



RESEARCH BRIEF

for the Houston Independent School District

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Equality of Pre-Kindergarten Educational Opportunities: Examining Student Differences in Access to High Quality Pre-Kindergarten (Part 1)

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This study focuses on variations in the quality of pre-kindergarten programs across the Houston Independent School District (HISD) by examining the number of National Institute for Early Education Research (NIEER) quality benchmarks attained by pre-k programs and how these contexts vary for students of different racial/ethnic, economic, and linguistic backgrounds. Findings from this study suggest that White and Black students are in pre-k programs which have attained a higher number of quality benchmarks than Hispanic and Asian students. Additionally, students who have limited English proficiency (LEP) are in programs attaining fewer benchmarks than non-LEP students.

BACKGROUND

Fifty years ago, a study commissioned by the United States Department of Health, Education, and Welfare changed the way scholars, educators, and policy makers understood the educational opportunities afforded students in this country through the public school system. Entitled “The Equality of Educational Opportunity” (EEO), in this study, James Coleman and collaborators (1966) examined variations in educational opportunities for children of different racial and ethnic backgrounds, including the extent to which students experienced segregation, how resources varied between schools, and whether these differences in resources and schools

attended were associated with differences in student academic achievement.

Today, the same questions are still relevant, but also must include an examination of variations in educational opportunities and outcomes that exist at the earliest point in children’s educational trajectories. While the EEO study, or as it is more commonly referred, the “Coleman report”, examines children’s educational experiences beginning at 3rd grade, as we also recognize the importance of early education, examining whether disparities in opportunities exist as early as pre-kindergarten is warranted. As a number of states offer pre-kindergarten programs as part of the public schooling system, the same questions that led to

the EEO study in 1966 remain relevant, including understanding whether students of different racial and ethnic and socioeconomic backgrounds are receiving access to equal educational resources and whether equality exists in their educational outcomes.

Increasing focus has moved to these early years as a significant body of existing literature has established that the skills children develop in their early years are associated with later educational outcomes. Students who are prepared for school have greater academic achievement than their peers who are not ready, complete more years of education, and have fewer behavioral problems throughout their educational careers (Alexander, Entwisle, and Horsey 1997; Duncan et al. 2007; Entwisle, Alexander, and Olson 2005; Kurdek and Sinclair 2001). Children who participate in programs like pre-kindergarten and preschool are on average more prepared for school than students who participate in other types of early childhood care. In these early educational programs, children develop cognitive skills, including early math and reading skills, and non-cognitive skills, including approaches to learning and socioemotional behaviors, to a greater extent than their peers who do not participate in these types of early childhood programs (Bradley and Vandell 2007; Burchinal 1999; Howes and Hamilton 1993; Vandell, 2004).

In trying to ensure that children have equal opportunities to be ready for school, state and federal governments have increasingly invested resources in strengthening early childhood education and the availability of programs to children (Barnett et. al., 2016; Parker, Atchison, and Workman, 2016). For some families, the cost of high quality early childhood education programs is prohibitive and thus, in order to receive high quality educational opportunities for their children, they rely on programs offered through the public education system (Glynn, Farrell, and Wu, 2013; Greenberg, Adams, and Michie, 2016)

Using a wide body of existing research, the National Institute for Early Education Research (NIEER) has developed a list of ten quality

benchmarks which serve as indicators of a high quality state-funded pre-k program (Barnett et al., 2010, 2016). These include topics around teacher training, developmentally appropriate curricula, and support services for students, to name a few (see Appendix B for greater detail). Although this is not intended to be a comprehensive list, NIEER believes that they serve as the minimum requirements necessary to be providing high quality early education services to children.

However, there is less known about whether all children, regardless of background, are participating in pre-k programs of similar quality throughout the district. Given the autonomy of schools in HISD, it stands to reason that there may be significant differences between pre-k programs with regards to where resources are focused and, in turn, which quality benchmarks are reached. As a result, all students may not be enrolled in programs of the same quality, with some demographic groups, such as economically disadvantaged students, students in poverty, Black, and Latino students, at risk of being enrolled in programs with the fewest resources (Betts, Reuben, and Danenberg, 2000; Condrón and Roscigno, 2003; Desimone and Long, 2010; Darling-Hammond, 1998). Better understanding these disparities in inputs is of interest to education researchers as we look for ways to better understand significant disparities that exist in student educational outcomes. Students who are economically disadvantaged, have limited English proficiency, and are racial and ethnic minorities have lower academic achievement, fewer years of educational attainment, and greater risk of dropping out of school than their peers (see APA, 2012; Jencks and Phillips, 2011; Warren, 1996). A number of these disparities can be traced back to disparities that exist in early childhood (Garcia, 2015; Jencks and Phillips, 2011; Jordan et al., 2009).

Thus, this two-part study examines the equality of educational opportunity as it relates to important questions in education today. Namely, are children of different sociodemographic backgrounds receiving equal educational opportunities beginning at pre-kindergarten (Part 1, which is included in this

brief)? Further, building on the concepts discussed in the EEO report calling for the consideration of the equality of results in addition to the equality of inputs, Part 2 of this study asks whether given the same background characteristics, the quality of the pre-kindergarten program in which a student is enrolled is associated with student academic skills at the end of pre-k (“Equality of Pre-Kindergarten Educational Opportunities: Examining Differences in Student Outcomes (Part 2), separate brief”).

Using data provided by the Houston Independent School District (HISD), and guided by research conducted by NIEER, this study assesses between-school variation in attaining a series of pre-k quality benchmarks and the relationship between student characteristics and the level of pre-k program quality.

RESEARCH QUESTIONS

Specifically, there are three questions Part 1 of this study aims to address:

- 1) What is the distribution of pre-k quality benchmarks reached by schools in the district?
- 2) Which student characteristics are associated with enrollment in pre-k programs with a higher number of quality benchmarks (continuous indicator)?
- 3) Which student characteristics are associated with enrollment in pre-k programs with the most quality benchmarks and those with the fewest (dichotomous indicators)?

DATA AND METHODS

Data

The data for this study come from two sources. One source is HISD, which provides information regarding student sociodemographic characteristics, enrollment status, teacher certifications, and school-level demographic characteristics for fall and spring of the 2015-2016 school year. This sample was restricted to

students who were in HISD pre-k in 2015-2016.¹

The second source of data comes from a questionnaire distributed to the 164 campuses identified in HISD as containing pre-kindergarten classrooms. This questionnaire is intended to measure various characteristics of pre-kindergarten programs throughout the district (see Appendix A for further detail on the questionnaire). Fifty-four schools responded to the questionnaire, but only fifty of these schools are included in this analysis, as some were missing data from administrative files regarding teacher certifications. While this reflects just under one-third of the campuses sent questionnaires, these campuses hold almost 40 percent of the pre-k students eligible for inclusion in this sample. When comparing schools with pre-k programs that participated in the questionnaire to those with pre-k programs that did not participate, there were no significant differences in student characteristics between schools (results available upon request). This suggests that the results observed in this analysis are likely not artifacts of the differences that exist between schools that responded and those that did not.

For those analyses which evaluate the relationship between student characteristics and program quality indicators, the sample is limited to only those students who were in schools which participated in the questionnaire (N=4,341).

Measures

Quality pre-kindergarten is a continuous measure that demonstrates the overall level of quality of pre-kindergarten programs within a school. This number is a composite score created through the combination of nine quality benchmarks established by the National

¹ In the state of Texas, only students who are identified in one or more risk groups are eligible for access to free, state-funded public pre-k, including: unable to speak and comprehend English, educationally disadvantaged, homeless, child of a member of the armed forces who is in active duty or who was killed or injured while serving, or has ever been in the care of the Department of Family and Protective Services (Texas Education Code §29.153).

Institute of Early Education Research (NIEER). A higher number on this measure is an indicator that a pre-kindergarten program is likely of higher quality. Note: this indicator is out of nine benchmarks, rather than ten, as established by NIEER, as data on one of the benchmarks are not available at this time. See Appendix B for a detailed description of this measure.

This study also utilizes an indicator of *high number of quality benchmarks*. This is a dichotomous variable that indicates whether a campus has at or above the median number of quality benchmarks (6 or greater). Similarly, an indicator of *low number of quality benchmarks* is a dichotomous variable indicating that a school has attained 3 or fewer benchmarks.²

Student-level characteristics include economic disadvantage, race/ethnicity, immigrant status, enrollment in special education, limited English proficiency, age, gender, and whether the student attends their zoned school.

Analytic Strategy

The first stage of this analysis (Part 1) uses bivariate analysis, OLS regression, and logistic regression to examine differences in quality benchmarks between schools and the characteristics of students who attend schools with fewer versus more quality benchmarks (dashed box in Fig. 1).

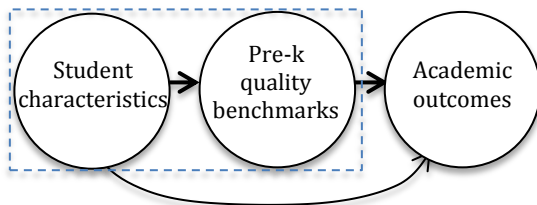


Figure 1. The relationship between student characteristics, pre-k quality benchmarks, and student outcomes.

² This analysis uses three benchmarks as an indicator of a “low” number of benchmarks achieved because all campuses have at least two benchmarks which means campuses with three have one more than the minimum. Six is used as an indicator of a “high” number of benchmarks achieved because this is the median number in the sample. Similar results are observed when using seven benchmarks as the cut for “high”.

RESULTS

Characteristics of schools in sample

Given both the socio-demographic composition of the Houston area and the characteristics of students who are allowed to access free, state-funded pre-k through HISD, it is not surprising that schools which participated in this study have student populations with high rates of economic disadvantage (81.4 percent) and high proportions of students with limited English proficiency (40 percent) (Table 1), compared to state and national averages which are closer to 50 percent economic disadvantage and 15.5 and 8.8 percent LEP, respectively (ED Data Express, 2015; Suitts, 2015; TEA, 2016).

Table 1. Descriptive characteristics of schools in sample (N=50).

	Percent/ Mean(SD)
Economically disadvantaged	81.4%
Limited English proficiency	40.0%
Racial/ethnic composition	
White	6.9%
Black	26.3%
Hispanic	62.6%
All other groups	4.2%
% of schools ≤ 3 benchmarks	14.0%
% of schools ≥ 6 benchmarks	48.0%
Number of quality benchmarks	5.2 (1.6)

On average, the schools in the sample attained just over half (5.2) of the nine NIEER quality benchmarks. As the school district has a set of comprehensive early learning standards and requires that teachers possess a B.A. or above, all schools have reached, at a minimum, these two benchmarks. Shown in Table 2, at schools with the most benchmarks (≥ 6), the other most commonly occurring benchmarks are: at least 15 hours of teacher in-service offered per year, additional services are offered to students (including health, dental, vision, other support services, or referrals for these services), the provision of at least one meal, and the school is aware of site monitoring occurring in the past five years.

At schools that attained the lowest number of quality benchmarks (≤ 3), there was not a third benchmark that was common across all campuses. Notably, one commonality between

these campuses was that none offered any health related screenings or support services (or referrals for these services) to students.

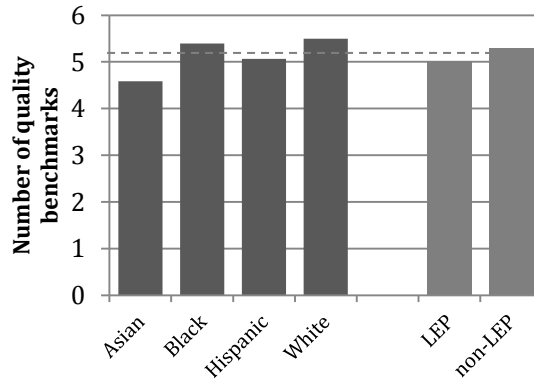
	Schools with...	
	≥ 6 benchmarks	≤ 3 benchmarks
Comprehensive early learning standards	100%	100%
Teacher degree: BA or above	100%	100%
Teacher specialized training in pre-K		
Teacher in service: 15 hours/year	92%	
Maximum class size: 20 or less		
Staff-child ratio: 1:10 or better		
Health related screenings/referrals and support services	92%	0%
At least one meal provided	100%	
Site monitoring in past 5 years	75%	

More details about these quality benchmarks can be found in Appendix B

Student characteristics associated with number of quality benchmarks of pre-k program

To better understand the relationship between student characteristics and the number of quality benchmarks of the program in which they enroll, this analysis next uses regression models to evaluate whether any association exists.

As shown in Figure 2 (full table available in Appendix C), when examining racial and ethnic differences in the number of quality benchmarks, Hispanic and Asian students are on campuses which have significantly fewer benchmarks than White students (just over one-quarter and one-half of a standard deviation, respectively). Similarly, Black students were on campuses with a higher number of quality benchmarks than Hispanic or Asian students, though these differences are slightly smaller than those from White students.



Dotted line represents the average number of benchmarks per school ($\bar{x}=5.2$).

Figure 2. Predicted number of quality benchmarks for select student groups.

Additionally, as shown on the right side of Figure 2, students who are classified as having limited English proficiency are in programs that reached fewer quality benchmarks than their non-limited English proficiency peers. This difference is equivalent to almost one-fifth of a standard deviation.

Student characteristics associated with enrollment in high or low quality pre-k programs

In Table 3, the first column of results presents the relationship between student characteristics and the odds of enrollment in a program with greater than or equal to 6 quality benchmarks. The results of this analysis suggest that Asian students have half the odds of being enrolled in a high quality program of White students (OR=0.512). In contrast to the previous results, there is not a difference between White and Hispanic students. But, the difference between Black students and Hispanic or Asian students is significant, in that odds of enrollment in a high quality program for Black students are significantly higher than for the other two groups.

Patterns are similar when estimating odds of enrollment in programs with the fewest quality benchmarks (less than or equal to 3) by race/ethnicity. Shown in the right columns of Table 3, Black students have the lowest odds of enrollment in the lowest quality programs of any racial or ethnic group, with odds of enrollment in these programs only about one-third of their peers. Asian students are more than twice as likely to be enrolled in a low

quality benchmark program as White or Hispanic students.

When compared to non-economically disadvantaged students, economically disadvantaged students are about twice as likely to be enrolled in a program with high quality benchmarks, and, also, twice as likely to be enrolled in a program with low quality benchmarks. These findings suggest that economically disadvantaged students are more likely than their non-disadvantaged peers to be enrolled in both the highest and lowest quality programs.

Similarly, students who attend their zoned schools are also less likely to attend a program with high quality benchmarks than students who attend non-zoned schools, with over fifty percent lower odds. Students who attend their zoned school are also less likely to be enrolled

in a low quality benchmark program than students who attend a non-zoned school. Together, these findings suggest that families who choose a non-zoned school for their child are more likely to be choosing both the highest and lowest quality programs.

The experiences for students with limited English proficiency show greater consistency in results, as those who are LEP have lower odds of enrollment in a pre-k program with a high number of quality benchmarks (OR=0.712), and greater odds of enrollment in a program with a low number of quality benchmarks (OR=1.72) than their peers who are not LEP. These differences reflect approximately 30 percent lower odds of being enrolled in a program with high quality benchmarks and 70 percent greater odds of being enrolled in a program attaining few quality benchmarks for LEP students.

Table 3. Odds ratios predicting enrollment in programs with a high number (≥6) and low number (≤3) of NIEER quality benchmarks for HISD pre-k students.

	High quality benchmarks N=2,292			Low quality benchmarks N=744	
	OR	SE		OR	SE
Race/ethnicity (ref: White)					
Hispanic	0.699	0.198		0.879	0.262
Black	1.217	0.206		0.326	0.281 ***
Asian	0.512	0.274 *		2.030	0.330 *
Other	2.162	0.415		0.105	1.048 *
Female (ref: male)	0.871	0.064 *		1.118	0.084
Economically disadvantaged (ref: non-economically disadvantaged)					
	1.930	0.152 ***		2.175	0.216 ***
Age (in years)	0.852	0.109		1.151	0.143
Immigrant (ref: non-immigrant)	1.077	0.153		0.813	0.191
Special education (ref: not enrolled in special education)					
	0.817	0.205		1.043	0.279
Attends zoned school (ref: attends non-zoned school)					
	0.434	0.064 ***		0.360	0.088 ***
Limited English proficiency (ref: not limited English proficiency)					
	0.712	0.080 ***		1.718	0.105 ***
Constant	2.920	0.525 *		0.079	0.700 ***

*** p<0.001 ** p<0.01 *p<0.05

Note: When the odds ratio on any variable is above 1, it indicates that the presence of the variable is associated with higher odds of being enrolled in a given program type than the comparison group. A value below 1 indicates lower odds of enrollment than the reference group.

DISCUSSION AND RECOMMENDATIONS

The purposes of this study were twofold. First, this study measured the variation across HISD with respect to the number of NIEER quality benchmarks attained by campuses with pre-k programs. Second, this study assessed whether students of all backgrounds had the same access to programs that reached higher numbers of quality benchmarks, evaluating the equality of opportunity for students in the district.

With regards to the first goal, this study finds that there is significant variation across the district with regards to the offerings associated with high quality pre-k programs at each campus. Of the fifty campuses included in this analysis, **there were no campuses in HISD which attained 9 of 9 quality benchmarks.** The average across the district was just over 5 benchmarks. While the district surpassed the current education policy of the state of Texas, which requires only two of these benchmarks (comprehensive early learning standards and teacher in-service), the National Institute for Early Education Research argues that attaining all benchmarks are the minimum requirements to possibly be considered high quality.

When examining whether disparities exist between students regarding participation in programs reaching a higher number of quality benchmarks, the answer is: yes, some disparities exist.

In particular, **Hispanic and Asian students are less likely than their White and Black peers to be in schools with higher quality benchmarks. LEP status is associated with fewer quality benchmarks.**

But, in analyses which focus on students **in the programs with the highest (≥ 6) number of quality benchmarks, Black students and economically disadvantaged students are more likely to be enrolled in these programs than their peers of other races/ethnicities or economic statuses.**

In a number of ways, this tells a promising story. It indicates that some of the students in greatest need of support given disparities in early educational outcomes, namely, economically

disadvantaged students or Black students, may be in schools of the highest quality. But, this study also finds that economically disadvantaged students are also more likely than non-economically disadvantaged students to be enrolled in programs with the fewest quality benchmarks. As noted earlier in the text, this means that economically disadvantaged students are enrolling in both the highest and lowest quality programs. As a result, these at-risk students may not be receiving the resources they need to prepare for kindergarten.

But, this study also finds that **students of limited English proficiency are less likely to be enrolled in the highest quality programs and more likely to be enrolled in the lowest quality programs than their peers.** As existing research has shown that disparities in educational outcomes exist between LEP and non-LEP students, their disparities in enrollment in high quality programs may be of concern. An implication of this finding is that it is particularly important that programs serving large proportions of LEP students ensure that they are providing the necessary resources to help foster later educational success. It may also suggest that it is particularly important to make targeted information regarding pre-k programs available to parents of LEP students, so that they are aware of all of the pre-k opportunities available to their children and can make a well-informed decision about which program to choose for their child.

These findings point to broader issues regarding the variation that exists across schools in the district. If the quality of programs was similar across schools, there would be fewer observed differences in both the number of benchmarks reached across programs and the characteristics of students who attend these programs. Whether a student attends their zoned or non-zoned school matters for the quality of program in which they enroll, as we see that some families may be opting into non-zoned programs because they are of higher quality than the schools to which they are zoned.

Without knowing the true motivation of choice for parents of young children in this district it is difficult to know how parents who select a non-

zoned school choose the campus. Some parents may choose campuses of higher quality, as reflected in the number of benchmarks, and some parents may choose campuses of convenience that are located near their place of employment or another caregiver, for example.

There are a few study limitations, which are important to note. First, only a fraction of campuses participated in the questionnaire used to measure the attainment of quality benchmarks. Although statistical tests show that the characteristics of the campuses responding to the questionnaire are similar to those that did not respond, there may be some unmeasured bias. Additionally, these indicators of quality may not be capturing all important indicators of high quality pre-k for students in this district. In future research, it may be important to measure programs associated with language services, given the high proportion of children for whom English is not their primary language.

Overall, this study reiterates the importance of ensuring that all pre-k programs in the district attain high quality standards so that students, regardless of the neighborhood they live in and their background characteristics, have access to high quality early learning opportunities. This highlights the importance of the district capturing information like that measured in this study on an ongoing basis, in order to assess whether this is the case.

Given what is generally known about the relationship between high quality early childhood education and later student outcomes, investments in these early years are likely to have significant returns in the long run. Future research must examine the association between these indicators of program quality and student outcomes in HISD to understand whether greater attainment of quality benchmarks by schools results in greater academic outcomes for HISD students.

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This is an abbreviated version of a longer research study written for peer review. For additional information on the findings presented here, or to obtain the full peer-review version of this research brief, contact the Houston Education Research Consortium at 713-348-2802 or email herc@rice.edu.

Appendix A: Information about questionnaire

In the Summer of 2016, a questionnaire was sent to principals at 164 HISD campuses identified as having at least one pre-k classroom (based on administrative data and review of campus websites). The questionnaire requested a response from a school administrator, office clerk, or the person overseeing pre-kindergarten education in the school. The questionnaire was initially administered via the Internet with first contact through email which included a customized link that directed respondents to a Survey Monkey page. Follow up contact was made by research assistants through postal mail and telephone as a reminder to complete the survey.

Topics covered in the survey included: number of students in pre-k classrooms, student-to-staff ratios, professional development required of pre-k teachers, support services offered to students (e.g. health, vision, dental, referrals), and whether site monitoring had occurred.

In supplemental analyses, differences between schools which responded to the survey and did not were tested. There were no significant differences between these groups when considering school- or pre-k level demographic characteristics, such as % of race/ethnic group, % economically disadvantaged, % limited English proficiency, or % from non-English households.

Appendix B: Information about NIEER Quality Benchmarks

The National Institute for Early Education Research has developed a list of 10 research-based quality standards benchmarks, which they feel are the minimum requirements for a high quality early education program. NIEER argues that high quality campuses achieve all of these benchmarks and does not weigh the importance of benchmarks or differentiate between one benchmark being more important than another. Although these standards cover a wide range of program characteristics, they are not intended to be a complete list of qualities associated with high quality learning environments. These indicators have generally been used to examine whether state policies require the level of the benchmark that is associated with high quality. This study examines whether these characteristics are observed in practice in campuses throughout HISD through the use of the questionnaire outlined in Appendix A and administrative data.

Quality	Benchmark
Early learning standards	Comprehensive
Teacher degree	BA
Teacher specialized training	Specialization in pre-k
Assistant teacher degree ^a	<i>CDA or equivalent</i>
Teacher in-service	At least 15 hours/year
Maximum class size	20 or lower
Staff-child ratio	1:10 or better
Screening/referral and support services	Vision, hearing, health; and at least one support service
Meals	At least one meal/day
Monitoring	Site visits at least every five years
From <i>The State of Preschool 2015: State Preschool Yearbook</i> . (Barnett, et al., 2016)	
^a Note: This indicator could not be assessed in this analysis, as HISD does not track the teaching or professional certifications of assistant teachers/teacher aides.	

Appendix C: Regression model predicting total quality benchmarks

OLS regression model predicting total quality benchmarks (N=4,341).			
	Coeff.	SE	
Race/ethnicity (ref: White)			
Hispanic	-0.431	0.137	**
Black	-0.103	0.141	
Asian	-0.911	0.184	***
Other	0.355	0.260	
Female	-0.062	0.044	
Economically disadvantaged	-0.128	0.102	
Age (in years)	-0.080	0.074	
Immigrant	0.052	0.106	
Special education	-0.117	0.142	
Attends zoned school	-0.030	0.044	
Limited English proficiency	-0.285	0.056	***
Constant	6.162	0.360	***
*** p<0.001 ** p<0.01 *p<0.05			