clubs of Greater Milwaukee. The tutoring component of SPARK is loosely based on the Reading Recovery program. Reading Recovery focuses on in-school tutoring with lesson plans written, and assessments, analyzed by the licensed teachers themselves, and has been found to be effective in developing student literacy skills (Pinnell, Lyons, DeFord, Bryk, & Seltzer, 1994). The family engagement aspect of SPARK is based on research that involving families in tutoring programs can improve children's academic knowledge, skills and confidence (Bryan, 2005; Little, 2009). Encouraging family involvement in educational programs traditionally focuses on families attending events, receiving information from staff, volunteering (Epstein, 2001), and generally exhibiting "good parent" behaviors (Li, 2010). Getting to know families and the ways that their lives are structured outside of the educational setting may lead to a reciprocal relationship that can increase involvement (Graue & Hawkins, 2010). The family component of a program is not only to make families aware of the program's mission and goals but also to empower families in their children's learning both in the program and at home.

Purpose / Objective / Research Question / Focus of Study

The purpose of this report is to present the results of a two-year randomized control trial evaluation of the SPARK literacy program. SPARK is an early grade literacy program developed by Boys & Girls Clubs of Greater Milwaukee. In 2010, SPARK was awarded an Investing in Innovation (i3) Department of Education grant to further develop the program and test its impact in seven Milwaukee Public Schools (MPS). The evaluation tested the impact of SPARK across three domains: reading achievement, literacy, and school attendance.

Setting

The Milwaukee Public Schools (MPS), a district serving over 80,000 students, faces a significant challenge to teach its students how to read and write. Only 15% of MPS students were proficient in reading in the 2011 administration of the Wisconsin Knowledge and Concepts Examination, compared to 35% statewide. The results of the WKCE are consistent with results of the National Assessment of Educational Progress (NAEP) and the ACT, which show that MPS students struggle with literacy throughout their education; only 15% of 4th grade MPS students are proficient in reading (NAEP, 2011) and 14% of MPS 11th graders scored at least 21 on the ACT Reading Test, the benchmark identified for college readiness. The results of the NAEP further shows that there are significant achievement gaps for minority and low-income students. Among fourth grade students in MPS, 39% of white students are proficient in reading, compared to 7% of black students and 15% of Hispanic students. Only 7% of 4th grade low-income (free/reduced lunch participants) MPS students are proficient in reading, compared to 48% of non-low-income students.

These statistics demonstrate that the need for increased literacy opportunities in the Milwaukee area is urgent, and that this need is even more pronounced for low-income and minority students. SPARK was created in 2005 by Boys & Girls Clubs of Greater Milwaukee (BGCGM) to address this need. In 2010, SPARK received a Department of Education Investing in Innovation (i3) grant award to further develop the program and expand it to seven additional low-income and minority Milwaukee elementary schools.

Participants

In the fall of 2013, a total of 576 students across seven schools consented to participate in the SPARK program and evaluation. Selections were made in October and November, after fall assessments had been completed. 286 students were randomly selected as SPARK participants

and 290 as control students.

Of the 576 consented students, 205 (36%) were in kindergarten, 214 (37%) in first grade, and 157 (27%) in second grade; 549 (95%) were eligible for free/reduced lunch; 459 (80%) were African American and 71 (12%) were Hispanic; 291 (50.5%) were female; and 51 (9%) had an IEP for speech or language disability. English language learners and students with learning disabilities, cognitive impairments, or emotional disabilities were excluded from the study but were able to receive SPARK tutoring. Table 1 presents the baseline literacy (PALS) and achievement scores (MAP) for the total consented sample of 576 students.

Table 2 presents the samples used in each analysis and the corresponding attrition rates. Depending on the analysis, overall attrition rates ranged from 33.9% to 36.3%. These include 187 students who moved away during the two years of the study and additional students with missing data. Differential attrition rates between participant and control students were not substantively different, ranging from 1.96% to 2.31%. There was no replacement of students who dropped from the evaluation.

By the spring of the 2014-2015 school year, after attrition, the characteristics of the resulting sample of 389 students are presented in Table 3. The final sample consisted primarily of low-income and minority students. Table 4 presents the baseline PALS and MAP scores for the final sample. Table 5 presents final scores on the PALS, MAP, and school absences.

Intervention / Program / Practice

By using both in-school tutoring and family engagement, SPARK works both to develop the literacy skills of early-grade students and to support families as they learn to support the literacy development of their students. SPARK students are also encouraged to participate in after-school club activities. It is through this multi-modal strategy that SPARK seeks to have a lasting impact on students and to prepare them to succeed beyond their participation in SPARK.

In-school tutoring

The tutoring component of SPARK is loosely based on the Reading Recovery program. Reading Recovery, which focuses on in-school tutoring with lesson plans written by and assessments analyzed by the licensed teachers themselves, has been found to be effective in developing student literacy skills (Pinnell, Lyons, DeFord, Bryk, & Seltzer, 1994). For the in-school tutoring component of the current study, SPARK students were pulled out of non-core classes during the school day for 30 minutes, up to three times per week, for two years. In the current study, SPARK students received an intensive amount of services across the two program years while control group students received the “business as usual” reading instruction provided by MPS. The average SPARK student received 122.5 tutoring sessions (SD = 27.3).

Family Engagement

SPARK seeks to have a lasting impact on students by engaging families in the literacy development of students. To execute the family engagement component, each site has a parent partner who works with each participating student’s family. Their work is designed to bridge the divide between school and home by translating literacy concepts, educating families about a variety of literacy activities, and validating the literacy practices already happening in the home. Parent partners help families see how they already are incorporating literacy into their children’s lives and show parents how to promote literacy more effectively. Parent partners stay connected with families through a monthly newsletter, monthly family events at each site, phone calls, and emails. These communications are designed to keep families aware of student progress in SPARK, help families promote literacy at home, and address any school attendance issues that arise during the program. Parent partners also conduct home visits for all students twice during

the summer between their first and second year of participation and as needed during the school year. These visits are viewed as opportunities to connect with families in their own space and learn about the literacy activities already taking place in the home. Parents of SPARK students attended an average of three family events (Range 0 to 10, SD = 2.2), received 32 parent contacts (Range 0 to 69, SD = 13.9) and had 2.4 home visits (Range 0 to 8, SD = 1.4).

Research Design

The evaluation used a randomized control trial selection framework at the student level to identify the impact of SPARK. Informed consent was obtained from 576 parents for their students to participate in the study. A random sample of kindergarten, 1st, and 2nd grade students in seven MPS schools was selected in October and November of 2013 to participate. 286 students were randomly selected as SPARK participants and 290 were randomly selected as control students. Stratification was done by school and grade level within school. The specific number of students selected to receive SPARK within each strata was determined both by the number of consented students and the capacity to serve students within each site. Students with a reading-related IEP or who were English Language Learners were not eligible to participate in the evaluation but were eligible to receive tutoring. All other students were eligible to participate.

Data Collection and Analysis

Outcome Measures

The evaluation tested the impact of SPARK across three domains: reading achievement, literacy, and school attendance. All three outcomes listed below are collected by MPS and were provided directly to the evaluation by MPS for the purpose of evaluating SPARK.

Reading achievement [Measures of Academic Progress (MAP) Reading Assessment] – The MAP is a norm-referenced, adaptive assessment of reading achievement.

Literacy [Phonological Awareness Literacy Screening (PALS)] – The PALS is a criterion-referenced, teacher-administered assessment of literacy. MPS began administering the PALS to second grade students in the 2014-2015 school year. Administering the PALS to third grade students was optional, but MPS decided to do so in all SPARK schools so that the PALS could be used as an outcome in the evaluation for all grade levels.

Regular School Data Attendance – The total number of absences for both the 2013-14 and 2014-2015 school years.

Modeling Strategy

Separate generalized linear statistical models with robust standard error estimators were used to compare spring 2015 MAP, spring 2015 PALS, and attendance (number of absences for both program years combined) of participants and controls for current first, second, and third grade students. The results of these grade level models were then pooled to estimate the overall impact of SPARK on each domain.

Table 6 presents the covariates used in each of the grade-specific models for each outcome. Covariates were chosen based on their availability and predictive validity for each outcome. Baseline PALS scores were not available for 3rd grade students because MPS did not require schools to administer PALS to 2nd grade students. Because of this unavailability, MAP math scores were included as an additional covariate in 3rd grade MAP and PALS models. Non-predictive covariates were removed from each model. School was included as a fixed factor in all models to account for the clustering of data within schools. Other student characteristics such as ethnicity, gender, and IEP status were not found to uniquely predict outcomes and were not included in any models. Students with missing data were excluded from each analysis. All models were estimated using both standardized and unstandardized outcomes. The potential that

SPARK has a differential impact on students with different levels of baseline literacy and reading achievement was explored by including terms that interacted SPARK with baseline PALS (for 1st and 2nd grade models) and with baseline MAP reading (for 3rd grade models) in each model. When the interaction terms were found to be significant, additional models were estimated that split the sample in half by baseline literacy and achievement scores.

Findings / Results

SPARK was found to significantly impact student reading achievement. The overall, unstandardized effect of SPARK on the MAP was 2.8 RIT score points (Table 7). This corresponds to an effect size (Hedges *g*) of .23. The pooled interaction term of SPARK participation and baseline PALS scores/MAP scores was also significant ($t = 2.17$, $p < .05$) suggesting that SPARK differentially impacted MAP scores for students with different starting literacy and achievement levels. SPARK had a much larger impact on the reading achievement of lower-achieving students. The unstandardized effect of SPARK on these students was 4.4 RIT score points on the MAP (Table 7). This corresponds to an effect size (Hedge's *g*) of .36.

SPARK was found to also significantly impact student literacy. The overall, unstandardized effect of SPARK on PALS was 5.7 scale points (Table 8). This corresponds to an effect size (Hedge's *g*) of .35. The pooled interaction term of SPARK participation and baseline PALS scores/ MAP scores was again significant ($t = 5.61$, $p < .001$). The results of additional modeling suggests that SPARK again had a much larger impact on the literacy of less-literate students. The unstandardized effect of SPARK on PALS for these students in the lower half of achievement at baseline was 10.5 points (Table 8). This corresponds to an effect size (Hedge's *g*) of .66. As an additional analysis of the PALS, scores were converted into literacy benchmarks, indicating whether students were on track in their literacy development. Table 9 presents the cross tabulation of baseline and post-SPARK benchmark status for first and second grade control and SPARK students. This table shows that there were 41 (21 SPARK and 20 control) students that started the evaluation below benchmark, while at post, there were 87 (35 SPARK and 52 control). Nearly all (18) of the 20 control students that started below benchmark finished below benchmark, while most SPARK students, 13 out of 21, that started below benchmark finished at or above benchmark.

Finally, SPARK was found to also significantly impact school attendance. The overall, unstandardized, effect of SPARK was 5.8 absences (Table 10), indicating that SPARK students had 5.8 fewer absences than control students. This corresponds to an effect size (Hedge's *g*) of .25. The pooled interaction term of SPARK participation and baseline PALS scores/ MAP scores was not a significant predictor of school absences ($t = 1.04$, $p > .05$).

Conclusions

The results suggest that SPARK had statistically significant, positive impacts on reading achievement, literacy, and regular school day attendance. SPARK students were absent from school, on average, 5.8 fewer times than control students. The benefit of SPARK was greater with students who started the program with greater literacy instruction needs; while only 10% of control students below literacy benchmarks at the start of the study met benchmark at the conclusion of the study, 62% of SPARK participants who started below benchmark met benchmark at the end of the study.

Further research of SPARK should explore the effectiveness of SPARK with students outside of the Milwaukee context. The results here, although positive, only reflect one study. It is important the SPARK be tested in a variety of settings and contexts. Further, it will be important to follow SPARK students beyond their participation to determine the stability of the impact.

Appendix A

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Appendix B. Tables and Figures

Table 1: Fall 2013 MAP and PALS scores – Total sample

		MAP Reading RIT			MAP Math RIT			PALS		
	Grade	Mean	SD	n	Mean	SD	n	Mean	SD	n
Control	K	142.9	9.1	104	138.2	9.8	92	64.0	21.5	93
	1st	155.1	10.6	108	155.8	12.2	94	48.3	19.3	95
	2nd	163.4	12.4	78	167.7	10.3	75			
	Total	153.0	13.4	290	153.0	16.1	261	56.1	21.8	188
SPARK	K	140.4	10.6	101	137.4	9.2	89	60.1	22.6	89
	1st	155.3	10.9	106	157.0	12.5	101	50.0	17.3	101
	2nd	165.8	13.4	79	170.1	10.7	76			
	Total	152.9	15.4	286	154.2	17.0	266	54.7	20.5	190
Total	K	141.6	9.9	205	137.8	9.5	181	62.1	22.1	182
	1st	155.2	10.7	214	156.4	12.3	195	49.2	18.3	196
	2nd	164.6	12.9	157	168.9	10.5	151			
	Total	153.0	14.4	576	153.6	16.6	527	55.4	21.2	378

Table 2: Attrition rates for each analysis of the impact of SPARK

			Moved away	Missing data	Final sample	Attrition rate
MAP	Control	290	96	6	188	35.2%
	SPARK	286	91	3	192	32.9%
	Total	576	187	9	380	34.0%
PALS	Control	290	96	12	182	37.2%
	SPARK	286	91	10	185	35.3%
	Total	576	187	22	367	36.3%
Attendance	Control	290	96	5	189	34.8%
	SPARK	286	91	3	192	32.9%
	Total	576	187	8	381	33.9%

Table 3: Final sample of study participants

		Control	SPARK	Total
Grade Level	K-1st	72	66	138
	1st-2nd	63	74	137
	2nd-3rd	59	55	114
School	Brown	27	34	61
	Cass	21	25	46
	Clarke	25	21	46
	81st	27	24	51
	Engleburg	32	34	66
	Rogers Street	31	32	63
	Sherman	31	25	56
Race/Ethnicity	Black	149	146	295
	Hispanic	29	34	63
	Other	16	15	31
Gender	Female	96	100	196
	Male	98	95	193
F/R Lunch Eligible	No	9	8	17
	Yes	185	187	372
IEP	No	182	184	366
	Yes	12	11	23
Total		194	195	389

Table 4: Fall 2013 MAP and PALS scores – Final sample

		MAP Reading RIT			MAP Math RIT			PALS		
	Grade	Mean	SD	n	Mean	SD	n	Mean	SD	n
Control	K	143.9	9.0	72	139.0	9.0	69	66.6	20.7	70
	1st	156.2	9.9	63	156.0	11.5	59	51.3	18.3	60
	2nd	163.1	11.3	59	167.7	9.6	58			
	Total	153.7	12.8	194	153.4	15.6	186	59.5	21.0	130
SPARK	K	141.4	11.3	66	137.9	9.7	64	59.7	22.3	64
	1st	156.0	11.7	74	156.8	13.0	74	50.7	17.4	74
	2nd	164.4	12.5	55	168.5	10.2	54			
	Total	153.4	15.0	195	153.8	16.5	192	54.9	20.2	138
Total	K	142.7	10.2	138	138.5	9.4	133	63.3	21.6	134
	1st	156.1	10.9	137	156.5	12.3	133	51.0	17.8	134
	2nd	163.7	11.9	114	168.1	9.8	112			
	Total	153.6	13.9	389	153.6	16.1	378	57.2	20.7	268

Table 5: Spring 2015 MAP, PALS, and school absences – Final sample

		MAP Reading RIT			PALS			Absences		
	Grade	Mean	SD	n	Mean	SD	n	Mean	SD	n
Control	K	173.7	13.2	71	39.0	17.8	71	32.8	28.5	71
	1st	176.5	15.3	61	51.8	20.0	59	27.4	24.4	61
	2nd	188.7	12.5	59	66.6	15.5	55	25.0	21.1	59
	Total	179.2	15.1	191	51.3	21.1	185	28.7	25.2	191
SPARK	K	173.0	8.9	65	40.5	13.3	64	29.8	26.5	65
	1st	181.1	15.2	74	61.1	13.7	70	22.8	17.1	74
	2nd	189.8	14.8	54	68.0	16.9	53	20.7	14.2	54
	Total	180.8	14.8	193	56.0	18.5	187	24.6	20.4	193
Total	K	173.3	11.3	136	39.7	15.7	135	31.4	27.5	136
	1st	179.0	15.4	135	56.8	17.4	129	24.9	20.7	135
	2nd	189.2	13.6	113	67.3	16.1	108	23.0	18.2	113
	Total	180.0	14.9	384	53.7	19.9	372	26.6	22.9	384

Table 6: Factors included in each outcome model

Outcomes	2-year cohort	SPARK	School	Fall 2013 PALS	Fall 2013 MAP Reading	Fall 2013 MAP Math	F/R lunch	School x PALS	School x MAP Reading	School x MAP Math
PALS	K - 1st	x	x	x	x			x	x	
	1st - 2nd	x	x	x	x			x	x	
	2nd - 3rd*	x	x		x	x			x	x
MAP	K - 1st	x	x	x	x			x	x	
	1st - 2nd	x	x	x	x			x	x	
	2nd - 3rd*	x	x		x	x			x	x
Attendance	K - 1st	x	x	x			x	x		
	1st - 2nd	x	x	x			x	x		
	2nd - 3rd*	x	x		x		x		x	

* MPS did not administer the PALS with 2nd grade students in the 2013-2014 school year.

Table 7: Effects of SPARK on MAP Reading scores

			B	*SE*	*t*-stat	*p*-value
Unstandardized	Overall	K	1.99	1.35	1.47	
		First Grade	6.04	1.81	3.33	
		2nd Grade	1.23	1.70	0.73	
		Overall	2.80	0.67	4.15	<.001
	Low	K	2.56	2.21	1.15	
		First Grade	9.00	2.88	3.12	
		2nd Grade	2.65	3.13	0.84	
		Overall	4.39	1.11	3.97	< .001
	High	K	1.21	1.68	0.72	
		First Grade	6.59	2.53	2.60	
		2nd Grade	1.94	2.67	0.73	
		Overall	2.66	0.84	3.18	< .01
Standardized	Overall	K	0.18	0.12	1.47	
		First Grade	0.39	0.12	3.33	
		2nd Grade	0.09	0.12	0.73	
		Overall	0.23	0.06	3.97	<.001
	Low	K	0.23	0.20	1.16	
		First Grade	0.59	0.19	3.12	
		2nd Grade	0.20	0.23	0.85	
		Overall	0.36	0.09	3.82	< .001
	High	K	0.11	0.15	0.72	
		First Grade	0.43	0.16	2.60	
		2nd Grade	0.14	0.20	0.73	
		Overall	0.23	0.07	3.07	< .01

Table 8: Effects of SPARK on PALS scores

			B	*SE*	*t*-stat	*p*-value
Unstandardized	Overall	K	5.37	2.00	2.69	
		First Grade	9.62	2.47	3.89	
		2nd Grade	2.53	2.37	1.07	
		Overall	5.69	0.99	5.76	<.001
	Low	K	7.49	2.91	2.57	
		First Grade	19.83	3.76	5.28	
		2nd Grade	2.18	5.15	0.42	
		Overall	10.47	1.46	7.19	< .001
	High	K	-0.79	2.23	-0.35	
		First Grade	1.05	2.26	0.46	
		2nd Grade	3.74	1.36	2.75	
		Overall	2.21	0.92	2.41	< .01
Standardized	Overall	K	0.34	0.13	2.69	
		First Grade	0.55	0.14	3.89	
		2nd Grade	0.16	0.15	1.07	
		Overall	0.35	0.06	5.69	<.001
	Low	K	0.48	0.19	2.57	
		First Grade	1.14	0.22	5.28	
		2nd Grade	0.14	0.32	0.42	
		Overall	0.66	0.09	7.09	< .001
	High	K	-0.05	0.14	-0.35	
		First Grade	0.06	0.13	0.46	
		2nd Grade	0.23	0.08	2.74	
		Overall	0.13	0.06	2.37	< .05

Table 9: Cross-tabulation of students meeting PALS benchmark before and after SPARK

			Spring 2015 (Post SPARK)		
			Below benchmark	Met benchmark	Total
Fall 2013 (Pre SPARK)	Control	Below benchmark	18	2	20
		Met benchmark	34	74	108
	SPARK	Below benchmark	8	13	21
		Met benchmark	27	85	112
	Total	Below benchmark	26	15	41
		Met benchmark	61	159	220
		Total	87	174	261

Table 10: Effects of SPARK on Attendance (Number of absences)

		B	*SE*	*t*-stat	*p*-value
Unstandardized	K	5.6	4.3	1.31	
	First Grade	5.3	3.7	1.45	
	2nd Grade	6.6	4.0	1.63	
	Overall	5.8	1.9	3.00	<.01
Standardized	K	0.20	0.15	1.31	
	First Grade	0.26	0.18	1.45	
	2nd Grade	0.36	0.22	1.62	
	Overall	0.25	0.08	3.31	<.001