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PRE-KINDERGARTEN TO 3RD GRADE (PK-3) SCHOOL-BASED RESOURCES AND THIRD GRADE OUTCOMES

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By the end of third grade, children must develop foundational skills in reading, math, and behavioral predispositions that maximize their chances of future academic success and well-being.^{1,2,3,4} Results from the 2005 National Assessment for Educational Progress (NAEP) indicate that a large proportion of children lack these foundational skills, and that low-income children are especially vulnerable.^{5,6}

In contrast to many studies that focus on child-level variables in assessing their relationships to child outcomes (a child-readiness frame), this brief examines school as a context for the development of academic and behavior skills necessary for future success and well-being. A PK-3 approach to education provided the framework for selecting variables for this study.⁷ What children experience in school as they move from PK programs to kindergarten, and then through grades 1, 2, and 3 - the "PK-3 Continuum" - is based on high standards/expectations, shared vision and leadership between the principal and teachers, and continuity in learning experiences across these early grades via collaborative planning among teachers and low teacher turnover. Some empirical evidence indicates that the more PK-3 influences that children experience, the better their developmental outcomes by grade three and beyond.^{7,8}

In this brief, we explore the extent to which child outcomes in third grade differ according to variations in school-level variables that are hypothesized to be related to positive outcomes-school-based PK-3 resources. We examine these relationships by subgroups of children based on their educational risk status (e.g., parent education, family income, race/ethnicity). It is expected that children with higher educational risk experience lower quality schooling environments,^{10,11} which likely contribute to achievement gaps.^{12,13,14}

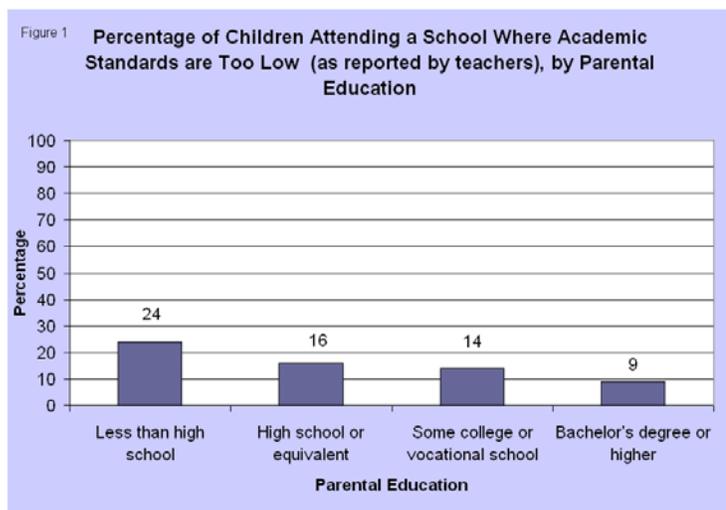
DATA AND METHODS

The data for this brief come from the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K). This is a nationally representative longitudinal study of more than 20,000 children who began kindergarten in the 1998-1999 school year. Data collected include direct assessments of children as well as interviews with parents, teachers,

and school administrators. Teachers and school administrators reported on school characteristics, and parents on family and child characteristics, when the children were in kindergarten. Child outcomes reported in this study were measured in the third grade.

PK-3 school-based resources for these analy-

ses include: principal leadership quality, whether there is broad agreement on the central mission of the school, level of academic standards, presence of a PK class in the school, frequency of teacher meetings for curriculum development, frequency of teacher meetings for lesson planning, teacher absenteeism, teacher turnover, and self-reports of teacher efficacy. For a more detailed description of these and other variables used in the analyses, see Table 1.



Child outcome measures in these analyses include math and reading scores; teacher assessment of child's capacity for self-control; teacher assessment of child's level of school engagement; and grade retention. Family background measures used in the descriptive and multivariate analyses include poverty status; family structure; parent education attainment; race/ethnicity; and whether the child was foreign-born.

PK-3 SCHOOL-BASED RESOURCES

Table 1 presents rates of exposure to selected PK-3 school resources for the population of kindergarten students as a whole, and disparities in access to these influences across key social groups.

Who has Access?

Our analyses indicate that exposure to most of the positive PK-3 school influences as we have measured them is experienced by a majority of children across the sociodemographic groups examined. Most children in each of these groups go to grade schools that report high levels of administrative leadership, a strong emphasis on alignment, where academic standards are not perceived as low, where regular curriculum development takes place, teacher absenteeism and turnover is not perceived as a problem, and with high levels of self-efficacy among the teachers. The exception is the presence of a pre-k through grade three in the school

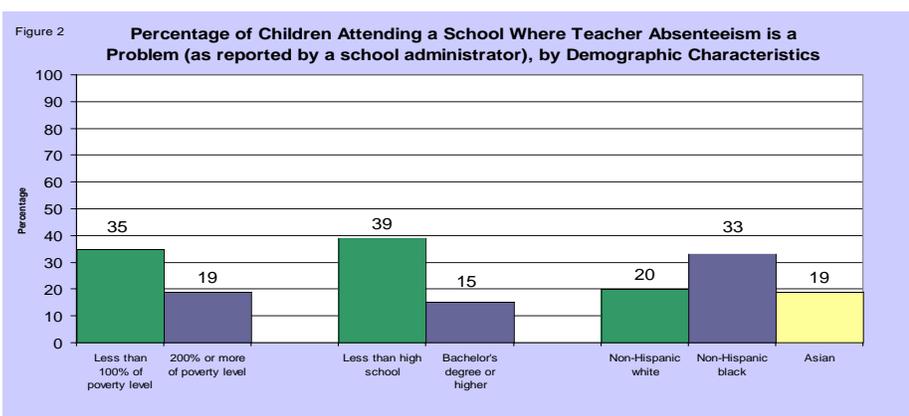
where the students attended kindergarten, with fewer than a third of students in such schools.

Some notable and potentially troubling differences in access to these school resources were found across groups, however.¹⁵ For example, low-income kindergarten children were twice as likely as children living at 200+ percent of the poverty line to attend schools where academic standards were reported by teachers to be a potential problem (20 percent versus 10 percent). Differences in access to school resources by educational risk status were even larger when parent education level was considered. Children whose parents lacked a high school degree were nearly three times as likely as children whose parents have a bachelor's degree or higher to be in schools where teachers consider academic standards to be too low (see Figure 1). Black (non-Hispanic) children were also more likely than White or Asian children to attend schools where academic standards were reported to be too low.

Educational risk factors were also related to perceived problems with teacher absenteeism and turnover, and principal leadership. Low-income, low levels of parent education, and being Black related disproportionately to more problems with teacher absenteeism (see Figure 2 and Table 1). Children who were more affluent, White, and whose parents had a Bachelor's degree or higher were more likely to have strong principal

leadership and lower rates of teacher turnover. (See Table 1).

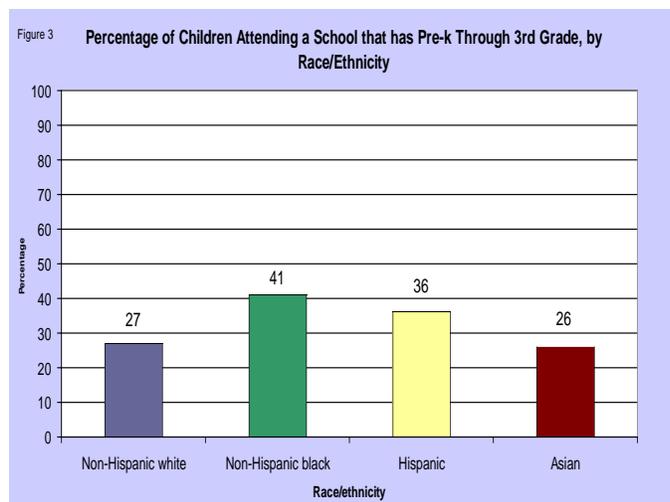
Black and Hispanic children were more likely than white or Asian children to attend kindergarten in schools that contained a PK classroom (see Figure 3). This finding may be due to targeted PK programs in many states. Only Oklahoma, Georgia, Florida, and Washington, D.C. provide universal access to state-funded PK programs.¹⁶



and self-control), and logit models for positive school engagement and grade retention. The results are displayed in Table 2.

Third Grade Math and Reading

The results indicate that math and reading scores are susceptible to a number of PK-3 school-based resources.¹⁷ The analyses show that a child is more likely to read well in schools with strong principal leadership and where academic standards are not perceived as being low. There is also a trend towards a positive relationship with higher levels of collaborative curriculum development by teaching staff, (significant at the 0.1 level). Math scores are related as expected to these three school influences, though their relationship to principal leadership and academic standards are weaker. Counter to our expectations, perceived problems with teacher absenteeism predicted higher math scores once other factors were controlled. This multivariate finding is opposite to the bivariate analysis, which showed a negative relationship.¹⁸



RELATIONSHIPS BETWEEN PK-3 SCHOOL-BASED RESOURCES AND THIRD GRADE OUTCOMES

Our choice of measures was guided by a PK-3 framework, which is based on what research shows contributes to good child outcomes. However, little research has examined multiple PK-3 school-based resources simultaneously in predicting academic and behavioral outcomes in the third grade. The purpose of the multivariate analyses was to see which of the PK-3 school-based resources continued to predict third grade outcomes once we controlled for other factors (personal, family, as well as other selected school contextual influences). We ran ordinary least squared regression models for our three continuous outcomes (math score, reading score,

Third Grade Self-Control, School Engagement, and Grade Retention from K-3

The other three outcomes (self-control, school engagement, and grade retention) did not show significant relationships to the PK-3 school-based resources that predicted math and reading outcomes. All were, however, related to teacher turnover, with high rates of turnover related to less self-control, less positive engagement, and surprisingly, a lower chance of having repeated a grade. A positive relationship was found between teachers who believed that they made a dif-

ference in children's lives, and grade retention from K-3. It may be that unstable environments, characterized by high teacher turnover are somehow more conducive to social promotion outcomes for children, and alternatively, teachers with positive self-efficacy believe they are doing the right thing to retain children who have not mastered grade level material.

DISCUSSION

This brief examined multiple PK-3 school-based resources that tap into children's experiences of early elementary grade learn- to PK-3 school-based resources by key social groups of children defined by poverty status, parental education, and race/ethnicity. While the majority of children had access to most positive PK-3 school influences, marked inequalities in access were still found. Unequal access to these school resources were observed by parental education and income level, as well as race and Hispanic origin. The most educationally at-risk children (i.e., parents have less than a high school education, family income below the poverty level, Black non-Hispanic children) were the least likely groups of children to access high resource elementary schools. This finding clearly indicates that the quality of elementary schools must be considered when examining questions concerning achievement gaps by income and race/ethnicity.

Our preliminary multi-variate analyses point to some core school variables that predict academic and behavior skills necessary for future success and well-being. Of particular interest are the differential relationships between two clearly defined sets of PK-3 school-based resources reported in kindergarten, and their relationships to academic and behavior outcomes in third grade. Reading and math scores were consistently predicted by strong principal leadership, high academic standards, and teachers collaboratively developing curricular materials. Teacher turnover, which can be considered indicative of instability within a school, was related to lower rates of self-control and

school engagement among third grade children. These findings suggest that there may be PK-3 school-based resources that independently predict academic and behavioral outcomes. Though these results are preliminary, we believe they are the strongest research evidence yet that such factors each have influence over levels of school readiness in young children.

LIMITATIONS

These analyses have some important limitations which should be acknowledged.

First, by limiting the analysis to only two time points (kindergarten and third grade) we did not take full advantage of the rich longitudinal data of the ECLS-K. While this approach is useful for exploratory analyses, future work should take advantage of the longitudinal nature of the ECLS-K dataset and chart individual growth in achievement and behavior over time as it relates to PK-3 school-based resources.

Second, single survey items can have less power to predict outcomes than composite variables that converge on a single construct. Future work in the area of PK-3 school-based resources should explore developing psychometrically sound composite variables to explore the key constructs that predict third grade outcomes.

Third, the preliminary multivariate analyses presented here did not correct statistically for the fact that multiple children from the same schools are in the sample. This can sometimes result in a higher probability of statistically significant findings than is actually warranted. In future work we will use more complex modeling procedures that make such corrections.

Fourth, the PK-3 measures were based on principal and teacher report, which may produce a more optimistic picture of the school environment than more objective methodologies such as observation.

Lastly, these analyses did not find that having a PK classroom in the school was related to third grade outcomes. We would argue that the quality of PK experiences is a more important measure of a PK-3 school-based resource than simply the presence of a PK classroom. The ECLS-K dataset does not include a PK quality measure, and therefore such a measure could not be included in the analyses.

IMPLICATIONS

The findings in this brief add fresh evidence that key elements of the school environment as identified in the PK-3 literature are related to later positive intellectual and behavioral outcomes for children. In addition, reducing the inequality of access to these positive influences may lead to improved outcomes for children from high-risk backgrounds.

These analyses create a path for future researchers to examine school-level variables as a context for children's developmental outcomes. By modeling a combination of child, family, and school characteristics found to predict child outcomes, researchers can contribute to the agenda on improving educational contexts for all children.

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¹National Research Council (1998). *Preventing Reading Difficulties in Young Children. Committee on the Prevention of Reading Difficulties in Young Children.* Catherine E. Snow, M. Susan Burns, and Peg Griffin, eds. Commission on Behavioral and Social Sciences and Education. Washington, D.C.: National Academy Press.

²Good, R. H., Simmons, D. C., & Kame'enui, E. J. (2001). The importance and decision-making utility of a continuum of fluency-based indicators of foundational reading skills for third-grade high-stakes outcomes. *Scientific Studies of Reading*, 5, 257-288.

³Lehr, C. A., Sinclair, M. F., & Christenson, S. L. (2004). Addressing student engagement and truancy prevention during the elementary school years : A replication study of the Check & Connect Model. *Journal of education for students placed at risk*, 9, 279-301.

⁴Reynolds, A. J. (1998). Resilience among Black urban youth: Prevalence, intervention effects, and mechanisms of influence. *American Journal of Orthopsychiatry*, 68 (1), 84-100.

⁵Perie M, Grigg W, and Dion G. (2005) The Nation's Report Card : Mathematics 2005. (NCES 2006-453). U.S. Department of Education, National Center for Education Statistics. Washington, D.C. U.S. GPO.

⁶Peri M, Grigg W, and Donahue P (2005). The Nation's Report Card : Reading 2005. (NCES 2006-451). U.S. Department of Education, National Center for Education Statistics. Washington, D.C. U.S. GPO.

⁷Bogard, K. & Takanishi, R. (2005). PK-3: An aligned and coordinated approach to education for children 3 to 8 years old. *SRCD Social Policy Report*, 19, 1-23.

⁸Reynolds, A. J., Magnusson, K., & Ou, S. (2006). P-3 education: Programs and practices that work in children's first decade. *Working paper*, Foundation for Child Development.

⁹Reynolds, A., Temple, J. A., Robertson, D., & Mann, E. (2001). Long-term effects of an early childhood intervention of educational attainment and juvenile arrest. *Journal of the American Medical Association*, 285, (18), 2339-2346.

¹⁰Pianta, R. C., La Paro, K. M., Payne, C., Cox, M. J., & Bradley, R. (2002). The relation of kindergarten classroom environment to teacher, family, and school characteristics and child outcomes. *Elementary School Journal*, 102, 225-238.

¹¹Entwisle, D. R., Alexander, K. L., & Olson, L. S. (2006). Educational tracking within and between schools from first grade through middle school and beyond. In A. C. Huston & M. N. Ripke, (Eds.), *Developmental contexts in middle childhood: Bridges to adolescence and adulthood. Cambridge studies in social and emotional development* (pp. 173-197). New York: Cambridge University Press.

¹²Reardon, S. F., & Galindo, C. (April, 2006). K-3 academic achievement patterns of Hispanics and other racial/ethnic groups. *Paper presented at the American Educational Research Association Meeting, San Francisco.*

¹³Bub, K. L., Murnane, R. J., Willett, J. B., & McCartney, K. (2006). Explaining puzzling patterns in black-white achievement gaps. *Brookings Wharton Papers on Urban Affairs*, 7.

¹⁴Duncan, G. J., & Magnusson, K. A. (2005). Can family socioeconomic resources account for racial and ethnic test score gaps? *Future of Children*, 15 (1), 35-54.

¹⁵In addition to the breaks shown in Table 1, we also examined differences by family structure and child's place of birth, but found very little variation, and so have not reported these estimates.

¹⁶Barnett, W.S., Hustedt, J.T., Hawkinson, L.E., and Robin, K.B. (2006) *The State of Preschool 2006: State Preschool Yearbook.* National Institute for Early Education Research.

¹⁷To simplify and strengthen the final set of equations, some measures of school context that were not significant in any of the models were dropped including: presence of PK classrooms in school where student attended kindergarten; how often teachers meet for lesson planning (distinct from curriculum development meetings); and whether there is broad agreement among faculty on the central mission of the school.

¹⁸The possibility of heteroskedasticity was explored but there was no evidence to indicate this might be the cause of this counter-intuitive finding.

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Appendix of Tables

Table 1: PK to Three Influences by Poverty Status, Race/Ethnicity, and Parental Education Level

| | Poverty | | Race/Ethnicity | | | Parental Education | | | | |
|---|---------------------------------|---------------------------|-------------------------------|---------------------|---------------------|--------------------|-------|----------------------------------|----------------------------------|-----------------------------|
| | Less than 100% of poverty level | 100-199% of poverty level | 200% or more of poverty level | White, non-Hispanic | Black, non-Hispanic | Hispanic | Asian | Less than high school equivalent | High school or vocational school | Bachelor's degree or higher |
| TOTAL | | | | | | | | | | |
| *****PK TO THREE INFLUENCES***** | | | | | | | | | | |
| School has pre-k through 3rd grade | 34 | 33 | 29 | 27 | 41 | 36 | 26 | 37 | 32 | 28 |
| Yes, has pre-k through 3rd grade | 66 | 67 | 71 | 73 | 59 | 64 | 74 | 63 | 68 | 72 |
| Does not | | | | | | | | | | |
| Leadership quality index | | | | | | | | | | |
| (Index score of 12 or above) | 68 | 70 | 76 | 74 | 71 | 70 | 76 | 67 | 69 | 78 |
| Index score of 3 to 11 | 29 | 30 | 24 | 26 | 29 | 29 | 24 | 33 | 31 | 22 |
| Academic standards are too low | | | | | | | | | | |
| Strongly disagree, disagree | 80 | 84 | 90 | 90 | 79 | 82 | 87 | 76 | 84 | 91 |
| Neither agree nor disagree, agree, strongly agree | 14 | 20 | 16 | 10 | 10 | 18 | 13 | 24 | 16 | 9 |
| Meet with other teachers for curriculum planning | | | | | | | | | | |
| Never, once or twice a month | 46 | 44 | 44 | 48 | 41 | 43 | 45 | 41 | 47 | 48 |
| Two or more times per month | 54 | 56 | 56 | 52 | 59 | 57 | 55 | 59 | 53 | 52 |
| Teacher absenteeism is a problem | | | | | | | | | | |
| Strongly disagree, disagree | 75 | 72 | 81 | 80 | 67 | 70 | 81 | 61 | 70 | 85 |
| Neither, Agree, Strongly Agree | 25 | 35 | 28 | 20 | 33 | 30 | 19 | 39 | 30 | 15 |
| Teacher turnover is a problem | | | | | | | | | | |
| Strongly disagree, disagree | 85 | 81 | 84 | 88 | 76 | 79 | 86 | 77 | 84 | 86 |
| Neither, Agree, Strongly Agree | 15 | 19 | 16 | 12 | 24 | 21 | 14 | 23 | 16 | 14 |
| Teacher believes he/she makes a difference in children's lives | | | | | | | | | | |
| Agree, Strongly agree | 98 | 97 | 98 | 98 | 96 | 98 | 99 | 97 | 97 | 99 |
| Strongly disagree, disagree, neither agree nor disagree | 2 | 3 | 2 | 2 | 4 | 2 | 1 | 3 | 3 | 1 |
| Broad agreement among faculty on central mission | | | | | | | | | | |
| Agree or strongly agree | 80 | 76 | 78 | 83 | 77 | 77 | 78 | 74 | 78 | 85 |
| Neither, Disagree, Strongly disagree | 20 | 24 | 22 | 17 | 23 | 23 | 22 | 26 | 22 | 15 |
| Meet with other teachers - lesson planning | | | | | | | | | | |
| Never, Once or twice a month | 29 | 27 | 29 | 31 | 24 | 27 | 29 | 24 | 29 | 30 |
| Twice a month or more | 71 | 72 | 71 | 69 | 76 | 74 | 71 | 76 | 71 | 70 |

Leadership quality index consists of the following three variables: "Administrator know what kind of school he/she wants", "Administrator set priorities, makes plans, carries them out", and "Administrator is supportive and encouraging".

Table 2
Results of Multivariate Analysis of 3rd Grade Outcome Measures, Controlling for PK to 3 and Family Background Influences

| | Dependent Variable | | | | |
|---|--------------------|-------------------|-------------------------------|---------------|----------------------------|
| | OLS | | | Logit | |
| | Math IRT Score | Reading IRT Score | Self Control (teacher report) | Ever Retained | Positive School Engagement |
| *****PK TO THREE INFLUENCES***** | | | | | |
| Leadership quality index (index score of 3 to 11) | | | | | |
| Index score of 12 or above | 1.08* | 1.40** | -0.01 | 0.91 | 1.03 |
| Academic standards are too low (Strongly disagree, disagree) | | | | | |
| Neither agree nor disagree, agree, strongly agree | -1.35* | -2.34** | 0.00 | 1.12 | 0.88 |
| Meet with other teachers for curriculum planning (Never, once or twice a month) | | | | | |
| Two or three times a month, Once or twice a week, Three or four times a week, daily | 1.35** | 1.06* | -0.01 | .87 | 0.94 |
| Teacher absenteeism is a problem (strongly disagree, disagree) | | | | | |
| Neither, Agree, Strongly Agree | 1.65** | 0.60 | 0.03 | .87 | 0.84 |
| Teacher turnover is a problem (strongly disagree, disagree) | | | | | |
| Neither, Agree, Strongly Agree | 0.26 | 0.16 | -0.07** | 0.72** | 0.74** |
| Teacher believes he/she makes a difference in children's lives (strongly disagree, disagree, neither agree nor disagree) | | | | | |
| Agree, Strongly agree | 1.67 | 2.87 | -0.11 | 0.47** | 0.84 |
| *****FAMILY BACKGROUND INFLUENCES***** | | | | | |
| Poverty (less than 100% of poverty level) | | | | | |
| 100-199% of poverty level | 3.24** | 3.54** | 0.07** | 0.63** | 1.08 |
| 200% or more of poverty level | 8.09** | 9.94** | 0.10** | 0.47** | 1.54** |
| Race/Ethnicity (white, non-Hispanic) | | | | | |
| Black, non-Hispanic | -11.76** | -10.43** | -0.17** | 1.56** | 0.76* |
| Hispanic | -5.59** | -7.09** | 0.03 | 0.92 | 1.06 |
| Asian | -1.76 | -3.19** | 0.11** | 0.83 | 2.61** |
| Other | -5.03** | -5.12** | -0.02 | 1.31 | 1.11 |
| Nativity (native born) | | | | | |
| Foreign born | 2.11 | 1.68 | 0.04 | 0.32** | 1.14 |
| Family structure (2 parents) | | | | | |
| Single parent | 0.01 | -0.47 | -0.10** | 0.83 | 0.83 |
| Other | -0.26 | 0.99 | 0.04 | 1.11 | 1.09 |
| Parental education (less than high school) | | | | | |
| High school or equivalent | 4.47** | 7.66** | 0.00 | 0.59** | 0.97 |
| Some college or vocational school | 9.90** | 13.37** | 0.03 | 0.48** | 1.07 |
| Bachelor's degree or higher | 17.41** | 22.34** | 0.16** | 0.32** | 1.85** |
| Constant | 76.48** | 97.15** | 3.21** | - | - |

Note: A *** indicates significance at the .10 level or higher. A **** indicates significance at the .05 level or higher.

Leadership quality index consists of the following three variables: "Administrator know what kind of school he/she wants", "Administrator set priorities, makes plans, carries them out", and "Administrator is supportive and encouraging".