

## Abstract

### **Nonmetropolitan Status and Kindergarteners' Early Literacy Skills: Is There A Rural Disadvantage?**

by

**Rachel E. Durham and P. Johnelle Smith**  
**Pennsylvania State University**

Since the passage of No Child Left Behind, accountability has become an important issue for schools. If students fail to meet standards, schools are subject to restructuring, reconstitution, or reassignment of teachers and administrators. No Child Left Behind applies universal standards of proficiency to all schools, thus neglecting the possible effects of local economic conditions that indirectly predict academic performance through their effects on a student's family, economic, and social background. These new requirements of No Child Left Behind underscore the importance of understanding the particular local characteristics that predict student academic performance.

There is relatively little research on the relationship between nonmetropolitan status, demographic characteristics, and children's school readiness as indicated by their early literacy skills. This study seeks to discover whether beginning kindergarteners vary in early literacy readiness according to their metro/nonmetropolitan status, net controls for family structure, socioeconomic status, parent-child interaction, educational resources, preschool childcare, as well as county-level economic characteristics. The Early Childhood Longitudinal Study of Kindergarteners (ECLS-K) provides early reading assessment data, as well as important family demographic controls and county-level geographic identifiers, which makes the ECLS-K an ideal data source for this study.

**Literature.** A child's initial reading assessment at the start of formal schooling is both an important outcome and predictor, because of the strong relationship between early literacy skills and later reading skills. The "emergent literacy approach" perceives reading as a skill that begins in the years prior to kindergarten with the development of early language and phonological skills (Lonigan et al 2000). Further, early school performance is highly predictive of later performance (Alexander, Entwisle, and Horsey 1997; Ensminger and Slusarcik 1992). Thus, since reading skills are a fundamental component of a child's capacity to perform well in other subjects and in later years, recognizing the factors that promote young children's success in early reading development is key to improving educational outcomes.

Not all children have equal access to quality early childhood education, and often children in nonmetropolitan areas are the ones most impacted by poor quality or unavailability of educational resources. One of the main problems facing nonmetropolitan children is widespread poverty. Rural children living in poverty often confront a host of educational, economic, and social disadvantages, in contrast to their metropolitan counterparts. Unfortunately, the problems facing rural children are further complicated by issues of isolation and a limited number of services (O'Hare and Johnson

2004). Persistent poverty has also been linked to poor outcomes for children's cognitive and emotional development (Duncan and Brooks-Gunn 1997; McLeod and Shanahan 1996). Rural children may be even more vulnerable to developmental problems, since poverty rates for children in nonmetropolitan areas have been consistently higher than poverty rates for children in metropolitan areas for the past two decades (Lichter, Roscigno, and Condron 2003).

**Data/Methods.** The data for this study come from the first two waves (kindergarten and first grade) of the ECLS-K (restricted use files). The main outcome variable of interest is the initial reading assessment given to kindergarteners immediately after the start of their first year of formal schooling. This assessment captures students' ability to recognize the letters of the alphabet, hear the beginning and ending sounds of words, and to recognize sight words and words in context. These components are scaled into a single reading score, though individually they provide interesting information on specific literacy deficits.

The second wave of the ECLS-K contains state and county FIPS codes, which were matched with Economic Research Service (ERS) data containing county metro/nonmetropolitan continuum codes (10 categories), economic dependencies (e.g., farm dependent, mining dependent), income inequality, and persistent poverty. This additional ERS data provides a rich layer of important demographic information that can be used to supplement detailed student-level data on family characteristics and cognitive ability from the ECLS-K. Individual-level controls obtained from the ECLS-K include: age at assessment, race/ethnicity, SES, household size, family structure (e.g., single parent), parents' employment status, child educational resources (e.g., number of books owned), parent-child instructive interaction (e.g., reading or talking to child), preschool childcare arrangements, and parental education values.

Taken together, the ERS and ECLS-K data provide the opportunity to examine individual early school readiness in a hierarchical model that adjusts for clustering within counties under this model specification. Hierarchical Linear Modeling will provide more robust standard errors and unbiased coefficients of the relationships between children's school readiness as measured by early kindergarten reading scores and family and socioeconomic characteristics, as well as county-level economic characteristics. Figure 1. presents the conceptual model of these relationships.

**Initial Results.** Initial analyses were run in STATA using a method that adjusts for sample clustering within counties. In further analyses, HLM will be used to construct a 2-level hierarchical model. Our Initial results demonstrate that children from most rural areas have a pronounced disadvantage in terms of their most basic reading skills (see Table 1). Model 3 shows that even after controls are entered for individual socioeconomic status, race, and family structure, the negative effect of living in a less metropolitan area on a child's early literacy ability persists. Further, even when parental mediators and preschool childcare arrangements are controlled, nonmetropolitan status continues to exert a strong, significant negative effect.

Another notable finding is that living in the South initially appears to have no effect, yet after metropolitan status is controlled, it becomes strongly positive. Also, while the negative effect of being Black is mediated by parental factors and childcare

type, those same factors do not appear to influence the negative effects of being Hispanic or American Indian. The county-level characteristics do not demonstrate any statistically significant effects; however, the hierarchical model may show better the effects of county-level variables.<sup>1</sup>

## References

- Alexander, K., D. Entwisle, and C. Horsey. 1997. "From First Grade Forward: Early Foundations of High School Dropout." *Sociology of Education* 70: 87 – 107.
- Cook, Peggy J. and Karen L. Mizer. 1994. *The Revised ERS County Typology: An Overview*, RDRR-89, Economic Research Service. Washington, DC: U.S. Department of Agriculture.
- Duncan, Greg J. and Jeanne Brooks-Gunn. 1997. "Income Effects Across the Life Span: Integration and Interpretation." In *Consequences of Growing Up Poor*, ed. J. BrooksGunn and G.J. Duncan, 596-610. New York: Russell Sage.
- Ensminger, M. and A. Slusarcik. 1992. "Paths to High School Graduation or Dropout: A Longitudinal Study of a First-Grade Cohort." *Sociology of Education* 65: 95 – 113.
- Lichter, Daniel T., Vincent J. Roscigno, and Dennis J. Condron. 2003. "Rural Children and Youth at Risk." In *Challenges for Rural America in the Twenty-First Century*, eds. David L. Brown and Louis E. Swanson, 97-108. University Park, PA: Penn State Univ Press.
- Lonigan, C. J.; S. R. Burgess; and J. L. Anthony. 2000. "Development of Emergent Literacy and Early Reading Skills in Preschool Children: Evidence from a Latent Variable Longitudinal Study." *Developmental Psychology*, 36(5), 596-613.
- McLeod, Jane D. and Michael J. Shanahan. 1996. "Trajectories of Poverty and Children's Mental Health." *Journal of Health and Social Behavior*, 37(3): 207-220.
- O'Hare, William P. and Kenneth M. Johnson. 2004. "Child Poverty in rural America." *Reports on America*. Population Reference Bureau Publication 4(1): 1-20.
- U.S. Department of Education. 2001. User's Manual for the ECLS-K Base Year Public-Use Data Files and Electronic Codebook. National Center for Educational Statistics.
- U.S. Department of Education. 2002. User's Manual for the ECLS-K First Grade Restricted-Use Data Files and Electronic Codebook. National Center for Educational Statistics.

---

<sup>1</sup> We suspect that the present lack of statistical significance may be a result of applying county-level data to individual outcomes.

Table 1. OLS Regression of Initial Kindergarten Reading Assessment with Robust Standard Errors on Student and County-Level Predictors (adjusted for county clustering) Unstandardized coefficients with standard errors in parentheses

Predictors:	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age at Assessment (in months)	.349 (.02)***	.341 (.02)***	.347 (.02)***	.349 (.02)***	.338 (.02)***	.333 (.02)***
Male=1	-1.496 (.16)***	-1.553 (.15)***	-1.556 (.15)***	-1.554 (.15)***	-1.421 (.15)***	-1.422 (.15)***
South=1	.055 (.35)	.688 (.28)*	.757 (.29)*	.670 (.32)*	.632 (.31)*	.539 (.30)†
<b>Metro/Nonmetro Continuum:</b> <sup>a</sup>						
Metro1	-1.818 (.60)**	-1.188 (.44)**	-1.336 (.43)**	-1.198 (.43)**	-1.169 (.42)**	-1.084 (.41)**
Metro2	-1.948 (.47)***	-1.429 (.35)***	-1.564 (.36)***	-1.571 (.36)***	-1.517 (.35)***	-1.479 (.33)***
Metro3	-1.855 (.53)**	-1.347 (.42)*	-1.600 (.39)***	-1.574 (.39)***	-1.525 (.40)***	-1.460 (.40)***
Metro4	-1.838 (.84)*	-819 (.64)	-1.251 (.67)†	-1.387 (.67)*	-1.291 (.58)*	-1.142 (.55)*
Metro5	-2.367 (.70)**	-1.576 (.71)*	-1.925 (.71)**	-1.984 (.88)*	-1.629 (.89)†	-1.499 (.88)†
Metro6	-5.017 (.56)***	-2.680 (.39)***	-2.642 (.52)***	-2.889 (.55)***	-2.757 (.52)***	-2.406 (.51)***
Metro7	-3.853 (.80)***	-2.687 (.70)***	-2.748 (.49)***	-3.019 (.63)***	-2.736 (.60)***	-2.632 (.57)***
Metro8	-5.852 (.58)***	-3.722 (.64)***	-4.341 (.59)***	-4.207 (.50)***	-4.314 (.47)***	-3.983 (.47)***
Metro9	-5.146 (1.20)***	-2.746 (.83)**	-2.536 (.54)***	-2.585 (.92)**	-2.590 (.86)**	-2.418 (.82)***
<b>Demographic Mediators:</b>						
Household SES		4.073 (.16)***	3.545 (.17)***	3.549 (.17)***	3.263 (.16)***	3.022 (.16)***
Single Parent=1			-1.654 (.17)***	-1.667 (.17)***	-834 (.30)**	-812 (.28)**
Household size			-811 (.08)***	-810 (.08)***	-804 (.08)***	-736 (.08)***
Black <sup>a</sup>			-842 (.31)**	-906 (.29)**	-464 (.29)	-353 (.28)
Hispanic			-1.031 (.26)***	-1.053 (.28)***	-802 (.27)**	-686 (.26)**
Asian			2.768 (.79)**	2.718 (.78)**	3.093 (.75)***	3.280 (.75)***
American Indian			-2.026 (.50)***	-1.995 (.57)**	-1.518 (.55)**	-1.374 (.55)*
Other Race			-151 (.54)	-246 (.53)	.032 (.53)	.139 (.53)
<b>County Econ Dependencies:</b>						
Farming Dep.				-194 (.65)	-052 (.63)	.073 (.65)
Mining Dep.				-1.328 (.86)	-1.074 (.87)	-776 (.86)
Manufacturing Dep.				.602 (.62)	.702 (.57)	.721 (.54)
Govt Transfer Dep.				1.281 (1.00)	1.295 (.85)	1.677 (.97)
Persistent Poverty				-1.306 (1.06)	-1.144 (.91)	-1.334 (1.01)†
Income Inequality				4.305 (5.25)	5.344 (4.96)	5.327 (4.82)
<b>Parental Mediators:</b>						
Mother Employed					-365 (.14)*	-405 (.15)**
Father Employed					.786 (.26)**	.677 (.26)**
Parent Educ Values					.949 (.07)***	.935 (.07)***
Parent-child Interaction					.068 (.08)	.091 (.08)
Parental Warmth					.131 (.07)†	.128 (.07)†
Educational Resources					.024 (.00)***	.022 (.00)***
<b>Preschool Childcare:</b> <sup>b</sup>						
Relative care						.129 (.27)
Non-relative care						.518 (.24)*
Head Start						-.398 (.25)
Center-based care						1.677 (.22)***
More than one arrangement						.489 (.32)
R-square	.07	.20	.23	.23	.25	.26
N	12,523	12,523	12,506	12,506	12,506	12,506

\*\*\* p<.001 \*\* p<.01 \* p<.05 † p<.10

<sup>a</sup> 1993 rural-urban Continuum codes include 0=Central counties of metro areas of 1 million or greater [Reference group]; 1=Fringe counties of metro areas of 1 million or more; 2=Metro counties of 250,000-1 million; 3=Metro counties of less than 250,000; 4=Urban population of 20,000 or more adjacent to metro area; 5=Urban population of 20,000 or more not adjacent to a metro area; 6=Urban population of 2,500-19,000 adjacent to a metro area; 7=urban population of 2,500-19,000 not adjacent to a metro area; 8=Completely rural adjacent to a metro area; and 9=Completely rural not adjacent to a metro area.

<sup>b</sup> The reference category for race/ethnicity is White.

<sup>c</sup> The reference category for preschool childcare is parental care at home.

Note. Other controls in models 5 and 6 include whether the child was retained in kindergarten the prior year, the number of places the child has lived until kindergarten, and whether the mother worked after the child's birth.

Figure 1.

