Title: Addressing Quandaries in Early Education Through Research Practice Partnerships

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Background / Context:

Children's educational experiences in their earliest years hold the promise of supporting or undermining their life trajectories in myriad ways. For example, Harte and Risley's (1995) findings about the gap in children's vocabulary by age 4 based on their family income level shine a light on the importance of children's early childhood educational experiences. The math and literacy skills of low-income children are a full year behind those of high-income children at the time of kindergarten entry, and these gaps do not diminish by the time the children reach eighth grade (Duncan & Murnane, 2014). That said, a substantial literature documents the benefits of early childhood education and formal preschool experiences on children's school readiness, with low-income and otherwise disadvantaged children benefitting the most from these programs (Barnett, 2011; Camilli, Vargas, Ryan, & Barnett, 2010; Duncan & Magnuson, 2013; Reynolds, Temple, & Ou, 2010). For these reasons, the United States has experienced an unprecedented expansion of early childhood education (ECE) programs over the past 40 years.

Researchers, practitioners and policymakers are interested in early education for various reasons. On one hand, researchers see the promise of exploring new interventions and testing theories aimed at overcoming or explaining these gaps in achievement that form in the early years. On the other hand, practitioners and policy makers want to better understand how systematically they can build and support educational experiences in the early years in both the home or school settings that close the opportunity gap, and therefore the gap in student outcomes, as they progress through school. These sentiments from practitioners and policy makers have driven some cities like San Francisco have adopted pre-school for all initiatives.

With these converging interests, a number of research practice partnerships are focusing their efforts on the topic of early education. These partnerships satisfy the five characteristics of research practice partnerships offered by Coburn, Penuel, and Giel (2013) including being: 1) long term, 2) focused on a problem of practice, 3) mutualistic, 4) fostering partnership through specific strategies, and 5) leading to original analyses. In this case, the topic of early education is mutually of interest to both the researchers and practitioners and offers a clearly defined problem of practice – students enter early education with either an advantage or disadvantage in their skills and knowledge. The topic also lends itself to a high likelihood of producing original analyses as only a certain number of local educational agencies have the longitudinal data infrastructure to explore the questions about early education.

Two research practice partnerships in particular – the Baltimore Education Research Consortium (BERC) with Baltimore City Schools and Johns Hopkins University and the Stanford-SFUSD Partnership with San Francisco Unified School District (SFUSD) and Stanford University – have explored the topics of early education through a number of research studies. These partnerships are both long-term, with BERC launching in 2006 and Stanford-SFUSD formalized in 2009. Finally, they have intentional strategies in place to foster partnership including approaches to setting joint research agendas with researchers and practitioners, advancing data management which provides better access to the early education data, and having a two way dialog about research findings between practitioners and researchers (Wentworth and Khanna, 2011; Connolly, Plank, and Rone, 2012; Wentworth, 2014; Wentworth and Khanna, 2014; Durham, Bell-Ellwanger, Connolly, Robinson, Olson, and Rone, 2015).

Purpose / Objective / Research Question / Focus of Study:

This panel will examine research on early education from two research practice partnerships. First, it will explore how BERC convened the Early Education Data Collaborative

(EEDC), a collection of Baltimore agencies that provide services to children from birth through the early elementary years. The primary goal of the EEDC—which includes the Baltimore City Health Department, providers of home visiting services to infants and mothers, Baltimore City Head Start, and Baltimore City Schools—is to understand how different pathways to kindergarten may be associated with kindergarten readiness and later learning outcomes.

The EEDC follows a series of birth cohorts of Baltimore children as they grow up in the city and enter Kindergarten. The first cohort of EEDC children attended kindergarten in 2013-2014; birth records were matched to 76% of these children. Seventy-five percent of the 2014-2015 kindergarten cohort were matched to their birth records. In the symposium, the Baltimore team will describe the process of forming the EEDC from the perspective of both research and practice and present initial analyses from both cohorts of kindergarten readiness controlling for birth circumstances and prior care.

Second, it will explore a line of research by a Stanford University professor and her team of doctoral students working with SFUSD's early education department. The Stanford team worked with SFUSD to establish and test a new Pre-Kindergarten (Pre-K) early literacy assessment aligned to K-12 measures, and also established a kindergarten readiness indictor that has been used by SFUSD over the past three years. For the purposes of this panel discuss, the Stanford-SFUSD partnership will feature a study of the effect of SFUSD's Transitional Kindergarten (TK) program, a state-mandated early education program, which the district established in 2012-2013 school year. The Stanford team leverages a regression discontinuity research design to identify the causal effect of the program on the first two cohorts of students. Doss compares the fall Kindergarten literacy outcomes, as measured by the Fountas and Pinnell Benchmark Assessment System, of former TK-eligible students to those of their peers who were not eligible for the program. The setting of this study is unique because San Francisco has implemented a robust Universal Pre-K program. As a result, the vast majority of four year olds in the city attend some form of Pre-K. Within this context, this study identifies the causal effect of TK on literacy outcomes above and beyond the Pre-K services available to four year olds. It is therefore a direct test of the developmentally appropriate theory of TK in practice.

Third, it will examine the strategies used across these two research practice partnerships to facilitate the research (which are described later in this proposal). It will also describe the use of the research in decisions by the respective school districts.

Setting:

The research took place in Baltimore, Maryland and San Francisco, California.

Population / Participants / Subjects:

The Baltimore sample includes 11,897 kindergarten students across two cohorts with matched program and birth records. 5,082 of these students attended Baltimore City Schools PreK; 2,268 students attended Baltimore City Head Start; and 2,017 students attended both programs. Characteristics of the first cohort of Baltimore kindergarten students are shown in Table 1 (the second cohort is nearly identical and will be shown in the presentation).

The San Francisco Transitional Kindergarten study examines literacy outcomes, as measured by the Fountas and Pinnell Benchmark Assessment System, of Kindergarteners enrolled in SFUSD in the 2013-2014 and 2014-2015 school years. The sample contains 6,174 students, 5% of which (309 students) had enrolled in the TK program. Another 17% (1,051 students) attended the district's Pre-K program. The remainder of the students had the option to

attend a Pre-K program offered by San Francisco. San Francisco has a long established Universal Pre-K market and as of 2011-2012 about 83% of four years olds in San Francisco attended Pre-K (EED, 2012). Therefore, a vast majority of the remaining students are likely to have attended some form of Pre-Kindergarten. Table 3 provides descriptive statistics of the analytical sample.

Intervention / Program / Practice:

Both studies will examine the use of longitudinal data sets from large urban school districts with robust early education programs. Using this data set, BERC will explore the use of its kindergarten readiness measure as a way of describing outcomes and effects of different Pre-K programs in Baltimore. Stanford-SFUSD will explore the effect of San Francisco's Transitional Kindergarten program, a newer Pre-K program in San Francisco instituted by a state wide policy.

Research Design:

One study will share analyses from both cohorts of kindergarten readiness controlling for birth circumstances and prior care. Specifically, they will describe the results of multilevel models predicting scale score differences and the odds of being ready for kindergarten in Baltimore. Another study will leverage a fuzzy regression discontinuity research design to identify the causal effect of an early education program called Transitional Kindergarten on the first two cohorts of students in the program.

Data Collection and Analysis:

Both studies examine administrative data from the early education programs in two large urban cities. Also, the studies provide descriptive statistics as well as comparing outcomes based on different types of regression models and regression discontinuity estimates.

Findings / Results:

Preliminary results from the first cohort of students from the Baltimore study are shown in Table 2. Results from the second cohort of students are equivalent and will be included in the presentation. The analysis compares kindergarten readiness measures for the three most common pathways to kindergarten: Baltimore City Schools Pre-K, Baltimore City Head Start, and both programs. The reference group consists of children who enrolled in neither program.

As Table 2 shows, children who attended only Head Start are indistinguishable from children who attended neither program if the birth record information is not accounted for (Model 1). When the mother's background and the circumstances of the child's birth are accounted for (Model 2), students with prior experience in only Head Start are more likely to be ready for kindergarten than students who did not attend either program (odds ratio: 1.260; 95% CI: 1.016, 1.563).

When mother's background and the circumstances of the child's birth are accounted for (Model 2), children who attended both Head Start and BCPS Pre-K are nearly four times as likely to be identified as ready for kindergarten as children from neither program (odds ratio: 3.904; 95% CI: 3.058, 4.983). Children who attended only BCPS Pre-K were three times as likely to be ready for kindergarten than children who attended neither program (odds ratio: 3.314; 95% CI: 2.744, 4.009) when family background is taken into account. The estimates for BCPS Pre-K only and Head Start followed by BCPS Pre-K are not distinguishable from one

another (χ^2 (1): 2.03; $p < 0.154$). Mother's race is associated with school readiness, as is mother's education at the time of the child's birth, but birth weight and preterm status are not significantly associated with kindergarten readiness once the other variables are taken into account.

Preliminary results from the SFUSD Transitional Kindergarten (TK) study indicate that the program may have increased fall student literacy outcomes. Table 4 provides reduced form intent to treat and two-stage least squares results for the fall kindergarten outcomes. Children who attended TK outperformed their peers on foundational literacy skills. The intent to treat estimate of the standardized average of all foundational literacy skills is 0.166SD and the analogous treatment on the treated effect is 0.505SD. Fall results, however, indicate that TK students are not more likely to able to read books. Despite the causal nature of the research design, these results alone cannot definitely indicate if TK is more effective at raising literacy outcomes. This is because SFUSD uses the Fountas and Pinnell assessment as a formative assessment their TK through third grade classrooms. Assuming Pre-K programs in the city do not use this assessment, former TK students have had more exposure to the assessment. Fortunately, the second cohort is now in first grade and the district uses the Fountas and Pinnell in first grade to assess students on reading books of increasing difficulty. We will received data in November 2015 and see if these effects persist to first grade. At this point all students will have had ample exposure to the assessment, and if former TK students are reading at higher levels, this finding will provide more definitive proof of the program's efficacy.

Both the Baltimore Education Research Consortium and the Stanford-SFUSD Partnership will explain in the context of sharing these findings the lessons learned about working together in research practice partnerships. The findings will emphasize the importance of developing joint research agendas and establishing motivation for both the researcher and practitioner to be invested in the study from the very beginning. Both partnerships will also explain the importance of data management and the efforts that went into establishing data sharing agreements needed to operationalize these studies. Finally, both partnerships will explain how these projects benefited from structures and systems they have for supporting a two-way dialog between researchers and practitioners aimed at facilitating the use of the practitioners in their decision-making.

Conclusions:

This panel will provide conference attendees with information on two long-term research practice partnerships that have produced robust, analytically advanced research on early childhood education. Discussants will speak to how the research has been utilized by San Francisco's and Baltimore's school systems to improve their schools and services to students, and to how the partnership has helped augment the agenda of researchers. Finally, the panel will share lessons learned about partnering to support this complex topic of early education where traditional data sets are cumbersome and longitudinal data is scarce.

During this 90-minute panel, the discussion will be organized accordingly:

- To start, audience members will be asked what the most pivotal piece of research on early education, and think of a way this research was used to inform policy/practice. During the panel discussion, they would be asked to list one question and one thing they learn.
- The partnerships would share about strategies they use for partnering, the two exemplars of research findings described in this proposal, and practitioners' use of the findings.
- Then, audience members would discuss their questions with the panelists.
- Audience members and panelists would share one thing they learned.

Appendix A. References

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Appendix B. Tables and Figures

Table 1: Characteristics of First Cohort of Baltimore Kindergarten Students (2007-2008 Births)

Variable	Mean	Std. Dev.	Min	Max
Kindergarten Ready	0.76	--	0	1
Head Start and Pre-K	0.17	--	0	1
Head Start Only	0.17	--	0	1
Pre-K Only	0.44	--	0	1
Neither Program*	0.22	--	0	1
Less Than High School	0.33	--	0	1
High School Degree*	0.42	--	0	1
Some College	0.14	--	0	1
College Degree	0.11	--	0	1
Birth weight (grams)	3095.26	604.83	520	5245
Birth weight (std).	0.00	1.00	-4.26	3.55
Preterm Birth	0.13	--	0	1
Mother Married at Birth	0.18	--	0	1
Assistance with Medical Costs at Birth	0.77	--	0	1
African-American*	0.83	--	0	1
White	0.10	--	0	1
Hispanic/Latina	0.06	--	0	1
Asian	0.01	--	0	1
American Indian	0.00	--	0	1
Other	0.00	--	0	1

N = 5,409; * Denotes reference category in statistical model.

Table 2: Results of Multilevel Logistic Regression Models Predicting the Odds of Being Ready for Kindergarten in Baltimore

	Model 1	Model 2
Head Start and Pre-K	3.589***	3.904***
	[2.823, 4.562]	[3.058, 4.983]
Head Start Only	1.115	1.260*
	[0.904, 1.376]	[1.016, 1.563]
Pre-K Only	3.128***	3.317***
	[2.598, 3.766]	[2.744, 4.009]
Mother Did Not Complete High School		0.739***
		[0.628, 0.871]
Mother Attended Some College		1.373**
		[1.083, 1.741]
Mother Holds College Degree		2.813***
		[1.989, 3.979]
Birth weight (std)		1.047
		[0.959, 1.143]
Preterm Birth		0.847
		[0.659, 1.087]
Assistance with Medical Costs at Birth		0.924
		[0.755, 1.130]
Not African-American		1.314*
		[1.016, 1.700]
Variance Estimate		
Constant	1.511*	1.577*
	[1.093, 2.090]	[1.123, 2.159]

N = 5,409; Exponentiated coefficients (odds ratios) shown; 95% confidence intervals in brackets; * p<0.05, ** p < 0.01, *** p < 0.001.

Table 3: Descriptive Statistics of SFUSD Transitional Kindergarten Study Sample

	Analytical Sample		Former TK Students			
Variable	Mean	St. Dev.	Mean	St.Dev	Minimum	Maximum
Programmatic Characteristics						
TK Eligible	0.139	0.346	0.997	0.057	0	1
Attended TK In Year T-1	0.050	0.218	1	0	0	1
Attended District PreK in Year T-1	0.170	0.376	0	0	0	1
Birthday (days from December 2)	-120.391	98.351	25.887	17.063	-304	61
Student Characteristics						
Female	0.495	0.500	0.479	0.500	0	1
Asian	0.324	0.468	0.443	0.498	0	1
Hispanic	0.241	0.428	0.256	0.437	0	1
White	0.163	0.369	0.097	0.297	0	1
Other	0.173	0.378	0.162	0.369	0	1
Declined To State Ethnicity	0.096	0.295	0.042	0.201	0	1
Special Education	0.071	0.257	0.032	0.177	0	1
Limited English Proficient (LEP)	0.451	0.498	0.576	0.495	0	1
Home Language:						
Chinese	0.178	0.383	0.294	0.457	0	1
Spanish	0.140	0.347	0.165	0.372	0	1
English	0.596	0.491	0.456	0.499	0	1
Other	0.086	0.280	0.084	0.278	0	1
Dominant Language:					0	1
Chinese	0.217	0.412	0.311	0.464	0	1
Spanish	0.164	0.371	0.172	0.378	0	1
English	0.503	0.500	0.411	0.493	0	1
Other	0.116	0.321	0.107	0.309	0	1
Fall Fountas and Pinnell Outcomes						
Upper Case Letters	20.693	8.180	22.896	6.621	0	29
Lower Case Letters	19.103	8.448	22.275	6.896	0	29
Letter Sounds	12.866	9.106	18.071	8.200	0	29
High Frequency Words	7.070	7.872	14.217	9.399	0	25
Initial Word Sounds	5.358	3.197	6.534	2.594	0	10
Early Literacy Behaviors	7.002	3.019	8.534	2.458	0	11
Blending	3.790	4.090	5.863	4.080	0	10
Rhyming	5.756	4.095	7.363	3.690	0	10
Mastered Required Found. Skills	0.071	0.256	0.246	0.431	0	1
Reached Leveled Reading	0.158	0.365	0.223	0.417	0	1
Test Given In Spanish	0.129	0.336	0.120	0.325	0	1

Note: Analytical sample contains 6,174 students for all variables listed above, except: fall rhyming (5,541), and fall blending (5,905). Former TK students are students in the analytical sample who enrolled in the district's TK program in the previous year. TK sample contains 309 students for all variables except fall rhyming (273), and midyear rhyming (278).

SOURCES: 2013-2014 and 2014-2015 Kindergarten administrative data contained student characteristics, including exact birthdate. Administrative data was linked to district test files to obtain Fountas and Pinnell outcome data. Students who experienced district TK and PreK were identified by linking Kindergarten administrative data to the district TK and PreK adminsitrative data sets from the previous school year. TK stands for Transitional Kindergarten and PreK stands for Pre-Kindergarten.

Table 4: Reduced Form OLS and 2SLS RD Estimates of Fall Literacy Outcomes

	(1)	(2)	(3)	(4)
Literacy Outcome	Reduced Form		2SLS	
Average of Foundational Skills	0.154*	0.166**	0.445**	0.505**
	(0.060)	(0.042)	(0.159)	(0.106)
Upper Case Letters	0.154*	0.147**	0.447**	0.449**
	(0.065)	(0.050)	(0.173)	(0.129)
Lower Case Letters	0.146*	0.136**	0.422*	0.413**
	(0.066)	(0.051)	(0.175)	(0.128)
Letter Sounds	0.175**	0.221**	0.508**	0.674**
	(0.061)	(0.059)	(0.162)	(0.135)
High Frequency Words	0.239**	0.230**	0.692**	0.701**
	(0.067)	(0.071)	(0.173)	(0.163)
Early Literacy Behaviors	0.159*	0.164**	0.462*	0.499**
	(0.079)	(0.050)	(0.211)	(0.138)
Initial Word Sounds	0.110	0.116*	0.318	0.353*
	(0.075)	(0.054)	(0.207)	(0.142)
Rhyming	0.135	0.154**	0.379	0.453**
	(0.086)	(0.058)	(0.236)	(0.164)
Blending	0.072	0.142*	0.210	0.432*
	(0.078)	(0.062)	(0.224)	(0.174)
Pr(Reached Leveled Reading)	0.023	0.009	0.066	0.026
	(0.026)	(0.017)	(0.075)	(0.042)
Covariates		√		√
Teach-By-Year FE		√		√

Note: Each cell represents the results of a separate regression discontinuity estimate of the effect of Transitional Kindergarten on the indicated literacy outcome. Row headers indicate the dependent variable. Columns 1-4 present fall literacy results. Covariates include all student characteristics in Table 3, an indicator for kindergarten year, and teacher-by-year fixed effects. The functional form of all regressions is a linear spline. Akaike's Information Criteria indicates a linear spline is optimal. Sample size is 6,174 for all regressions except fall rhyming (5,541 students) and fall blending (5,905 students). All standard errors are clustered on the day of birth running variable. *indicates p<0.10, **p<0.05, ***p<0.01