

**Access to Early Care and Education in Rural Communities:
Implications for Children's School Readiness**

Technical Appendix

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In this Technical Appendix, we provide details about our data sources and measures as well as detailed tables corresponding to the figures presented in the main article. In addition, this Technical Appendix contains supplemental descriptive and multivariate analyses, intended to complement the findings presented in the main article. At the outset, readers should note that we use the terms rural and nonmetropolitan interchangeably, as well as refer to urban areas as counties located within metropolitan areas.

Additional Information on Data Sources

Urban-Rural Continuum Codes. We classify counties according to a four-category urban-rural continuum ranking, based on the nine-category ranking used by the U.S. Department of Agriculture (USDA) Economic Research Service (2020). The codes used in our analysis were released in 2013 and were based on data from the 2010 census. The USDA urban-rural codes split counties into nine categories. First, the codes delineate three categories of metropolitan counties based on population size. Then, they categorize nonmetropolitan, or rural, counties into six groupings based on the size of the primary population center and the spatial adjacency of the county to a metropolitan area. In our analyses, we collapse these codes into four codes, as shown in Technical Appendix Table 1 below. In additional supplemental analyses, we use a modified seven-category code. From the full nine-category USDA code, this seven-category code combines codes 7 and 9, and 6 and 8, to account for sample size limitations in the ECLS-K:2011 analyses.

(Technical Appendix Table 1 about here)

Preschool Enrollment. We use the 2007-2011 five-year estimates of the American Community Survey (ACS) to estimate county-level preschool enrollment rates. Specifically, we use two measures from Table S1401, "School Enrollment": the percent of the population of

three- to four-year-olds enrolled in school and the percent of those enrolled who were enrolled in private school.

Nonprofit Child Care Program Expenditures. We use data published by the National Center for Charitable Statistics (NCCS) to estimate county-level expenditures by nonprofit human service organizations that provide child care services. The NCCS data report organization-level statistics coded based on the National Taxonomy of Exempt Entities – Core Codes (NTEE-CC). We pull expenditure data from the NCCS for nonprofit organizations registered as providing services within the following codes we determine to best capture child care services delivered to young children:

- B21: Education: Elementary and Secondary Schools: Preschools
- O20: Youth Development: Youth Centers & Clubs
- O21: Youth Development: Youth Centers & Clubs: Boys Clubs
- O22: Youth Development: Youth Centers & Clubs: Girls Clubs
- O23: Youth Development: Youth Centers & Clubs: Boys & Girls Clubs
- P27: Human Services: Young Men's or Women's Associations
- P33: Children & Youth Services: Child Day Care

Our data scale nonprofit child care expenditures (in 2009 dollars) to the relevant population by dividing by the number of poor children under five years old from the 2007-2011 Five-Year Estimates of the ACS, Table B17001: Poverty Status in the Past 12 Months by Sex by Age.

Head Start Capacity. Information about Head Start (HS) capacity combines data from two main sources: HS Program Information Reports (PIR) and center-level datasets with information on the location of HS centers and the number of slots offered by each. We are interested in HS data from 2009, the year prior to the ECLS-K sample entering Kindergarten. In this year, only the PIR data are available. The PIR data are geographically linked to the grantee's administrative headquarters, but because grantees often operate centers in other counties, these

data do not accurately depict the geographic distribution of actual HS centers. Therefore, we first develop a weighting scheme to describe the geographic distribution of HS slots provided by each grantee by linking the PIR data to the center-level data in 2013 (the closest available year to 2009). We merge the PIR grantee data to center-level data based on grant number, program number, and program type. This allows us to determine the geographic distribution of HS slots operated by each grantee – that is, in which counties the grantee operated HS centers and how many slots these centers had. Then, for all grantees whose administrative headquarters are located in a given county, we calculate the overall county distribution of HS slots operated by that county's grantees. We then apply this weighting scheme, developed using the 2013 data, to the 2009 PIR data. If none of a county's grantees matched to a HS center, we assumed that these grantees operated all their slots in the county where the grantee administrative headquarters was located. This method assumes that 2009 HS grantees in a given county will operate centers in a similar pattern as the 2013 HS grantees.

Detailed Tables Supporting Figures and Findings Presented in Text

Technical Appendix Table 2 contains descriptive measures of early care and education (ECE) program capacity and enrollment across rural and urban county geography that are reported in Figure 1 in the main article. Similarly, Technical Appendix Table 3 contains descriptive measures of ECE program capacity and enrollment across race/ethnicity and household income of children in the ECLS-K:2011 that are reported in Figure 2 in the main article. Technical Appendix Table 4 reports full model results from the multivariate models visualized in Figure 3 in the main article.

(Technical Appendix Tables 2 through 4 about here)

Technical Appendix Table 1. Construction of Four-Code Urban-Rural County Categorization Code.

USDA Rural-Urban Continuum Code	Metro or nonmetro	Description	Collapsed Four-Category Urban-Rural Code
1	Metro	Counties in metro areas of 1 million population or more	Large urban or metropolitan
2	Metro	Counties in metro areas of 250,000 to 1 million population	Large urban or metropolitan
3	Metro	Counties in metro areas of fewer than 250,000 population	Small urban or metropolitan
4	Nonmetro	Urban population of 20,000 or more, adjacent to a metro area	Large rural or nonmetropolitan
5	Nonmetro	Urban population of 20,000 or more, not adjacent to a metro area	Large rural or nonmetropolitan
6	Nonmetro	Urban population of 2,500 to 19,999, adjacent to a metro area	Small rural or nonmetropolitan
7	Nonmetro	Urban population of 2,500 to 19,999, not adjacent to a metro area	Small rural or nonmetropolitan
8	Nonmetro	Completely rural or less than 2,500 urban population, adjacent to a metro area	Small rural or nonmetropolitan
9	Nonmetro	Completely rural or less than 2,500 urban population, not adjacent to a metro area	Small rural or nonmetropolitan

Source: U.S. Department of Agriculture (2020).

Technical Appendix Table 2. Early Childhood Program Provision by Four-Category Urban-Rural Continuum Code, 2009.

Urban-Rural Continuum Code	Preschool Enrollment Rate, Children 3 to 4 years old 2007-11 ACS	Number of Funded Head Start Slots per 100 Poor Children 3 to 4 years old 2009		Private Preschool Enrollment Rate, Children 3 to 4 years-olds 2007-11 ACS	Nonprofit Child Care Expenditures per Poor Child under 5 2009 (in \$100s)		N
	Mean (1)	Mean (2)	Median (3)	Mean (4)	Mean (5)	Median (6)	
In metro areas of +250,000 population	0.47 ^{abc} (0.11)	46.3 ^a (50.0)	36.3	0.43 ^{abc} (0.16)	30.8 ^a (60.5)	9.6	811
In metro areas of < 250,000 population	0.43 ^a (0.11)	50.3 ^b (47.3)	41.8	0.34 ^{ad} (0.16)	21.6 (35.0)	9.5	356
Large nonmetro, urban population +20,000	0.44 ^b (0.10)	51.5 ^c (31.1)	47.8	0.32 ^{bc} (0.13)	25.0 ^b (36.1)	10.8	306
Small nonmetro or remote rural, urban population less than 20,000	0.43 ^c (0.16)	66.8 ^{abc} (77.7)	52.3	0.23 ^{cde} (0.19)	14.5 ^{ab} (59.7)	0	1,670

Notes: Standard deviations reported in parentheses. Superscript letter pairs indicate within-column cell-pair mean differences that are statistically significant from zero at or below the .05 level. Counties with missing nonprofit expenditure data are coded as having no nonprofit human service programming (see Allard 2017). To reduce the effects of a few outlying counties, we excluded 7 counties from descriptive analysis if they report 1,000 or more Head Start slots per 100 poor children 3 to 4 years old.

Sources: U.S. Department of Agriculture (2020); American Community Survey, 2007-11; Office of Head Start; National Center on Charitable Statistics.

Technical Appendix Table 3: Early Childhood Program Provision in the ECLS-K:2011: Weighted means and standard errors by child characteristics.

	Mean Preschool Enrollment Rate, Children 3 to 4 years-olds	Mean Number of Funded Head Start Slots per 100 Poor Children 3 to 4 years old	Nonprofit Child Care Expenditures per Poor Child Under 5
	2007-11 ACS	2009	2009 (in \$100s)
Child Characteristics	(1)	(2)	(3)
Non-Hispanic -white	46.4 (0.2)	43.1 (0.6)	47.3 (0.9)
Non-Hispanic black	51.0 ^a (0.4)	46.5 ^a (1.9)	41.1 (1.4)
Hispanic	46.2 ^a (0.2)	35.8 ^a (0.6)	37.8 (1.4)
Household income below 100% of FPL	45.7 ^a (0.3)	42.5 (1.1)	35.9 ^a (1.1)
Household income 100-200% of FPL	46.1 ^b (0.2)	42.0 (1.0)	39.5 ^b (1.3)
Household income above 200% FPL	48.2 ^{ab} (0.1)	40.6 (0.6)	52.2 ^{ab} (1.0)

Notes: Percent or mean, with standard errors in parentheses, are shown. Superscript letter pairs indicate within-column and variable pair mean differences that are statistically significant from zero at or below the .05 level. Observations are rounded to the nearest 10, in accordance with NCES requirements. All child-level variables are assessed at the fall of Kindergarten.

Sources: American Community Survey, 2007-11; Office of Head Start; U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics; Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); U.S. Department of Agriculture, Economic Research Service.

Technical Appendix Table 4: Factors Associated with ECE participation in the year prior to Kindergarten and school readiness, Four-Category Urban-Rural Continuum Code, ECLS-K:2011.

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
Panel A: County Geography (Reference: metro counties <250,000 population)				
In metro areas of + 250,000 population	1.237 (0.175)	0.876 (0.118)	0.0134 (0.0552)	-0.0185 (0.0589)
Large nonmetro, urban population +20,000	1.209 (0.175)	1.129 (0.238)	-0.0789 (0.0575)	-0.0110 (0.0927)
Small nonmetro or remote rural, urban population less than 20,000	1.062 (0.175)	1.781* (0.465)	-0.00605 (0.0665)	-0.0891 (0.0841)
Panel B: County-level Early Care and Education				
Nonprofit child care expenditures per poor child <5 (logged)	1.012 (0.011)	0.993 (0.014)	0.00915** (0.00305)	0.00204 (0.00485)
Number of Head Start slots per 100 poor children age 3-4	1.003* (0.001)	1.005*** (0.001)	-0.000194 (0.000277)	-0.000389 (0.000441)
Panel C: County-level Economic and Demographic Characteristics				
Percent of population that is non-Hispanic white	1.000 (0.002)	1.002 (0.005)	-0.00135+ (0.000692)	-0.00368*** (0.000688)
Panel D: State Early Care and Education Policy				
Percent of 4 year-olds enrolled in state preK	1.005* (0.003)	0.991** (0.003)	0.000303 (0.000738)	0.000634 (0.00107)
Maximum child care subsidy reimbursement rate (center care for 4 year-old)	1.000 (0.0003)	1.000 (0.0003)	0.000164 (0.000115)	-0.000156 (0.000123)
Panel E: Child- and Household-level Characteristics				
Child attended center care in pre-K			0.135*** (0.0262)	0.156*** (0.0258)
Child attended Head Start in pre-K			-0.0553+ (0.0319)	-0.0157 (0.0308)
Child age in months	0.992 (0.006)	0.983+ (0.009)	0.0614*** (0.00255)	0.0475*** (0.00274)

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
Panel E: Child- and Household-level Characteristics (continued)				
Child is non-Hispanic Black	1.387** (0.156)	2.861*** (0.380)	-0.205*** (0.0361)	-0.0252 (0.0375)
Child is Hispanic	0.839+ (0.080)	2.825*** (0.419)	-0.278*** (0.0358)	-0.209*** (0.0479)
Child is another race	1.142 (0.092)	1.377* (0.182)	0.0774* (0.0355)	0.157** (0.0522)
Child is female	0.963 (0.042)	0.929 (0.054)	-0.0414* (0.0198)	0.0849*** (0.0194)
Child's primary language is not English	0.705+ (0.146)	2.355*** (0.531)	-0.104 (0.0800)	-0.108 (0.106)
Child has a disability	1.112+ (0.70)	1.046 (0.088)	-0.249*** (0.0341)	-0.212*** (0.0346)
Parents are married	0.995 (0.060)	0.671*** (0.055)	0.129*** (0.0251)	0.136*** (0.0232)
Household size	0.885*** (0.015)	1.089* (0.036)	-0.0302*** (0.00829)	-0.0518*** (0.00881)
All parents are employed in Kindergarten	1.067 (0.079)	1.068 (0.087)	0.0567* (0.0277)	0.0156 (0.0238)
Neither parent has a high school degree	0.737** (0.076)	1.180 (0.124)	-0.347*** (0.0357)	-0.288*** (0.0524)
One or more parents have a college degree or more	1.678*** (0.111)	0.347*** (0.038)	0.000393*** (9.85e-05)	0.366*** (0.0280)
Logged number of books in the home	1.001* (0.0002)	0.999 (0.001)	-0.189*** (0.0360)	0.000417*** (0.000102)
Household income is below 100% FPL	0.090 (0.067)	2.183*** (0.223)	0.000393*** (9.85e-05)	-0.175*** (0.0363)

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
Panel E: Child- and Household-level Characteristics (continued)				
Household income is 100-200% FPL	0.877 (0.077)	1.589*** (0.169)	-0.112*** (0.0246)	-0.106** (0.0337)
Received SNAP since child was born	1.082 (0.082)	1.977*** (0.180)	-0.108*** (0.0276)	-0.0931** (0.0270)
Constant	2.651 (1.598)	0.446 (0.378)	-4.136*** (0.213)	-2.758*** (0.224)
Observations	10,430	6,480	10,080	10,100

Notes: See also Figure 3. Each column represents a separate regression. Odds ratios are shown for binary dependent variables (attended center care or Head Start) and coefficients are shown for math and reading scores. All child-level variables are assessed at the fall of kindergarten. All county level variables were assessed at 2009 (the year prior to children's K entry), or for ACS variables, in the five-year 2007-2011 estimates. Observations are rounded to the nearest 10, in accordance with NCES requirements. Standard errors are clustered at the state level. Robust standard errors in parentheses. Estimates use weights as specified by IES.

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Sources: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); 2007-2011 American Community Survey; Office of Head Start; U.S. Department of Agriculture, Economic Research Service (2020); National Center on Charitable Statistics; the National Institute for Early Education Research; the Urban Institute.

Supplemental Analyses

Ideally, our analyses would allow us to explore differences across many different types of rural or nonmetropolitan counties. Due to concerns about sample size in the ECLS-K:2011 and the limited number of children in small rural counties, however, we chose to collapse the nine-category urban-rural continuum code into a four-category classification in the main article, as described above. Technical Appendix Tables 5 through 7 examine measures of ECE program provision and participation across different geography categorizations. Technical Appendix Table 5 contains descriptive measures of ECE program capacity and enrollment across rural and urban county geography using a seven-category urban-rural continuum code, modified from the full nine-category code from the U.S. Department of Agriculture (USDA) Economic Research Service (2020). Findings in Technical Appendix Table 5 are consistent with those reported in Figure 1 and in Technical Appendix Table 1, which feature a collapsed four-category urban-rural county classification. Private preschool enrollment and private nonprofit child care per capita expenditures are greater in the largest metropolitan areas than in nonmetro or rural counties of all sizes and degree of adjacency to metropolitan areas. Smaller nonmetro or rural counties, adjacent and not adjacent to metropolitan areas, have much higher numbers of HS slots per poor child 3 or 4 years old than metropolitan areas of all sizes.

(Technical Appendix Table 5 about here)

To assess whether observed differences in county-level nonmetropolitan and metropolitan provision of ECE programs was consistent across the U.S. or whether these differences were most prominent in certain regions of the country, Technical Appendix Table 6 examines ECE program capacity and enrollment across rural and urban county geography in each of the four census regions of the country. While there is some evidence of regional variation

favoring counties in the Northeast – particularly when looking at nonprofit organization child care expenditures – the rural-urban trends observed in Technical Appendix Table 2 are consistent across all regions of the country.

(Technical Appendix Table 6 about here)

An early presentation of our findings generated discussion about the impact of state-level pre-K provision on ECE capacity. The direction of the relationship between pre-K provision and provision of other ECE programs is ambiguous. Greater public provision could stimulate and normalize participation in ECE programs more broadly, or greater public provision could crowd-out private ECE provision. To examine the extent to which pre-K provision may shape other types of ECE programming, Technical Appendix Table 7 descriptively examines county-level ECE program provision and participation in Georgia and Oklahoma, two states that were early adopters to universal pre-K, compared to ECE program provision and participation in bordering states. We find some descriptive evidence that universal pre-K could be associated with greater investment in public programs and weaker capacity of nonprofit child care organizations. For example, counties in Georgia and Oklahoma have higher average public preschool enrollment rates and higher per capita Head Start provision than neighbors. Similarly, we see descriptive evidence that universal pre-K could be associated with lower rates of private preschool attendance and lower average nonprofit child care organization per capita expenditures. While suggestive, these findings should be viewed cautiously and serve as motivation for future research.

(Technical Appendix Table 7 about here)

Technical Appendix Table 8 examines the child-level characteristics of our ECLS-K:2011 sample across the full seven-category urban-rural continuum. Again, we find these

results to be consistent with the results using the four-category codes presented in Figure 2 and Table 1 in the main article. Participation in center-based care is higher in metropolitan areas than in smaller, more remote nonmetropolitan areas. HS attendance is more prevalent among children in smaller rural counties and in larger rural counties not adjacent to metro areas than in metropolitan areas. As with our county-level analyses in Technical Appendix Table 5, private preschool enrollment and private nonprofit child care per capita expenditures are higher among children living in the largest metropolitan areas than children living in nonmetro or rural counties of all sizes and degree of adjacency to metropolitan areas.

(Technical Appendix Tables 8 and 9 about here)

Because rural and metropolitan counties likely differ on a range of demographic and economic characteristics, we provide two tables showing descriptive characteristics for the counties in which children in the ECLS-K:2011 lived using the four-category urban-rural continuum classification. Technical Appendix Table 9 shows the number and percent of children in our ECLS-K sample by county racial and ethnic composition across the four-category urban-rural continuum code. Children in the ECLS-K most likely to live in racially or ethnically diverse counties are those living in the largest metropolitan areas. We also find evidence similar to that in other published research; apart from the very largest metro areas and the smallest remote rural counties, metropolitan and rural counties look quite comparable, on average, in terms of racial composition (see Lee and Sharp, 2017). Our ECLS-K sample contains no or very few children living in small metro areas, large nonmetro areas, or small nonmetro areas where less than 20% of the population was non-Hispanic white or in which more than 20% of the population was Hispanic. Among ECLS-K children in our sample living in nonmetro counties, about three-quarters or more children lived in counties in which less than 10% of the population was non-

Hispanic black, although 11% and 8% of children lived in large and small non-metro counties, respectively, in which 20% or more of the population was non-Hispanic black.

While rural counties tend to have a larger share of non-Hispanic white residents compared to urban counties, this masks demographic heterogeneity among rural regions. Technical Appendix Table 10 shows differences in our ECE provision variables by county urban/rural code and the share of non-Hispanic black residents in the county. Rural counties with a larger share of black residents tend to have higher preschool enrollment rates, a lower share of preschoolers enrolled in private preschool, and higher nonprofit child care expenditures per capita. The only mean difference that is statistically distinct from zero, however, is the difference in preschool enrollment rate among small rural counties. Appendix Table 11 presents comparable results broken out by the share of Hispanic residents in the county. On average, rural counties with a larger share of Hispanic residents have lower preschool enrollment rates, fewer funded HS slots per capita, a lower share of preschoolers enrolled in private schools, and smaller nonprofit child care expenditures per capita, although none of these mean differences are statistically significant. These descriptive tables underscore what we note in the conclusion of the main article: more research is needed to understand the intersection of race/ethnicity and rural geography as it relates to ECE access and participation.

(Technical Appendix Tables 10 and 11 about here)

Technical Appendix Table 12 displays a range of other county-level demographic and economic variables for children in the ECLS-K sample by our four-category urban-rural continuum classification. Moving from left to right, we see that the young child population differed across all types of counties, as expected. Children in non-metro counties had higher average county-level child poverty rates relative to those in metro counties, and the counties of

children in small metropolitan areas had the lowest unemployment rates, although maternal employment rates among those with young children did not significantly differ. There was a gradient in median household income such that metropolitan counties averaged higher incomes. Among children living in large metropolitan areas, the mean percent of the population who were foreign-born or spoke a language other than English was 14% and 22%, respectively. In small metro and non-metro counties, these means were much smaller. Because of this relative lack of diversity in more rural communities and the collinearity of several of our household-level characteristics (e.g., poverty level and parental employment), we chose to include only the percent non-Hispanic white as a county-level covariate in our regression models.

(Technical Appendix Table 12 about here)

Because urban and rural communities may also differ in family structure variables, Technical Appendix Table 13 displays the mean number of adults and children in the household for children in the ECLS-K sample by our four-category urban-rural continuum classification. As shown, the total number of children under 18 in the household did not differ by urban-rural code, but children in large metropolitan areas averaged more adults in their households than those in small metro counties or in small non-metro counties.

(Technical Appendix Table 13 about here)

Technical Appendix Tables 14 through 17 report stepwise regression coefficients for each of the four dependent variables discussed in the main article. These progressive regression models show each covariate block's added contribution in explaining geographic differences in ECE participation and school readiness. Here, we note the association between living in rural counties and higher HS participation, relative to those in mid-sized cities, remains large and remarkably stable when controlling for child, household, county, and state characteristics,

including HS and other ECE capacity variables. Consistent with this finding is that children in rural counties, particularly those adjacent to metro areas, are less likely to attend other types of center care compared to those in mid-sized cities (Technical Appendix Table 14). Consistent with the full model results, there are no significant geographic differences in any center or HS participation in the year before kindergarten. Not surprisingly, county HS capacity helps explain about half of the association between living in a rural county and a higher likelihood of attending HS, but a positive association remains with child-, county- and state-level factors controlled (Technical Appendix Table 15). We find that child and household characteristics, particularly children's participation in ECE, as well as county nonprofit child care expenditures help explain the lower math scores of children in rural counties (Technical Appendix Table 16), whereas child- and household-level factors, rather than county factors, appear to explain geographic differences in children's reading scores (Technical Appendix Table 17). County-level resources for ECE and ECE attendance may be particularly important for supporting children's math development, whereas household resources may more so explain reading outcomes.

(Technical Appendix Tables 14 through 17 about here)

Again, due to concerns about sample size in the ECLS-K:2011 and the limited number of children in small rural counties, we collapsed the nine-category USDA urban-rural continuum code into a four-category urban-rural continuum code for our multivariate analyses reported in the main article (as described above). To look at nonmetropolitan or rural counties with a bit more texture, Technical Appendix Table 18 reports multivariate model results for each of the four dependent variables discussed in the main article using a seven-category modified urban-rural code discussed above. Results reported in Technical Appendix 18 closely mirror those reported in the main article as well as in Technical Appendix Table 4 above.

(Technical Appendix Table 18 about here)

Technical Appendix Figure 1 provides additional visualization of model results (point estimates and 95 percent confidence intervals for regression coefficients and odds ratios) presented in Figure 3 of the main article and Technical Appendix Table 3 above.

(Technical Appendix Figure 1 about here)

In addition to the interactions between geography and ECE capacity discussed in the main text, we tested whether associations between ECE access, participation, and kindergarten readiness vary by household and child characteristics, specifically parent education, household poverty, and child race (results available upon request). We find that parent education and local ECE capacity interacted such that HS capacity mattered less, and nonprofit child care expenditures mattered more, to the reading scores of children whose parents had college degrees. This may be a result of nonprofit child care expenditures proxying for neighborhood wealth, and children with low-educated parents may be more likely to attend HS in areas with higher HS capacity, whereas their higher-SES peers likely would not. There was no evidence that associations between ECE capacity, attendance, and school readiness measures varied by child poverty or that child race interacted with the percent of the county that is non-Hispanic white.

We ran four sets of additional sensitivity models including different control variable specifications. First, recognizing that rural, suburban, and urban counties likely differ in racial and ethnic composition (see Technical Appendix Tables 11 and 12 for descriptive differences), we re-ran our main models including the percent of the population that is Hispanic and the percent of the population that is non-Hispanic black. Results, as shown in Technical Appendix Table 19, show very similar results to our main model that includes only the percent of the population that is non-Hispanic white (Appendix Table 4).

(Technical Appendix Tables 19, 20, 21 and 22 about here)

Second, recognizing that family structure is often different in rural vs. suburban or urban contexts, we re-ran our main models including separate controls for the number of adults and number of children in the household (see Technical Appendix Table 13 for descriptive results). Like our main models in Appendix Table 4, results, displayed in Appendix Table 20, show negative associations between both the number of adults and attending center care as well as with math and reading scores but positive associations with HS attendance. With the exception of HS attendance (where it was non-significant), associations between the number of children in the household and the outcomes followed the same pattern as the number of adults.

Finally, we present findings in Technical Appendix Table 21 that include county-level unemployment rate, child poverty rate, and percentage of the population foreign-born (in addition to the more fine-grained measures of county race and ethnicity included in Appendix Table 19). Results from these additional models are consistent with the main findings reported in the article, with the exception that the coefficient between living in a rural county and attending HS, which remains positive but no longer statistically significant. However, Technical Appendix Table 22 shows these same models using the seven-category urban-rural code, indicating that children in rural counties remain more likely to attend HS despite controlling for these additional county characteristics, and thus our main findings hold. As we find in other instances noted above, the inclusion of additional contextual measures do not fundamentally alter our findings or conclusions drawn from the main models as reported in the article.

Technical Appendix Table 5. Early Childhood Program Provision by Seven-Category Urban-Rural Continuum Code, 2009.

Urban-Rural Continuum Code	Preschool Enrollment Rate, Children 3 to 4 years old 2007-11 ACS	Number of Funded Head Start Slots per 100 Poor Children 3 to 4 years old 2009		Private Preschool Enrollment Rate, Children 3 to 4 years-olds 2007-11 ACS	Nonprofit Child Care Expenditures per Poor Child under 5 2009 (in \$100s)		N
	Mean (1)	Mean (2)	Median (3)	Mean (4)	Mean (5)	Median (6)	
In metro areas of +1 million population	0.49 ^{abcde} (0.11)	47.1 ^{ab} (55.9)	36.4	0.47 ^{abcdef} (0.16)	37.0 ^{abc} (71.8)	10.0	432
In metro areas of 250,000 to 1 million population	0.45 ^a (0.11)	45.4 ^{cd} (42.4)	36.4	0.38 ^{aghi} (0.16)	23.8 (43.3)	9.3	379
In metro areas of < 250,000 population	0.43 ^b (0.11)	50.3 ^c (47.3)	41.8	0.34 ^{bjk} (0.16)	21.6 ^a (35.0)	9.5	356
Large nonmetro, urban population +20,000, adjacent to metro area	0.44 ^c (0.10)	48.3 ^f (28.9)	44.4	0.32 ^{eglm} (0.13)	22.8 (32.2)	10.3	214
Large nonmetro, urban population +20,000, not adjacent to metro area	0.44 (0.12)	59.1 (34.6)	53.8	0.32 ^{dno} (0.15)	30.1 (43.5)	17.4	92
Small Nonmetro or remote rural, urban population less than 20,000, adjacent to metro area	0.43 ^d (0.15)	63.0 ^{ac} (56.3)	50.8	0.24 ^{chjlnp} (0.18)	12.6 ^b (40.0)	0	813
Small Nonmetro or remote rural, urban population less than 20,000, not adjacent to metro area	0.43 ^e (0.18)	70.5 ^{bdef} (89.3)	54.3	0.21 ^{fikmop} (0.20)	16.4 ^c (73.9)	0	857

Notes: Standard deviations reported in parentheses. Superscript letter pairs indicate within-column cell-pair mean differences that are statistically significant from zero at or below the .05 level. Counties with missing nonprofit expenditure data are coded as having no nonprofit human service programming (see Allard 2017). To reduce the effects of a few outlying counties, we excluded 7 counties from descriptive analysis if they report 1,000 or more Head Start slots per 100 poor children 3 to 4 years old.

Sources: U.S. Department of Agriculture, Economic Research Service; National Center on Charitable Statistics; Office of Head Start; U.S. Census Bureau, American Community Survey 2007-2011.

Technical Appendix Table 6. Early Childhood Program Provision by Metro versus Nonmetro Location and Region, 2009.

	Preschool Enrollment Rate, Children 3 to 4 years old 2007-11 ACS	Number of Funded Head Start Slots per 100 Poor Children 3 to 4 years old, 2009		Private Preschool Enrollment Rate, Children 3 to 4 years-olds 2007-11 ACS	Nonprofit Child Care Expenditures per Poor Child under 5 2009 (in \$100s)		N
	Mean (1)	Mean (2)	Median (3)	Mean (4)	Mean (5)	Median (6)	
Northeast Region							
Metropolitan Areas	0.54 ^{abcdefg} (0.10)	50.9 (24.8)	45.9	0.50 ^{abcdef} (0.14)	74.7 ^{abcdef} (79.5)	52.6	520
Non-metropolitan Areas	0.44 ^a (0.11)	66.1 (36.6)	60.8	0.36 ^{agh} (0.16)	48.3 ^{ghij} (94.8)	21.7	348
Midwest Region							
Metropolitan Areas	0.45 ^b (0.09)	48.7 ^a (39.5)	41.8	0.38 ^{bijk} (0.14)	23.8 ^{ak} (35.1)	12.4	1,208
Non-metropolitan Areas	0.42 ^c (0.15)	63.8 ^{bc} (74.3)	51.0	0.25 ^{cgilmno} (0.18)	20.2 ^{bgl} (68.0)	0.7	3,012
South Region							
Metropolitan Areas	0.45 ^d (0.12)	49.0 ^{bd} (60.7)	34.7	0.38 ^{dlpqr} (0.18)	19.2 ^{chm} (48.3)	3.8	2,376
Non-metropolitan Areas	0.43 ^e (0.16)	65.6 ^{ade} (67.3)	52.5	0.20 ^{chjimpst} (0.17)	6.7 ^{diklmno} (29.2)	0.0	3,320
West Region							
Metropolitan Areas	0.42 ^f (0.12)	35.7 ^{cef} (22.1)	32.8	0.44 ^{nqsu} (0.17)	30.7 ^{en} (60.9)	12.7	580
Non-metropolitan Areas	0.43 ^g (0.18)	62.5 ^f (89.0)	40.4	0.31 ^{fkortu} (0.23)	23.3 ^{fjo} (63.6)	0.5	1,204

Notes: Standard deviations reported in parentheses. Superscript letter pairs indicate within-column cell-pair mean differences that are statistically significant from zero at or below the .05 level. Counties with missing nonprofit expenditure data are coded as having no nonprofit human service programming (see Allard 2017). To reduce the effects of a few outlying counties, we excluded 7 counties from descriptive analysis if they report 1,000 or more Head Start slots per 100 poor children 3 to 4 years old.

Sources: U.S. Department of Agriculture, Economic Research Service; National Center on Charitable Statistics; Office of Head Start; U.S. Census Bureau, American Community Survey 2007-2011.

Technical Appendix Table 7. Early Childhood Program Provision in Georgia, Oklahoma, and Neighboring States.

	Preschool Enrollment Rate, Children 3 to 4 years old in the 2007-11 ACS			Number of Funded Head Start Slots per 100 Poor Children 3 to 4 years old in 2009	Nonprofit Child Care Expenditures per Poor Child under 5 in 2009 (in \$100s)	N
	Public and Private	Public Only	Private Only			
Mean across Georgia counties	0.47 ^a	0.75 ^a	0.25 ^a	50.8	5.1 ^a	159
Mean across counties in states neighboring Georgia	0.43 ^a	0.66 ^a	0.34 ^a	44.4	13.9 ^a	375
Mean across Oklahoma counties	0.42	0.89 ^a	0.11 ^a	72.9 ^a	10.6	77
Mean across counties in states neighboring Oklahoma	0.43	0.76 ^a	0.23 ^a	58.7 ^a	12.9	631

Notes: Standard deviations reported in parentheses. Superscript letter pairs indicate within-column cell-pair mean differences that are statistically significant from zero at or below the .05 level. Counties with missing nonprofit expenditure data are coded as having no nonprofit human service programming (see Allard 2017). To reduce the effects of a few outlying counties, we excluded 7 counties from descriptive analysis if they report 1,000 or more Head Start slots per 100 poor children 3 to 4 years old.

Sources: U.S. Department of Agriculture, Economic Research Service; National Center on Charitable Statistics; Office of Head Start; U.S. Census Bureau, American Community Survey 2007-2011.

Technical Appendix Table 8: Characteristics of ECLS-K:2011 Sample by Seven-Category Urban-Rural Continuum Code.

	Metro Areas			Large nonmetro +20,000 population		Small nonmetro or remote rural, < 20,000 population	
	+1,000,000 population	250,000-1,000,000 population	<250,000 population	Adjacent to metro	Not adjacent to metro	Adjacent to metro	Not adjacent to metro
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Dependent variables:</i>							
Attended center care in preK	48.9% ^a	48.6%	45.9% ^c	41.1%	43.3%	35.5% ^{ac}	36.3% ^{ab}
Attended Head Start in preK	15.1% ^a	13.7% ^b	11.5% ^c	22.3% ^{cd}	15.0% ^{de}	21.5% ^{bce}	28.1% ^{acc}
Math score at fall of K(std)	.08	.07	.21 ^a	-.01 ^a	-.09 ^a	.05	-.12 ^a
Reading score at fall of K(std)	.10 ^a	.09	.16 ^b	.03	-.02 ^a	-.06 ^b	-.14
<i>County-level characteristics:</i>							
Nonprofit child care expenditures per poor child <5 (in \$100)	\$49.6 ^a	\$48.6	\$58.1 ^b	\$36.4 ^c	\$8.1 ^{abc}	\$17.3 ^{ab}	\$19.2 ^{ab}
# of Head Start slots per 100 poor 3-4 year-olds (2009)	35.8 ^a	41.0 ^b	35.1 ^c	49.5 ^{ad}	39.1 ^{de}	81.0	70.9 ^{abcde}
% non-Hispanic white	57.0% ^a	67.9% ^b	78.0% ^a	84.6% ^{ab}	81.6% ^a	80.1% ^a	88.2% ^{ab}
<i>State-level characteristics:</i>							
% 4 year-olds enrolled in state preK	23.2%	24.2%	21.5%	18.8%	19.5%	32.6%	18.1%
Max. child care subsidy reimbursement (4 year old, center care, in \$)	\$641	\$573	\$710 ^a	\$701 ^b	\$627	\$667	\$475 ^{ab}
Observations	9,490	4,180	1,760	420	420	770	490

Notes: Weighted frequency or mean shown. Superscript letter pairs indicate within-row cell-pair mean differences that are statistically significant from zero at or below the .05 level. Observations are rounded to the nearest 10, in accordance with NCES requirements. Estimates use weights as specified by IES. All child-level variables are assessed at the fall of Kindergarten. All county variables were assessed in 2009 or in the 2007-2011 ACS. All differences in population are significant across urban-rural categories.

Sources: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); U.S. Department of Agriculture, Economic Research Service; National Center on Charitable Statistics; Office of Head Start; U.S. Census Bureau, American Community Survey 2007-2011; the Urban Institute.

Technical Appendix Table 9. County Racial and Ethnic Composition Characteristics of ECLS-K:2011 Sample by Four-Category Urban-Rural Continuum Code.

USDA-ERS Urban-Rural Continuum Code	County Population that is Hispanic 2007-11 ACS			County Population that is non-Hispanic Black 2007-11 ACS			County Population that is non-Hispanic White 2007-11 ACS		
	< 10%	10-20%	20%+	< 10%	10-20%	20%+	< 10%	10-20%	20%+
In metro areas of +250,000 population	37% (5,120)	26% (3,510)	37% (5,050)	57% (7,730)	17% (2,340)	26% (3,600)	2% (270)	4% (490)	94% (12,900)
In metro areas of < 250,000 population	71% (1,240)	29% (520)	0	63% (1,110)	70% (520)	7% (120)	0	0	100% (1,760)
Large nonmetro, urban population +20,000	66% (550)	34% (290)	0	84% (710)	5% (40)	11% (100)	0	0	100% (840)
Small nonmetro or remote rural, urban population less than 20,000	95% (70)	0	0	74% (930)	18% (22)	8% (100)	0	0	100% (1,260)

Notes: Figures are weighted and represent the percent and number of children in the ECLS-K:2011 data by USDA urban-rural code of residence ACS data from the 2007-2011 Five -Year estimates. Sample sizes are rounded to the nearest 10 in accordance to NCES requirements.

Sources: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); U.S. Department of Agriculture, Economic Research Service; U.S. Census Bureau, American Community Survey 2007-2011.

Technical Appendix Table 10. Early Childhood Program Provision by Four-Category Urban-Rural Continuum Code and Share of non-Hispanic Black Population in County, 2009.

		Preschool Enrollment Rate, Children 3 to 4 years old 2007-11 ACS	Number of Funded Head Start Slots per 100 Poor Children 3 to 4 years old, 2009		Private Preschool Enrollment Rate, Children 3 to 4 years-olds 2007-11 ACS	Nonprofit Child Care Expenditures per Poor Child under 5 2009 (in \$100s)		N
		Mean (1)	Mean (2)	Median (3)	Mean (4)	Mean (5)	Median (6)	
In metro areas of +250,000 population	<10% non-Hispanic Black	45.39 ^a	45.02 ^{ab}	37.51	42.37 ^{abcdef}	30.02 ^{ab}	8.84	518
	>=10% non-Hispanic Black	49.17 ^{bcd}	48.53 ^c	34.25	42.96 ^{ghijk}	32.20 ^{cd}	11.08	293
In metro areas of <250,000 population	<10% non-Hispanic Black	41.81 ^{be}	51.02	43.17	35.72 ^{agmn}	25.13	13.14	247
	>=10% non-Hispanic Black	45.69	48.74	40.13	31.43 ^{bhop}	13.39	3.72	107
Large nonmetro, urban population +20,000	<10% non-Hispanic Black	42.80 ^{ef}	52.56	49.76	33.42 ^{ciqr}	29.02 ^e	15.73	240
	>=10% non-Hispanic Black	47.32	47.86	39.68	27.68 ^{dj}	10.49	4.72	66
Small nonmetro or remote rural, urban population less than 20,000	<10% non-Hispanic Black	41.40 ^{adg}	66.94 ^{ac}	50.96	22.82 ^{ekmoq}	15.87 ^{ac}	0.00	1311
	>=10% non-Hispanic Black	48.00 ^{efg}	66.16 ^b	55.48	21.34 ^{flnpr}	9.15 ^{bde}	0.00	322

Notes: Superscript letter pairs indicate within-column cell-pair mean differences that are statistically significant from zero at or below the .05 level. Counties with missing nonprofit expenditure data are coded as having no nonprofit human service programming (see Allard 2017). To reduce the effects of a few outlying counties, we excluded 7 counties from descriptive analysis if they report 1,000 or more Head Start slots per 100 poor children 3 to 4 years old.

Sources: U.S. Department of Agriculture, Economic Research Service; National Center on Charitable Statistics; Office of Head Start; U.S. Census Bureau, American Community Survey 2007-2011.

Technical Appendix Table 11. Early Childhood Program Provision by Four-Category Urban-Rural Continuum Code and Share Hispanic Population in County.

		Preschool Enrollment Rate, Children 3 to 4 years old 2007-11 ACS	Number of Funded Head Start Slots per 100 Poor Children 3 to 4 years old, 2009		Private Preschool Enrollment Rate, Children 3 to 4 years-olds 2007-11 ACS	Nonprofit Child Care Expenditures per Poor Child under 5 2009 (in \$100s)		N
		Mean (1)	Mean (2)	Median (3)	Mean (4)	Mean (5)	Median (6)	
In metro areas of +250,000 population	<10% Hispanic	46.44 ^{abc}	49.82 ^a	38.35	41.70 ^{abcdef}	26.68 ^{ab}	7.51	598
	>=10% Hispanic	47.63 ^{def}	36.36 ^{bc}	31.82	45.08 ^{ghijkl}	42.39 ^{cdef}	15.03	213
In metro areas of <250,000 population	<10% Hispanic	43.61	53.61	43.86	34.95 ^{agmn}	23.16 ^c	8.70	287
	>=10% Hispanic	40.28	36.27 ^d	35.18	32.20 ^{bhop}	14.83 ^d	10.09	67
Large nonmetro, urban population +20,000	<10% Hispanic	45.02	52.55	48.99	32.88 ^{ciqr}	26.41	12.09	232
	>=10% Hispanic	39.87 ^{ad}	48.39	40.68	29.97 ^{djs}	20.66	7.70	74
Small nonmetro or remote rural, urban population less than 20,000	<10% Hispanic	43.09 ^{bc}	67.37 ^{abd}	53.36	22.91 ^{skmoq}	15.19 ^{ae}	0.00	1351
	>=10% Hispanic	40.87 ^{cf}	63.98 ^c	43.93	20.65 ^{flnprs}	11.47 ^{bf}	0.00	282

Notes: Superscript letter pairs indicate within-column cell-pair mean differences that are statistically significant from zero at or below the .05 level. Counties with missing nonprofit expenditure data are coded as having no nonprofit human service programming (see Allard 2017). To reduce the effects of a few outlying counties, we excluded 7 counties from descriptive analysis if they report 1,000 or more Head Start slots per 100 poor children 3 to 4 years old.

Sources: U.S. Department of Agriculture, Economic Research Service; National Center on Charitable Statistics; Office of Head Start; U.S. Census Bureau, American Community Survey 2007-2011.

Technical Appendix Table 12. County Demographic and Economic Characteristics of ECLS-K:2011 Sample by Four-Category Urban-Rural Continuum Code.

County characteristic	Population under 5 years	Poverty rate, children under 5 years	Unemployment rate	Percent mothers with children under 6 years employed	Median household income	Percent foreign born	Percent speaking language other than English
	Mean	Mean	Mean	Mean	Mean	Mean	Mean
In metro areas of +250,000 population	86,056 ^{abcd} (1,567)	20.89% ^a (0.11)	7.76% ^a (0.02)	66.71% (0.08)	\$58,414 ^a (160)	14.26% ^a (0.13)	22.31% ^a (0.22)
In metro areas of < 250,000 population	8,357 ^{abcd} (110)	19.76% ^b (0.32)	5.85% ^{ab} (0.04)	68.84% (0.31)	\$55,576 ^b (430)	5.02% ^{ab} (0.08)	10.73% ^{ab} (0.32)
Large nonmetro, urban population +20,000	3,917 ^{abcd} (47)	26.95% ^{ab} (0.17)	6.90% ^b (0.07)	71.59% (0.30)	\$44,993 ^{abc} (248)	2.97% ^{ab} (0.04)	5.64% ^a (0.12)
Small nonmetro or remote rural, urban population less than 20,000	1,602 ^{abcd} (31)	27.65% (0.43)	7.16% (0.13)	70.59% (0.37)	\$39,857 ^{abc} (310)	2.37% ^{ab} (0.09)	4.42% ^{ab} (0.16)

Notes: Figures are weighted and represent frequency or means for children in the ECLS-K:2011 data by USDA urban-rural code of residence using ACS data from the 2007-2011 Five-Year estimates. Standard errors are reported in parentheses. Superscript letter pairs indicate within-column cell-pair mean differences that are statistically significant from zero at or below the .05 level.

Sources: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); American Community Survey, 2007-11; U.S. Department of Agriculture, Economic Research Service.

Technical Appendix Table 13. Household Composition of the ECLS-K:2011 Sample by Four-Category Urban-Rural Continuum Code.

	Mean Number of adults in the household	Mean Number of children (<18) in the household
In metro areas of +250,000 population	2.08 ^{ab} (0.01)	2.51 (0.01)
In metro areas of < 250,000 population	2.00 ^a (0.02)	2.48 (0.04)
Large nonmetro, urban population +20,000	1.98 (0.03)	2.49 (0.05)
Small nonmetro or remote rural, urban population less than 20,000	1.98 ^b (0.02)	2.49 (0.04)

Notes: Figures are weighted and represent means in the ECLS-K:2011 data by USDA urban-rural code of residence. Standard errors reported in parentheses. Superscript letter pairs indicate within-column cell-pair mean differences that are statistically significant from zero at or below the .05 level.

Sources: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); U.S. Department of Agriculture, Economic Research Service.

Technical Appendix Table 14: Factors Associated with Head Start or other type of center care participation in the year prior to Kindergarten, ECLS-K:2011: Stepwise regression coefficients using Four-Category Urban-Rural Continuum Code.

VARIABLES	Attended Center Care or Head Start				
	(1)	(2)	(3)	(4)	(5)
<i>Rural/urban code (Reference: metro counties <250,000 population)</i>					
In metro areas of + 250,000 population	0.254 (0.181)	0.282+ (0.159)	0.261 (0.172)	0.240 (0.168)	0.213 (0.142)
Large nonmetro, urban population +20,000	0.142 (0.170)	0.182 (0.180)	0.179 (0.178)	0.187 (0.176)	0.190 (0.145)
Small nonmetro or remote rural, urban population less than 20,000	0.111 (0.138)	0.162 (0.137)	0.0957 (0.156)	0.103 (0.158)	0.0603 (0.165)
<i>Child-level covariates</i>					
Child age in months		-0.00512 (0.00616)	-0.00518 (0.00625)	-0.00510 (0.00622)	-0.00764 (0.00648)
Child is non-Hispanic Black		0.374*** (0.110)	0.368*** (0.105)	0.340** (0.109)	0.327** (0.112)
Child is Hispanic		-0.135 (0.0877)	-0.134 (0.0857)	-0.171+ (0.0954)	-0.176+ (0.0957)
Child is another race		0.149* (0.0737)	0.155+ (0.0800)	0.135 (0.0830)	0.133+ (0.0806)
Child is female		-0.0351 (0.0420)	-0.0319 (0.0422)	-0.0317 (0.0422)	-0.0380 (0.0436)
Child's primary language is not English		-0.340 (0.217)	-0.350 (0.215)	-0.350 (0.214)	-0.349+ (0.207)
Child has a disability		0.132* (0.0638)	0.135* (0.0639)	0.136* (0.0638)	0.107+ (0.0626)
Parents are married		0.00231 (0.0582)	0.00441 (0.0582)	0.00448 (0.0578)	-0.00547 (0.0599)
Household size		-0.124*** (0.0171)	-0.124*** (0.0171)	-0.124*** (0.0171)	-0.122*** (0.0174)
All parents in household were employed		0.0704 (0.0760)	0.0639 (0.0751)	0.0655 (0.0751)	0.0648 (0.0743)
Neither parent has a high school degree		-0.320** (0.103)	-0.316** (0.103)	-0.320** (0.104)	-0.306** (0.103)
One or more parents have a college degree or more		0.519*** (0.0663)	0.518*** (0.0663)	0.517*** (0.0663)	0.518*** (0.0659)
Number of books in the home (logged)		0.000553* (0.000253)	0.000554* (0.000254)	0.000570* (0.000256)	0.000590* (0.000262)
Household income is below 100 percent FPL		-0.0939 (0.0759)	-0.0953 (0.0757)	-0.0974 (0.0757)	-0.0949 (0.0742)
Household income is 100-200 percent FPL		-0.130 (0.0884)	-0.130 (0.0889)	-0.130 (0.0893)	-0.131 (0.0872)
Received SNAP since child was born		0.0934 (0.0782)	0.0935 (0.0762)	0.0932 (0.0771)	0.0793 (0.0761)

	(1)	(2)	(3)	(4)	(5)
<i>County-level covariates</i>					
Nonprofit child care expenditures per poor child <5 (logged)			0.00597 (0.0110)	0.00546 (0.0106)	0.0117 (0.0111)
Number of Head Start slots per 100 poor children age 3-4			0.00224+ (0.00136)	0.00226+ (0.00133)	0.00276* (0.00120)
Percent non-Hispanic White				-0.00187 (0.00181)	-0.000398 (0.00205)
<i>State-level covariates</i>					
Percent of 4 year olds enrolled in public preschool					0.00512* (0.00249)
Maximum child care subsidy reimbursement rate					-0.000226 (0.000316)
Constant	0.300* (0.152)	0.905* (0.433)	0.777+ (0.467)	0.928+ (0.510)	0.975 (0.603)
Observations	10,620	10,530	10,530	10,530	10,430

Notes: All child-level variables are assessed at the fall of Kindergarten, except for household food insecurity, which is assessed at the spring of Kindergarten. All county level variables were assessed at 2009 (the year prior to children's K entry), or for ACS variables, in the five-year 2007-2011 estimates. Observations are rounded to the nearest 10, in accordance with NCES requirements. Estimates use weights as specified by IES. Standard errors are clustered at the state level. Robust standard errors in parentheses.

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10.

Sources: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); American Community Survey, 2007-11; National Center on Charitable Statistics; Office of Head Start; U.S. Department of Agriculture, Economic Research Service; the National Institute for Early Education Research; the Urban Institute.

Technical Appendix Table 15: Factors Associated with Head Start participation in the year prior to Kindergarten relative to other types of center care, ECLS-K:2011: Stepwise regression coefficients using Four-Category Urban-Rural Continuum Code.

VARIABLES	Attended Head Start				
	(1)	(2)	(3)	(4)	(5)
<i>Rural/urban code (Reference: metro counties <250,000 population)</i>					
In metro areas of + 250,000 population	0.187 (0.247)	-0.134 (0.158)	-0.173 (0.149)	-0.130 (0.151)	-0.132 (0.134)
Large nonmetro, urban population +20,000	0.565* (0.221)	0.199 (0.270)	0.142 (0.225)	0.124 (0.229)	0.121 (0.211)
Small nonmetro or remote rural, urban population less than 20,000	1.008*** (0.285)	0.756** (0.256)	0.521* (0.246)	0.500+ (0.261)	0.577* (0.261)
<i>Child-level covariates</i>					
Child age in months		-0.0184* (0.00892)	-0.0191* (0.00875)	-0.0192* (0.00887)	-0.0166+ (0.00896)
Child is non-Hispanic Black		0.983*** (0.123)	0.973*** (0.129)	1.034*** (0.124)	1.051*** (0.133)
Child is Hispanic		0.896*** (0.241)	0.933*** (0.226)	1.010*** (0.150)	1.039*** (0.148)
Child is another race		0.183 (0.157)	0.241+ (0.138)	0.278* (0.139)	0.320* (0.132)
Child is female		-0.0722 (0.0618)	-0.0601 (0.0614)	-0.0592 (0.0620)	-0.0732 (0.0587)
Child's primary language is not English		0.788** (0.266)	0.794** (0.251)	0.812*** (0.245)	0.856*** (0.226)
Child has a disability		0.0160 (0.0876)	0.0156 (0.0875)	0.0112 (0.0873)	0.0453 (0.0837)
Parents are married		-0.415*** (0.0771)	-0.423*** (0.0773)	-0.421*** (0.0790)	-0.398*** (0.0821)
Household size		0.0881** (0.0326)	0.0887** (0.0332)	0.0890** (0.0331)	0.0852* (0.0337)
All parents in household were employed		0.104 (0.0828)	0.0833 (0.0806)	0.0823 (0.0809)	0.0661 (0.0823)
Neither parent has a high school degree		0.145 (0.116)	0.155 (0.110)	0.166 (0.107)	0.165 (0.105)
One or more parents have a college degree or more		-1.036*** (0.0983)	-1.043*** (0.104)	-1.043*** (0.105)	-1.058*** (0.108)
Number of books in the home (logged)		-0.000574 (0.000539)	-0.000544 (0.000519)	-0.000599 (0.000502)	-0.000759 (0.000574)
Household income is below 100% FPL		0.776*** (0.104)	0.787*** (0.103)	0.793*** (0.0996)	0.781*** (0.102)
Household income is 100-200% FPL		0.461*** (0.103)	0.460*** (0.104)	0.461*** (0.103)	0.463*** (0.106)
Received SNAP since child was born		0.670*** (0.101)	0.647*** (0.0954)	0.645*** (0.0970)	0.681*** (0.0909)

<i>County-level covariates</i>					
Nonprofit child care expenditures per poor child <5 (logged)		-0.00189	-0.00127	-0.00652	
		(0.0182)	(0.0177)	(0.0145)	
Number of Head Start slots per 100 poor children age 3-4		0.00563***	0.00559***	0.00521***	
		(0.00123)	(0.00121)	(0.00112)	
Percent non-Hispanic White			0.00375	0.00219	
			(0.00483)	(0.00483)	
<i>State-level covariates</i>					
Percent of 4 year olds enrolled in public preschool					-0.00886**
					(0.00333)
Maximum child care subsidy reimbursement rate					-2.93e-05
					(0.000317)
Constant	-1.380***	-0.607	-0.728	-1.033	-0.808
	(0.218)	(0.604)	(0.608)	(0.847)	(0.848)
Observations	6,600	6,550	6,550	6,550	6,480

Notes: All child-level variables are assessed at the fall of Kindergarten, except for household food insecurity, which is assessed at the spring of Kindergarten. All county level variables were assessed at 2009 (the year prior to children's K entry), or for ACS variables, in the five-year 2007-2011 estimates. Observations are rounded to the nearest 10, in accordance with NCES requirements. Estimates use weights as specified by IES. Standard errors are clustered at the state level. Robust standard errors in parentheses.

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10.

Sources: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); American Community Survey, 2007-11; National Center on Charitable Statistics; Office of Head Start; U.S. Department of Agriculture, Economic Research Service; the National Institute for Early Education Research; the Urban Institute.

Technical Appendix Table 16: Factors Associated with math scores at the fall of Kindergarten, ECLS-K:2011: Stepwise regression coefficients using Four-Category Urban-Rural Continuum Code.

VARIABLES	Math Score at Kindergarten					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Rural/urban code (Reference: metro counties <250,000 population)</i>						
In metro areas of + 250,000 population	-0.134 (0.106)	0.0491 (0.0666)	0.0373 (0.0678)	0.0116 (0.0642)	-0.00312 (0.0637)	0.0134 (0.0552)
Large nonmetro, urban population +20,000	-0.262** (0.0927)	-0.126* (0.0567)	-0.121* (0.0570)	-0.0920 (0.0599)	-0.0867 (0.0602)	-0.0789 (0.0575)
Small nonmetro or remote rural, urban population less than 20,000	-0.233* (0.110)	-0.131+ (0.0704)	-0.114 (0.0692)	-0.0688 (0.0706)	-0.0646 (0.0717)	-0.00605 (0.0665)
<i>Child-level covariates</i>						
Child age in months		0.0601*** (0.00268)	0.0605*** (0.00258)	0.0605*** (0.00259)	0.0606*** (0.00258)	0.0614*** (0.00255)
Child is non-Hispanic Black		-0.210*** (0.0302)	-0.194*** (0.0303)	-0.189*** (0.0353)	-0.209*** (0.0365)	-0.205*** (0.0361)
Child is Hispanic		-0.263*** (0.0470)	-0.242*** (0.0410)	-0.253*** (0.0423)	-0.279*** (0.0359)	-0.278*** (0.0358)
Child is another race		0.105* (0.0392)	0.0972* (0.0390)	0.0867* (0.0375)	0.0736* (0.0348)	0.0774* (0.0355)
Child is female		-0.0337+ (0.0198)	-0.0369+ (0.0203)	-0.0375+ (0.0200)	-0.0371+ (0.0201)	-0.0414* (0.0198)
Child's primary language is not English		-0.0787 (0.0829)	-0.0779 (0.0810)	-0.0922 (0.0806)	-0.0924 (0.0811)	-0.104 (0.0800)
Child has a disability		-0.245*** (0.0334)	-0.250*** (0.0337)	-0.247*** (0.0334)	-0.246*** (0.0334)	-0.249*** (0.0341)
Parents are married		0.126*** (0.0266)	0.116*** (0.0259)	0.118*** (0.0263)	0.118*** (0.0263)	0.129*** (0.0251)
Household size		-0.0335*** (0.00803)	-0.0302*** (0.00845)	-0.0308*** (0.00835)	-0.0309*** (0.00832)	-0.0302*** (0.00829)
All parents in household were employed		0.0580* (0.0272)	0.0544+ (0.0282)	0.0563* (0.0276)	0.0573* (0.0275)	0.0567* (0.0277)
Neither parent has a high school degree		-0.327*** (0.0356)	-0.334*** (0.0362)	-0.335*** (0.0359)	-0.338*** (0.0355)	-0.347*** (0.0357)
One or more parents have a college degree or more		0.401*** (0.0247)	0.374*** (0.0243)	0.372*** (0.0248)	0.371*** (0.0249)	0.373*** (0.0255)
Number of books in the home (logged)		0.000421*** (9.49e-05)	0.000402*** (9.28e-05)	0.000396*** (9.31e-05)	0.000404*** (9.57e-05)	0.000393*** (9.85e-05)
Household income is below 100 percent FPL		-0.228*** (0.0381)	-0.204*** (0.0381)	-0.203*** (0.0376)	-0.205*** (0.0371)	-0.189*** (0.0360)
Household income is 100-200 percent FPL		-0.133*** (0.0226)	-0.116*** (0.0232)	-0.115*** (0.0236)	-0.116*** (0.0235)	-0.112*** (0.0246)
Received SNAP since child was born		-0.123*** (0.0277)	-0.118*** (0.0270)	-0.113*** (0.0263)	-0.113*** (0.0275)	-0.108*** (0.0276)

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Child-level covariates (continued.)</i>						
Child attended center care in pre-K			0.137*** (0.0270)	0.135*** (0.0270)	0.134*** (0.0271)	0.135*** (0.0262)
Child attended Head Start in pre-K			-0.0527 (0.0348)	-0.0502 (0.0329)	-0.0501 (0.0323)	-0.0553+ (0.0319)
<i>County-level covariates</i>						
Nonprofit child care expenditures per poor child <5 (logged)				0.0104** (0.00351)	0.0100** (0.00340)	0.00915** (0.00305)
Number of Head Start slots per 100 poor children age 3-4				-9.03e-05 (0.000354)	-7.49e-05 (0.000362)	-0.000194 (0.000277)
Percent non-Hispanic White					-0.00128+ (0.000739)	-0.00135+ (0.000692)
<i>State-level covariates</i>						
Percent of 4 year olds enrolled in public preschool						0.000303 (0.000738)
Maximum child care subsidy reimbursement rate						0.000164 (0.000115)
Constant	0.211* (0.100)	-3.895*** (0.214)	-3.972*** (0.217)	-4.067*** (0.218)	-3.963*** (0.210)	-4.136*** (0.213)
Observations	10,440	10,320	10,190	10,190	10,190	10,080

Notes: All child-level variables are assessed at the fall of Kindergarten, except for household food insecurity, which is assessed at the spring of Kindergarten. All county level variables were assessed at 2009 (the year prior to children's K entry), or for ACS variables, in the five-year 2007-2011 estimates. Observations are rounded to the nearest 10, in accordance with NCES requirements. Estimates use weights as specified by IES. Standard errors are clustered at the state level. Robust standard errors in parentheses.

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10.

Sources: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); American Community Survey, 2007-11; National Center on Charitable Statistics; Office of Head Start; U.S. Department of Agriculture, Economic Research Service; the National Institute for Early Education Research; the Urban Institute.

Technical Appendix Table 17: Factors Associated with reading scores at the fall of Kindergarten, ECLS-K:2011: Stepwise regression coefficients using Four-Category Urban-Rural Continuum Code.

VARIABLES	Reading Score at Kindergarten					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Rural/urban code (Reference: metro counties <250,000 population)</i>						
In metro areas of + 250,000 population	-0.0574 (0.0804)	0.0589 (0.0573)	0.0454 (0.0571)	0.0450 (0.0585)	-0.00244 (0.0601)	-0.0185 (0.0589)
Large nonmetro, urban population +20,000	-0.151 (0.0951)	-0.0366 (0.104)	-0.0348 (0.101)	-0.0274 (0.0997)	-0.0108 (0.0968)	-0.0110 (0.0927)
Small nonmetro or remote rural, urban population less than 20,000	-0.251* (0.101)	-0.162* (0.0756)	-0.151+ (0.0776)	-0.123 (0.0777)	-0.109 (0.0817)	-0.0891 (0.0841)
<i>Child-level covariates</i>						
Child age in months		0.0477*** (0.00305)	0.0478*** (0.00293)	0.0478*** (0.00292)	0.0480*** (0.00264)	0.0475*** (0.00274)
Child is non-Hispanic Black		0.0292 (0.0420)	0.0424 (0.0433)	0.0446 (0.0436)	-0.0202 (0.0362)	-0.0252 (0.0375)
Child is Hispanic		-0.149* (0.0673)	-0.127* (0.0620)	-0.131* (0.0624)	-0.213*** (0.0488)	-0.209*** (0.0479)
Child is another race		0.207*** (0.0507)	0.195*** (0.0520)	0.191*** (0.0519)	0.149** (0.0493)	0.157** (0.0522)
Child is female		0.0895*** (0.0189)	0.0864*** (0.0193)	0.0853*** (0.0191)	0.0866*** (0.0192)	0.0849*** (0.0194)
Child's primary language is not English		-0.110 (0.100)	-0.107 (0.101)	-0.108 (0.105)	-0.110 (0.103)	-0.108 (0.106)
Child has a disability		-0.210*** (0.0347)	-0.216*** (0.0349)	-0.217*** (0.0345)	-0.213*** (0.0350)	-0.212*** (0.0346)
Parents are married		0.143*** (0.0248)	0.131*** (0.0240)	0.131*** (0.0242)	0.132*** (0.0239)	0.136*** (0.0232)
Household size		-0.0577*** (0.00840)	-0.0531*** (0.00876)	-0.0532*** (0.00864)	-0.0536*** (0.00891)	-0.0518*** (0.00881)
All parents in household were employed		0.0168 (0.0234)	0.0112 (0.0238)	0.0135 (0.0244)	0.0167 (0.0239)	0.0156 (0.0238)
Neither parent has a high school degree		-0.266*** (0.0493)	-0.269*** (0.0487)	-0.271*** (0.0492)	-0.281*** (0.0501)	-0.288*** (0.0524)
One or more parents have a college degree or more		0.398*** (0.0279)	0.371*** (0.0288)	0.371*** (0.0286)	0.369*** (0.0284)	0.366*** (0.0280)
Number of books in the home (logged)		0.000422*** (0.000101)	0.000397*** (9.88e-05)	0.000396*** (9.76e-05)	0.000422*** (0.000102)	0.000417*** (0.000102)
Household income is below 100 percent FPL		-0.194*** (0.0365)	-0.171*** (0.0365)	-0.171*** (0.0365)	-0.177*** (0.0347)	-0.175*** (0.0363)
Household income is 100-200 percent FPL		-0.113** (0.0326)	-0.0990** (0.0337)	-0.0992** (0.0337)	-0.102** (0.0324)	-0.106** (0.0337)
Received SNAP since child was born		-0.104*** (0.0242)	-0.0949*** (0.0244)	-0.0938*** (0.0246)	-0.0944** (0.0276)	-0.0931** (0.0270)

	(1)	(2)	(3)	(4)	(5)	(6)
<i>Child-level covariates (continued)</i>						
Child attended center care in pre-K			0.164*** (0.0265)	0.163*** (0.0267)	0.159*** (0.0257)	0.156*** (0.0258)
Child attended Head Start in pre-K			-0.0156 (0.0343)	-0.00971 (0.0318)	-0.00946 (0.0297)	-0.0157 (0.0308)
<i>County-level characteristics</i>						
Nonprofit child care expenditures per poor child <5 (logged)				0.000901 (0.00632)	-0.000293 (0.00537)	0.00204 (0.00485)
Number of Head Start slots per 100 poor children age 3-4				-0.000600 (0.000492)	-0.000552 (0.000439)	-0.000389 (0.000441)
Percent non-Hispanic White					-0.00410*** (0.000789)	-0.00368*** (0.000688)
<i>State-level covariates</i>						
Percent of 4 year olds enrolled in public preschool						0.000634 (0.00107)
Maximum child care subsidy reimbursement rate						-0.000156 (0.000123)
Constant	0.155+ (0.0774)	-3.091*** (0.228)	-3.168*** (0.218)	-3.159*** (0.219)	-2.825*** (0.219)	-2.758*** (0.224)
Observations	10,460	10,340	10,210	10,210	10,210	10,100

Notes: All child-level variables are assessed at the fall of Kindergarten, except for household food insecurity, which is assessed at the spring of Kindergarten. All county level variables were assessed at 2009 (the year prior to children's K entry), or for ACS variables, in the five-year 2007-2011 estimates. Observations are rounded to the nearest 10, in accordance with NCES requirements. Estimates use weights as specified by IES. Standard errors are clustered at the state level. Robust standard errors in parentheses.

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10.

Sources: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); American Community Survey, 2007-11; National Center on Charitable Statistics; Office of Head Start; U.S. Department of Agriculture, Economic Research Service; the National Institute for Early Education Research; the Urban Institute.

Technical Appendix Table 18: Factors Associated with ECE participation in the year prior to Kindergarten and school readiness, using Seven-category Urban-Rural Code, ECLS-K:2011.

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
<i>Panel A: County Geography (Reference: Metro counties 250,000 - 1 million)</i>				
In metro areas of +1 million population 1	1.125 (0.120)	1.170 (0.206)	-0.0217 (0.0471)	-0.0201 (0.0504)
In metro areas of < 250,000 population 3	0.861 (0.138)	1.246 (0.245)	-0.0270 (0.0663)	0.00433 (0.0686)
Large nonmetro, urban population +20,000, 4 adjacent to metro area	1.216 (0.186)	1.845* (0.467)	-0.0932* (0.0411)	0.0402 (0.104)
Large nonmetro, urban population +20,000, not adjacent to metro area	0.888 (0.149)	0.973 (0.349)	-0.115* (0.0484)	-0.0485 (0.0894)
Small Nonmetro or remote rural, urban population less than 20,000, adjacent to metro area	0.740* (0.104)	1.809* (0.530)	-0.0369 (0.0708)	-0.125 (0.103)
Small Nonmetro or remote rural, urban population less than 20,000, not adjacent to metro area	1.326 (0.271)	2.855** (1.074)	-0.0173 (0.0760)	-0.000447 (0.0927)
<i>Panel B: County-level Early Care and Education</i>				
Nonprofit child care expenditures per poor child <5 (in \$100)	1.010 (0.081)	.989 (0.011)	0.00902** (0.00315)	0.00144 (0.00480)
Number of Head Start slots per 100 poor children age 3-4	1.003** (.001)	1.005*** (0.001)	-0.000217 (0.000280)	-0.000416 (0.000455)
<i>Panel C: County-level Economic and Demographic Characteristics</i>				
Percent of population that is non-Hispanic white	1.000 (0.002)	1.003 (0.005)	-0.00148+ (0.000765)	-0.00386*** (0.000760)
<i>Panel D: State Early Care and Education Policy</i>				
Percent of 4 year-olds enrolled in state preK	1.006* (0.002)	0.992* (0.003)	0.000306 (0.000790)	0.000769 (0.00109)
Maximum child care subsidy reimbursement rate (center care for 4 year-old)	1.000 (0.0003)	1.000 (0.0003)	0.000178 (0.000178)	-0.000127 (0.000127)

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
<i>Panel E: Child- and Household-level Characteristics</i>				
Child attended center care in pre-K			0.135*** (0.0261)	0.155*** (0.0259)
Child attended Head Start in pre-K			-0.0551+ (0.0323)	-0.0184 (0.0324)
Child age in months	.992 (.006)	.984+ (.009)	0.0614*** (0.00253)	0.0475*** (0.00267)
Child is non-Hispanic Black	1.395** (.162)	2.926*** (.384)	-0.204*** (0.0359)	-0.0219 (0.0381)
Child is Hispanic	.839+ (.078)	2.846*** (.424)	-0.279*** (0.0355)	-0.209*** (0.0474)
Child is another race	1.161+ (.096)	1.247** (.191)	0.0782* (0.0360)	0.161** (0.0511)
Child is female	.963 (.043)	.937 (.058)	-0.0414* (0.0198)	0.0849*** (0.0194)
Child's primary language is not English	.693+ (.143)	2.294*** (.516)	-0.103 (0.0790)	-0.107 (0.105)
Child has a disability	1.115+ (.070)	1.048 (.086)	-0.249*** (0.0342)	-0.212*** (0.0347)
Parents are married	.994 (.060)	.671*** (.056)	0.128*** (0.0251)	0.136*** (0.0231)
Household size	.885*** (015)	1.088* (.037)	-0.0302*** (0.00829)	-0.0518*** (0.00893)
All parents are employed in Kindergarten	1.066 (.079)	1.065 (.089)	0.0563* (0.0275)	0.0146 (0.0239)
Neither parent has a high school degree	.732** (.075)	1.175 (.124)	-0.346*** (0.0368)	-0.288*** (0.0529)

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
<i>Panel E: Child- and Household-level Characteristics (continued)</i>				
One or more parents have a college degree or more	1.678*** (0.111)	.348*** (0.039)	0.373*** (0.0256)	0.366*** (0.0277)
Logged number of books in the home	1.001* (.0002)	0.999 (.001)	0.000393*** (9.94e-05)	0.000420*** (0.000102)
Household income is below 100 percent FPL	.908 (.066)	2.170*** (.223)	-0.190*** (0.0363)	-0.176*** (0.0368)
Household income is 100-200 percent FPL	.875 (.076)	1.577*** (.167)	-0.113*** (0.0248)	-0.107** (0.0336)
Received SNAP since child was born	1.091 (0.081)	2.001*** (0.191)	-0.110*** (0.0290)	-0.0953** (0.0276)
Constant	2.932+ (1.692)	0.338 (0.276)	-4.110*** (0.202)	-2.770*** (0.224)
Observations	10,430	6,480	10,080	10,100

Notes: Each column represents a separate regression. Odds ratios are shown for binary dependent variables (attended center care or Head Start) and coefficients are shown for math and reading scores. All child-level variables are assessed at the fall of Kindergarten, except for household food insecurity, which is assessed at the spring of Kindergarten. All county level variables were assessed at 2009 (the year prior to children's K entry), or for ACS variables, in the five-year 2007-2011 estimates.

Observations are rounded to the nearest 10, in accordance with NCES requirements. Standard errors are clustered at the state level. Robust standard errors in parentheses. Estimates use weights as specified by IES.

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Sources: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); 2007-11 American Community Survey 2007-2011; U.S. Department of Agriculture, Economic Research Service; National Center on Charitable Statistics; the National Institute for Early Education Research; the Urban Institute.

Technical Appendix Table 19: Factors Associated with ECE participation in the year prior to Kindergarten and school readiness, controlling for separate county-level racial and ethnic characteristics, using Four-Category Urban-Rural Continuum Code, ECLS-K:2011.

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
<i>Panel A: County Geography (Omitted: metro counties <250,000 population)</i>				
In metro areas of + 250,000 population	0.222 (0.145)	-0.101 (0.135)	0.0101 (0.0544)	-0.0299 (0.0583)
Large nonmetro, urban population +20,000	0.195 (0.143)	0.126 (0.195)	-0.0844 (0.0553)	-0.0260 (0.0900)
Small nonmetro or remote rural, urban population less than 20,000	0.0656 (0.163)	0.555* (0.257)	-0.00442 (0.0633)	-0.0836 (0.0706)
<i>Panel B: County-level Early Care and Education</i>				
Nonprofit child care expenditures per poor child <5 (in \$100)	0.0141 (0.0112)	-0.00833 (0.0131)	0.00960** (0.00314)	0.00324 (0.00483)
Number of Head Start slots per 100 poor children age 3-4	0.00269* (0.00118)	0.00533*** (0.00113)	-0.000204 (0.000280)	-0.000421 (0.000440)
<i>Panel C: County-level Economic and Demographic Characteristics</i>				
Percent of population that is Hispanic	-0.00215 (0.00235)	-0.00335 (0.00663)	0.00145 (0.00130)	0.00414*** (0.000905)
Percent of population that is non-Hispanic black	0.00185 (0.00300)	-0.00591 (0.00436)	0.00130 (0.00114)	0.00374* (0.00167)
<i>Panel D: State Early Care and Education Policy</i>				
Percent of 4 year-olds enrolled in state preK	0.00549* (0.00245)	-0.00880** (0.00334)	0.000287 (0.000754)	0.000558 (0.00107)
Maximum child care subsidy reimbursement rate (center care for 4 year-old)	-0.000205 (0.000308)	-0.000103 (0.000314)	0.000165 (0.000111)	-0.000151 (0.000127)

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
<i>Panel E: Child- and Household-level Characteristics</i>				
Child attended center care in pre-K			0.135*** (0.0261)	0.156*** (0.0260)
Child attended Head Start in pre-K			-0.0544+ (0.0318)	-0.0132 (0.0316)
Child age in months	-0.00779 (0.00645)	-0.0162+ (0.00916)	0.0613*** (0.00254)	0.0471*** (0.00272)
Child is non-Hispanic Black	0.300* (0.132)	1.111*** (0.141)	-0.204*** (0.0413)	-0.0255 (0.0373)
Child is Hispanic	-0.132 (0.0868)	1.056*** (0.138)	-0.277*** (0.0292)	-0.207*** (0.0434)
Child is another race	0.139+ (0.0760)	0.312* (0.132)	0.0862* (0.0369)	0.180** (0.0537)
Child is female	-0.0383 (0.0435)	-0.0736 (0.0589)	-0.0415* (0.0198)	0.0847*** (0.0197)
Child's primary language is not English	-0.349+ (0.207)	0.864*** (0.228)	-0.104 (0.0803)	-0.108 (0.107)
Child has a disability	0.104+ (0.0629)	0.0451 (0.0832)	-0.249*** (0.0345)	-0.213*** (0.0344)
Parents are married	-0.00241 (0.0599)	-0.399*** (0.0848)	0.128*** (0.0248)	0.135*** (0.0230)
Household size	-0.120*** (0.0174)	0.0838* (0.0327)	-0.0302*** (0.00826)	-0.0518*** (0.00846)
All parents are employed in Kindergarten	0.0636 (0.0742)	0.0668 (0.0829)	0.0558+ (0.0276)	0.0131 (0.0236)
Neither parent has a high school degree	-0.306** (0.103)	0.167 (0.107)	-0.347*** (0.0360)	-0.287*** (0.0544)

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
<i>Panel E: Child- and Household-level Characteristics (continued)</i>				
One or more parents have a college degree or more	0.518*** (0.0655)	-1.057*** (0.109)	0.373*** (0.0256)	0.366*** (0.0285)
Logged number of books in the home	0.000579* (0.000258)	-0.000779 (0.000583)	0.000393*** (9.81e-05)	0.000417*** (0.000101)
Household income is below 100 percent FPL at Kindergarten	-0.0957 (0.0726)	0.787*** (0.101)	-0.190*** (0.0362)	-0.177*** (0.0364)
Household income is 100-200 percent FPL at Kindergarten	-0.132 (0.0854)	0.467*** (0.106)	-0.113*** (0.0248)	-0.108** (0.0339)
Received SNAP since child was born	0.0820 (0.0758)	0.684*** (0.0941)	-0.109*** (0.0287)	-0.0977** (0.0277)
Constant	0.902 (0.586)	-0.543 (0.635)	-4.256*** (0.213)	-3.088*** (0.230)
Observations	10,430	6,480	10,080	10,100

Notes: Each column represents a separate regression. Odds ratios are shown for binary dependent variables (attended center care or Head Start) and coefficients are shown for math and reading scores. All child-level variables are assessed at the fall of Kindergarten, except for household food insecurity, which is assessed at the spring of Kindergarten. All county level variables were assessed at 2009 (the year prior to children's K entry), or for ACS variables, in the five-year 2007-2011 estimates.

Observations are rounded to the nearest 10, in accordance with NCES requirements. Standard errors are clustered at the state level. Robust standard errors in parentheses. Estimates use weights as specified by IES.

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Sources: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); 2007-11 American Community Survey 2007-2011; U.S. Department of Agriculture, Economic Research Service; National Center on Charitable Statistics; the National Institute for Early Education Research; the Urban Institute.

Technical Appendix Table 20: Factors Associated with ECE participation in the year prior to Kindergarten and school readiness, controlling for number of children and adults separately, using Four-Category Urban-Rural Continuum Code, ECLS-K:2011.

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
<i>Panel A: County Geography (Reference: metro counties 250,000 – 1 million)</i>				
In metro areas of + 250,000 population	0.213 (0.135)	-0.143 (0.133)	0.0328 (0.0579)	-0.0150 (0.0554)
Large nonmetro, urban population +20,000	0.226 (0.153)	0.111 (0.220)	-0.0888 (0.0542)	-0.00822 (0.0878)
Small nonmetro or remote rural, urban population less than 20,000	0.0836 (0.162)	0.564* (0.252)	-0.0176 (0.0660)	-0.0856 (0.0795)
<i>Panel B: County-level Early Care and Education</i>				
Nonprofit child care expenditures per poor child <5 (in \$100)	0.000914 (0.000764)	-0.00131* (0.000611)	0.000320 (0.000196)	0.000334 (0.000236)
Number of Head Start slots per 100 poor children age 3-4	0.00216* (0.000882)	0.00535*** (0.00139)	-0.000509+ (0.000293)	-0.000463 (0.000437)
<i>Panel C: County-level Economic and Demographic Characteristics</i>				
Percent of population that is non-Hispanic white	-0.00109 (0.00207)	0.00319 (0.00469)	-0.00165* (0.000782)	-0.00376*** (0.000749)
<i>Panel D: State Early Care and Education Policy</i>				
Percent of 4 year-olds enrolled in state preK	0.00561* (0.002)	-0.00901** (0.00315)	0.000189 (0.0002)	0.000597 (0.0002)
Maximum child care subsidy reimbursement rate (center care for 4 year-old)	-0.000366 (0.000285)	4.49e-05 (0.000333)	0.000169 (0.000130)	-0.000164 (0.000120)

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
<i>Panel E: Child- and Household-level Characteristics</i>				
Child attended center care in pre-K			0.133*** (0.0255)	0.155*** (0.0253)
Child attended Head Start in pre-K			-0.0549+ (0.0316)	-0.0164 (0.0307)
Child age in months	-0.00650 (0.00613)	-0.0177+ (0.00906)	0.0617*** (0.00256)	0.0476*** (0.00270)
Child is non-Hispanic Black	0.298** (0.110)	1.103*** (0.128)	-0.209*** (0.0347)	-0.0183 (0.0379)
Child is Hispanic	-0.165+ (0.0930)	1.055*** (0.151)	-0.272*** (0.0355)	-0.209*** (0.0478)
Child is another race	0.107 (0.0856)	0.335* (0.131)	0.0756* (0.0341)	0.155** (0.0518)
Child is female	-0.0346 (0.0443)	-0.0782 (0.0604)	-0.0416* (0.0197)	0.0841*** (0.0195)
Child's primary language is not English	-0.355+ (0.209)	0.856*** (0.223)	-0.0961 (0.0799)	-0.100 (0.106)
Child has a disability	0.111+ (0.0639)	0.0466 (0.0843)	-0.252*** (0.0340)	-0.213*** (0.0344)
Parents are married	0.00547 (0.0632)	-0.413*** (0.0840)	0.128*** (0.0237)	0.128*** (0.0215)
Number of adults in the household	-0.163*** (0.0327)	0.183** (0.0634)	-0.0339* (0.0132)	-0.0201+ (0.0111)
Number of children in the household	-0.102*** (0.0206)	0.0365 (0.0365)	-0.0287** (0.0102)	-0.0634*** (0.0107)
All parents are employed in Kindergarten	0.0703 (0.0747)	0.0682 (0.0821)	0.0557+ (0.0284)	0.0145 (0.0241)
Neither parent has a high school degree	-0.322** (0.108)	0.162 (0.106)	-0.357*** (0.0346)	-0.293*** (0.0514)

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
<i>Panel E: Child- and Household-level Characteristics (continued)</i>				
One or more parents have a college degree or more	0.491*** (0.0662)	-1.039*** (0.109)	0.371*** (0.0242)	0.369*** (0.0266)
Logged number of books in the home	0.000586* (0.000256)	-0.000697 (0.000555)	0.000398*** (9.85e-05)	0.000427*** (0.000103)
Household income is below 100 percent FPL at Kindergarten	-0.0993 (0.0746)	0.795*** (0.104)	-0.189*** (0.0364)	-0.171*** (0.0361)
Household income is 100-200 percent FPL at Kindergarten	-0.129 (0.0871)	0.466*** (0.109)	-0.112*** (0.0243)	-0.103** (0.0339)
Received SNAP since child was born	0.0771 (0.0784)	0.708*** (0.0930)	-0.110*** (0.0292)	-0.0902** (0.0274)
Constant	1.068* (0.544)	-0.960 (0.829)	-4.058*** (0.208)	-2.776*** (0.214)
Observations	10,390	6,480	10,080	10,100

Notes: Each column represents a separate regression. Odds ratios are shown for binary dependent variables (attended center care or Head Start) and coefficients are shown for math and reading scores. All child-level variables are assessed at the fall of Kindergarten, except for household food insecurity, which is assessed at the spring of Kindergarten. All county level variables were assessed at 2009 (the year prior to children's K entry), or for ACS variables, in the five-year 2007-2011 estimates. Observations are rounded to the nearest 10, in accordance with NCES requirements. Standard errors are clustered at the state level. Robust standard errors in parentheses. Estimates use weights as specified by IES.

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Sources: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); 2007-11 American Community Survey 2007-2011; U.S. Department of Agriculture, Economic Research Service; National Center on Charitable Statistics; the National Institute for Early Education Research; the Urban Institute.

Technical Appendix Table 21: Factors Associated with ECE participation in the year prior to Kindergarten and school readiness, controlling for additional county-level characteristics, using Four-Category Urban-Rural Continuum Code, ECLS-K:2011.

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
<i>Panel A: County Geography (Reference: metro counties 250,000 – 1 million)</i>				
In metro areas of <250,000 population (ref)				
In metro areas of + 250,000 population	0.163 (0.135)	-0.154 (0.194)	-0.00731 (0.0507)	-0.0471 (0.0509)
Large nonmetro, urban population +20,000	0.194 (0.166)	-0.000409 (0.157)	-0.0440 (0.0475)	0.0206 (0.0863)
Small nonmetro or remote rural, urban population less than 20,000	0.0422 (0.179)	0.337 (0.228)	0.0455 (0.0652)	-0.0251 (0.0724)
<i>Panel B: County-level Early Care and Education</i>				
Nonprofit child care expenditures per poor child <5 (in \$100)	0.00688 (0.0112)	-0.0147 (0.0105)	0.00942** (0.00318)	0.00325 (0.00458)
Number of Head Start slots per 100 poor children age 3-4	0.00245* (0.00120)	0.00523*** (0.00138)	-0.000224 (0.000327)	-0.000426 (0.000533)
<i>Panel C: County-level Economic and Demographic Characteristics</i>				
Percent of population that is Hispanic	-0.0102*** (0.00292)	-0.0221*** (0.00625)	0.00373 (0.00248)	0.00700** (0.00198)
Percent of population that is non-Hispanic black	0.000266 (0.00329)	-0.0163** (0.00563)	0.00352** (0.00119)	0.00637*** (0.00172)
Unemployment rate	0.00607 (0.0220)	0.0602 (0.0403)	-0.0111 (0.00975)	-0.0142 (0.00985)
Poverty rate among children under 5	-0.0425 (0.720)	1.800 (1.303)	-0.566* (0.259)	-0.637** (0.203)
Percent of population that is foreign-born	0.0185** (0.00618)	0.0253*** (0.00569)	-0.000317 (0.00288)	-0.000827 (0.00367)
<i>Panel D: State Early Care and Education Policy</i>				
Percent of 4 year-olds enrolled in state preK	0.00518* (0.00221)	-0.00789* (0.00359)	-0.000152 (0.000705)	5.67e-05 (0.000995)
Maximum child care subsidy reimbursement rate (center care for 4 year-old)	-0.000320 (0.000305)	-2.45e-05 (0.000304)	7.09e-05 (9.99e-05)	-0.000255* (0.000114)

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
<i>Panel E: Child- and Household-level Characteristics</i>				
Child attended center care in pre-K			0.133*** (0.0245)	0.154*** (0.0245)
Child attended Head Start in pre-K			-0.0503 (0.0313)	-0.00780 (0.0314)
Child age in months	-0.00607 (0.00648)	-0.0140 (0.00918)	0.0612*** (0.00249)	0.0470*** (0.00258)
Child is non-Hispanic Black	0.296* (0.132)	1.100*** (0.144)	-0.205*** (0.0394)	-0.0272 (0.0356)
Child is Hispanic	-0.149 (0.0908)	1.042*** (0.142)	-0.282*** (0.0300)	-0.213*** (0.0448)
Child is another race	0.0868 (0.0858)	0.255+ (0.138)	0.0859* (0.0379)	0.181** (0.0544)
Child is female	-0.0364 (0.0438)	-0.0608 (0.0616)	-0.0418* (0.0197)	0.0843*** (0.0195)
Child's primary language is not English	-0.404+ (0.206)	0.722** (0.246)	-0.0960 (0.0762)	-0.0958 (0.100)
Child has a disability	0.111+ (0.0642)	0.0573 (0.0827)	-0.249*** (0.0337)	-0.212*** (0.0342)
Parents are married	-0.00166 (0.0610)	-0.396*** (0.0896)	0.127*** (0.0243)	0.134*** (0.0227)
Household size	-0.119*** (0.0171)	0.0863* (0.0335)	-0.0317*** (0.00813)	-0.0536*** (0.00822)
All parents are employed in Kindergarten	0.0710 (0.0747)	0.0655 (0.0870)	0.0576* (0.0266)	0.0150 (0.0231)
Neither parent has a high school degree	-0.326** (0.102)	0.135 (0.107)	-0.345*** (0.0359)	-0.286*** (0.0501)

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
<i>Panel E: Child- and Household-level Characteristics (continued)</i>				
One or more parents have a college degree or more	0.505*** (0.0672)	-1.055*** (0.109)	0.367*** (0.0234)	0.359*** (0.0265)
Logged number of books in the home	0.000596* (0.000262)	-0.000768 (0.000580)	0.000391*** (9.81e-05)	0.000414*** (0.000101)
Household income is below 100 percent FPL at Kindergarten	-0.101 (0.0715)	0.761*** (0.105)	-0.180*** (0.0343)	-0.165*** (0.0361)
Household income is 100-200 percent FPL at Kindergarten	-0.135 (0.0847)	0.456*** (0.106)	-0.108*** (0.0246)	-0.101** (0.0339)
Received SNAP since child was born	0.109 (0.0711)	0.684*** (0.0906)	-0.0980** (0.0304)	-0.0855** (0.0278)
Constant	0.887+ (0.510)	-1.362* (0.682)	-4.022*** (0.206)	-2.813*** (0.224)
Observations	10,430	6,480	10,080	10,100

Notes: Each column represents a separate regression. Logistic regression models were conducted for binary dependent variables (attended center care or Head Start) and OLS models for continuous dependent variables (math and reading scores). Coefficients are shown. All child-level variables are assessed at the fall of Kindergarten, except for household food insecurity, which is assessed at the spring of Kindergarten. All county level variables were assessed at 2009 (the year prior to children's K entry), or for ACS variables, in the five-year 2007-2011 estimates. Observations are rounded to the nearest 10, in accordance with NCES requirements. Standard errors are clustered at the state level. Robust standard errors in parentheses. Estimates use weights as specified by IES.

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Sources: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); 2007-11 American Community Survey 2007-2011; U.S. Department of Agriculture, Economic Research Service; National Center on Charitable Statistics; the National Institute for Early Education Research; the Urban Institute.

Technical Appendix Table 22: Factors Associated with ECE participation in the year prior to Kindergarten and school readiness, controlling for additional county-level characteristics, using the USDA Rural-Urban Code (7 categories), ECLS-K:2011.

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
Panel A: County Geography (omitted category: counties 250,000 to 1 million)				
In metro areas of +1 million population 1	0.0310 (0.124)	0.140 (0.149)	-0.0603 (0.0486)	-0.0555 (0.0569)
In metro areas of < 250,000 population 3	-0.163 (0.148)	0.198 (0.222)	-0.0210 (0.0578)	0.0186 (0.0582)
Large nonmetro, urban population +20,000, 4 adjacent to metro area	0.241 (0.162)	0.417+ (0.249)	-0.0226 (0.0442)	0.119 (0.100)
Large nonmetro, urban population +20,000, not adjacent to metro area	-0.150 (0.156)	-0.0877 (0.281)	-0.0851* (0.0358)	-0.0140 (0.0554)
Small Nonmetro or remote rural, urban population less than 20,000, adjacent to metro area	-0.303* (0.154)	0.431 (0.332)	0.0185 (0.0569)	-0.0442 (0.0663)
Small Nonmetro or remote rural, urban population less than 20,000, not adjacent to metro area	0.270 (0.240)	0.656* (0.324)	0.0820 (0.0736)	0.117 (0.0858)
Panel B: County-level Early Care and Education				
Nonprofit child care expenditures per poor child <5 (in \$100)	0.00486 (0.0101)	-0.0178* (0.00852)	0.00890** (0.00324)	0.00236 (0.00423)
Number of Head Start slots per 100 poor children age 3-4	0.00249* (0.00116)	0.00540*** (0.00129)	-0.000333 (0.000330)	-0.000528 (0.000534)
Panel C: County-level Economic and Demographic Characteristics				
Percent of population that is Hispanic	-0.00969*** (0.00288)	-0.0221*** (0.00647)	0.00385 (0.00245)	0.00720*** (0.00188)
Percent of population that is non-Hispanic black	0.00118 (0.00346)	-0.0164** (0.00605)	0.00427** (0.00133)	0.00728*** (0.00190)
Unemployment rate	-0.00375 (0.0233)	0.0443 (0.0392)	-0.0104 (0.00963)	-0.0150 (0.00984)
Poverty rate among children under 5	-0.0832 (0.799)	2.038+ (1.170)	-0.701* (0.272)	-0.780** (0.226)
Percent of population that is foreign-born	0.0179** (0.00649)	0.0239*** (0.00661)	0.000595 (0.00263)	-9.18e-06 (0.00371)

VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
Panel D: State Early Care and Education Policy				
Percent of 4 year-olds enrolled in state preK	0.00585** (0.00220)	-0.00747* (0.00362)	-0.000186 (0.000756)	0.000137 (0.000993)
Maximum child care subsidy reimbursement rate (center care for 4 year-old)	-0.000256 (0.000307)	-2.07e-05 (0.000313)	9.00e-05 (0.000101)	-0.000226+ (0.000121)
Panel E: Child- and Household-level Characteristics				
Child attended center care in pre-K			0.132*** (0.0243)	0.152*** (0.0244)
Child attended Head Start in pre-K			-0.0508 (0.0317)	-0.0108 (0.0327)
Child age in months	-0.00631 (0.00641)	-0.0141 (0.00916)	0.0614*** (0.00246)	0.0472*** (0.00252)
Child is non-Hispanic Black	0.304* (0.132)	1.116*** (0.145)	-0.204*** (0.0393)	-0.0247 (0.0351)
Child is Hispanic	-0.141 (0.0909)	1.054*** (0.143)	-0.281*** (0.0302)	-0.210*** (0.0448)
Child is another race	0.110 (0.0888)	0.279* (0.142)	0.0876* (0.0370)	0.187*** (0.0520)
Child is female	-0.0365 (0.0443)	-0.0573 (0.0633)	-0.0418* (0.0198)	0.0841*** (0.0195)
Child's primary language is not English	-0.408* (0.205)	0.717** (0.247)	-0.0929 (0.0753)	-0.0937 (0.0998)
Child has a disability	0.112+ (0.0647)	0.0571 (0.0819)	-0.249*** (0.0338)	-0.212*** (0.0343)
Parents are married	-0.00372 (0.0614)	-0.398*** (0.0889)	0.127*** (0.0240)	0.134*** (0.0224)
Household size	-0.119*** (0.0169)	0.0850* (0.0337)	-0.0317*** (0.00813)	-0.0536*** (0.00833)

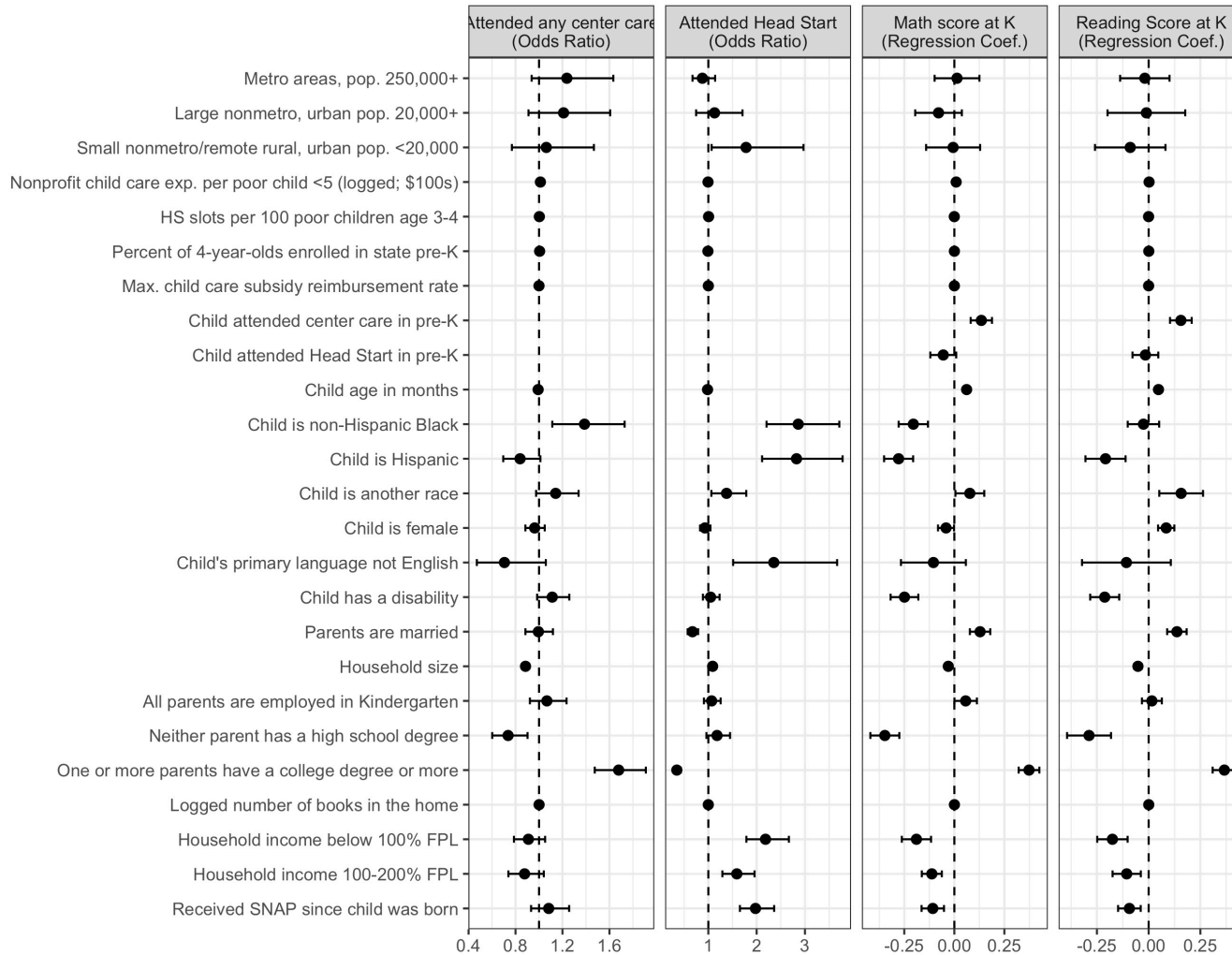
VARIABLES	Attended center care in pre-K (1)	Attended Head Start (2)	Math score at K (3)	Reading score at K (4)
Panel E: Child- and Household-level Characteristics (continued)				
All parents are employed in Kindergarten	0.0681 (0.0748)	0.0632 (0.0874)	0.0570* (0.0267)	0.0137 (0.0234)
Neither parent has a high school degree	-0.328** (0.100)	0.133 (0.107)	-0.344*** (0.0362)	-0.284*** (0.0497)
One or more parents have a college degree or more	0.505*** (0.0679)	-1.054*** (0.110)	0.366*** (0.0240)	0.359*** (0.0264)
Logged number of books in the home	0.000614* (0.000263)	-0.000734 (0.000580)	0.000389*** (9.87e-05)	0.000415*** (0.000102)
Household income is below 100 percent FPL at Kindergarten	-0.101 (0.0700)	0.756*** (0.104)	-0.181*** (0.0347)	-0.166*** (0.0365)
Household income is 100-200 percent FPL at Kindergarten	-0.135 (0.0839)	0.449*** (0.106)	-0.107*** (0.0248)	-0.101** (0.0340)
Received SNAP since child was born	0.110 (0.0701)	0.692*** (0.0942)	-0.0998** (0.0307)	-0.0871** (0.0277)
Constant	1.081* (0.528)	-1.492* (0.638)	-4.008*** (0.197)	-2.833*** (0.219)
Observations	10,430	6,480	10,080	10,100

Notes: Each column represents a separate regression. Logistic regression models were conducted for binary dependent variables (attended center care or Head Start) and OLS models for continuous dependent variables (math and reading scores). Coefficients are shown. All child-level variables are assessed at the fall of Kindergarten, except for household food insecurity, which is assessed at the spring of Kindergarten. All county level variables were assessed at 2009 (the year prior to children's K entry), or for ACS variables, in the five-year 2007-2011 estimates. Observations are rounded to the nearest 10, in accordance with NCES requirements. Standard errors are clustered at the state level. Robust standard errors in parentheses. Estimates use weights as specified by IES.

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Sources: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); 2007-11 American Community Survey 2007-2011; U.S. Department of Agriculture, Economic Research Service; National Center on Charitable Statistics; the National Institute for Early Education Research; the Urban Institute.

Technical Appendix Figure 1. Odds Ratios and Regression Coefficients from Models in Appendix Table 4 (All variables)



Notes: Each column represents a separate regression. Odds ratios are shown for binary dependent variables (attended center care or Head Start) and coefficients are shown for math and reading scores. All child-level variables are assessed at the fall of Kindergarten, except for household food insecurity, which is assessed at the spring of Kindergarten. All county level variables were assessed at 2009 (the year prior to children’s K entry), or for ACS variables, in the five-year 2007-2011 estimates. Observations are rounded to the nearest 10, in accordance with NCES requirements. Standard errors are clustered at the state level. Estimates use weights as specified by IES. Reference category for county geography codes is small metro areas with population < 250,000. For more information, see Appendix Table 15.

Sources: U.S. Department of Education, Institute for Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study-Kindergarten Cohort:2010-2011 (ECLS-K:2011); 2007-11 American Community Survey 2007-2011; U.S. Department of Agriculture, Economic Research Service; National Center on Charitable Statistics; the National Institute for Early Education Research; the Urban Institute.

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