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Differences in Child Care Quality in Rural and Non-Rural Areas

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This study examines rural differences in one important indicator of quality for licensed child care settings—the number of children per adult. It also investigates the relationships between cost of child care, child care subsidy receipt, and child care quality for both rural and non-rural areas. We used representative child care survey data pooled across five states with geographic identification of rural status at the zip code level. While controlling for other characteristics that may affect child:adult ratios, we found infants in center care in rural areas are more likely to experience higher child:adult ratios and preschoolers in center care in rural areas are more likely to experience lower child:adult ratios than their non-rural counterparts. Toddlers in family child care are more likely to experience lower child:adult ratios in rural than urban areas. In rural areas, the cost of family child care and center care, for the toddler age group only, is significantly associated with lower ratios. Infants and preschoolers whose families receive public child care subsidies are more likely to experience higher child:adult ratios regardless of whether they reside in a rural area or not. These results address the gap in knowledge about differences in child care quality in rural and non-rural areas and demonstrate that the relationship between one indicator of quality and rural status varies by age of children and type of care. However, children receiving child care subsidies are most consistently at risk for receiving lower quality care. Policies need to be in place to ensure low-income children receiving child care subsidies in both rural and non-rural areas have equal access to higher quality licensed care.

The quality of children's early care and education experiences is increasingly tied to children's developmental outcomes including their cognitive and social development, school readiness, and overall well-being (Adams, Zaslow, & Tout, 2007; Johansen, Leibowitz & Waite, 1996; National Research Council and Institute of Medicine, 2000; U.S. Department of Health and Human Services, 1999). The National Research Council and Institute of Medicine (2000), in a groundbreaking publication about the importance of early childhood, concluded that the developmental effects of child care depend on variables such as safety, stable relationships, and the provision of linguistically and cognitively rich environments. The authors point out that while high quality early childhood programs advance the skills and concepts children need for succeeding in school, overall child care in this country is highly fragmented and characterized by marked variation in quality, ranging from rich, growth promoting experiences to unstimulating, highly unmotivating and sometimes unsafe settings.

This study investigates one source of possible variation in child care quality—rural and non-rural differences. We focus attention on an often overlooked population of young children—children in rural areas. We address variation in

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the child care experiences of rural and non-rural children on one measure of child care quality, the number of children per adult, and its association with the cost of child care and receipt of government-funded child care subsidies through the Child Care Development Fund (CCDF) for qualifying low income families. The number of children per adult, or the child:adult ratio, is a common indicator of structural quality in licensed child care settings. Though we recognize many children are in non-licensed child care settings, our study focuses on a quality measure applicable to licensed settings. Child:adult ratios are a less applicable measure of quality for unlicensed settings because these caregivers usually only care for one or two children at a time (Maher, 2007).

Although rural populations comprise one-fifth of the nation (U.S. Census Bureau, 2000), they are often neglected in research studies and public consciousness. The U.S. Census defines rural as census block or blocks not classified as urban areas or urban clusters. Urban areas and clusters are defined based on a population density threshold per square mile. Researchers studying rural populations do not always use census definitions of rural and urban due to data constraints or academic preferences, which makes conceptual and empirical comparability a challenge. Rural populations are typically poorly represented in national studies because of geographic dispersion that creates difficulties in sampling and interviewing subjects (National Children's Study Workshop, 2004). The National Center for Rural Early Childhood Learning Initiatives commissioned a study of national public-use data sets in 2004 and found most of the data sets do not lend themselves to identification of the status of young rural children due to concerns about data confidentiality and underrepresentation (Capizzano & Fiorillo, 2004). Much of the existing data used in rural research is based on non-representative samples not generalizable to all rural communities (Atkinson, 1994; Beach, 1995; Capizzano & Fiorillo, 2004; National Center for Rural Early Childhood Learning Initiatives, 2005). The U.S. Department of Health and Human Services (2005) confirmed less is known about the quality, availability, use, and cost of human services in rural areas, including early education, because suitable data are hard to find.

While research has shown rural children score better than non-rural children on some indicators of well-being, such as English-language proficiency and housing, they perform worse on educational measures (Rural Families Data Center, 2004). A recent comparison of national rural and non-rural data found that rural children were less proficient in some literacy skills at the start of kindergarten and were more likely to be placed in special education than their non-rural counterparts (Grace, Shores, Zaslow, Brown, Aufseeser, & Bell, 2006). Another recent study using the same data merged with other county-level data sources found similar patterns. However, these patterns were mediated by county-level and child-level poverty indicators (Durham & Smith, 2006). Consequently, examination of the quality of children's early learning experiences in rural and non-rural areas becomes a critical question to address.

Child Care Quality

Nationally representative data on child care quality is somewhat limited. Existing studies suggest the majority of licensed child care in the United States is below the standard of good quality as measured by standard observational tools (Adams, Zaslow, & Tout, 2007). While research suggests patterns of child care use may be different in rural and non-rural areas (Atkinson, 1994, 1996; Davis & Weber, 2001; Grace et al., 2006; Gordon & Chase-Lansdale, 2001; Katras, Zuiker, & Bauer, 2004; Durham & Smith, 2006), research on differences in child care quality in rural and non-rural areas is not available—a situation guiding this study.

Factors affecting the availability of licensed child care may have a corresponding effect on quality. The high fixed costs associated with opening and operating a center and the distance between families make center-based care economically unfeasible for many rural providers (Gordon & Chase-Lansdale, 2001; Perroncel, 2000). Many rural child care providers may choose to forgo formal regulation because their child care setting is too small to warrant the costs associated with licensing requirements. These constraints would also likely affect a provider's ability to provide more expensive, higher quality care. When geographic areas implement their own regulations in addition to state child care regulations, researchers have found that the standards in rural areas may be less stringent than in urban communities (Beach, 1995; Colker & Dewees, 2000), suggesting one possible source of rural and urban differences.

While child:adult ratios are only one dimension of overall quality, it is typically the only parent-reported measure of child care quality available in household surveys. Research has shown this measure to be correlated with other measures of quality, including higher quality interactions between the child and the caregiver (Lowe-Vandell & Wolfe, 2000; National Institute of Child Health and Human Development Early Child Care Research Network, 1996, 2000; Phillipsen, Burchinal, Howes, & Cryer, 1997) and overall quality more generally (Cost, Quality, and Outcomes Study Team, 1995).

Regulations for maximum child:adult ratios are set by states, and thus, vary between them. To illustrate this variation, a report released around the time the data for this study were collected reported the following ranges in regulations for child:adult ratios in centers: from 3 to 6 children per adult for infants, 5 to 9 for toddlers, and 8 to 20 children for preschoolers (Azer, LeMoine, Morgan,

Clifford, & Crawford, 2002). The National Association for the Education of Young Children (2005) has developed a set of standards for high quality center programs. Their standards for child:adult ratios are 3-4 children per adult for infants, 3-6 for toddlers, and 6-12 for preschoolers (depending on group size and the ages of children within each age group). Regulations and standards for child:adult ratios for family child care are more complex because they are typically determined by the presence of children of different ages in mixed-age groups. Nonetheless, similar state variation in family child care regulations exists. Significant variation in ratios occurs within states as well, as many licensed facilities operate above licensing regulations in order to provide higher quality care and to meet demand for that care.

Five states are included in this study. Here we review variation in licensing regulations for the five states: Illinois, Ohio, Mississippi, South Carolina, and Washington. Licensing regulations for the number of infants per adult in center care was 4 for Illinois and Washington, 5 for Ohio and Mississippi, and 6 for South Carolina. For preschoolers it was 10 children per adult in Washington and Illinois, 14 for Ohio, 16 for Mississippi, and 18 for South Carolina (Azer et al., 2002). Data compiled in 2005 show similar between-state variations in family child care for these five states. The allowable number of children under five ranges from 6 children per adult (Ohio) to 16:1 (for Mississippi), though these regulations often depend on the number of very young children present in the group among other factors. (See http://www.nccic.org/IMS/Search.asp for a searchable online database of state child care regulations.) We investigate differences in child:adult ratios while controlling for unmeasured differences between states, including differences in regulations.

Despite recognition of child:adult ratios as an important indicator of quality, little research has assessed the validity of different ways of measuring it (Le, Perlman, Zellman & Hamilton, 2006). One older study found that parent-reported child:adult ratios are consistent with provider-reported ratios for family child care but slightly lower for center-based care (Willer, Hofferth, Kisker, Divine-Hawkins, Farquahar, & Glantz, 1991). These findings should be kept in mind when interpreting the results, but note that we are most interested in the association between rural status and other variables.

Child Care Cost, Subsidies, and Quality

The provision of high quality child care is associated with specific costs—more teachers for fewer children, teachers with more education requiring higher compensation, and more professional development opportunities for teachers, for instance. The association between cost and quality has led to what has widely been termed the 'trilemma' of availability, affordability, and quality. When available, high quality child care is generally not affordable to parents. When available and affordable, care is often not of high quality. However, research has shown only a modest relationship between cost and quality of licensed child care, which is likely due to higher quality programs relying on in-kind donations and the implicit subsidies of altruistic qualified providers rather than parental payment to cover costs (Helburn & Howes, 1996). Of course, the nature of the association between rural and non-rural areas is not known.

Child care subsidies can serve as both a work support and a child development program (Blau & Tekin, 2001; Davis & Weber, 2001) and are a critical support to help low-income working parents afford child care and maintain employment. The amount of the subsidy and eligibility for child care subsidies is determined at the state level and often varies by regions within the state. In addition, smaller jurisdictions within the state sometimes have an additional subsidy program to help more families receive more subsidies in addition to the state benefits. Subsidy receipt not only influences a parent's labor decisions; it also impacts how much parents work and what type of child care they select (Blau & Tekin, 2001). While child care subsidies help poor families access child care, the question of whether or not receipt of subsidies leads to higher quality child care is inconclusive.

Some research suggests that state investment in child care and parental subsidies may improve the quality of licensed care provided (Berger & Black, 1992; U.S. Department of Health and Human Services, 1999). Berger and Black's (1992) survey of participants and individuals on the waitlist for two subsidy programs in Kentucky used parental satisfaction with child care arrangements and objective measures (such as physical surroundings, center hours, and meals) as proxies for quality. Their findings suggest that quality of care accessed by families improved with subsidy receipt. Another study found that parents reported difficulty locating centers that accept subsidies and in those that did, the quality of care was often inadequate (Paulsell, Nogales, & Cohen, 2003). A study of family child care providers across four Midwestern states found that the number of children receiving subsidies in these settings was related to lower quality care (Raikes, Raikes, & Wilcox, 2005). Others conclude that the quality of child care is independent of subsidies (Blau & Tekin, 2001). Little is known about child care subsidy use in rural areas and how it relates to quality.

Research Questions

Our paper addresses the lack of research focused on the child care experiences of children in rural areas. We investigate the following questions:

1. Is there a difference in structural quality, as measured by the number of children per adult

(child:adult ratios), in centers and family child care in rural and non-rural areas?

2. What is the relationship between child:adult ratios, cost to parents for child care, and child care subsidy use in rural and non-rural areas?

Method

Data

We expand previous child care research on rural populations by relying on a unique data set that allows geographic identification of rural and non-rural areas at the zip code rather than county level. The dataset is comprised of representative samples of households with children from five states (Illinois, Mississippi, Ohio, South Carolina, and Washington) (Human Services Policy Center, 2005). The data were collected from random digit dial telephone interviews with female guardians of children age birth through five in these five states. The interviews were conducted between 2001 and 2003 and lasted about 25 minutes each. The content of the interview focused on household demographics and child care use patterns for a target child between birth and five years old selected from the household roster. The data were collected as part of the *Financing Universal Early Care and Education for America's Children* project (Kagan, Brandon, Ripple, Maher, & Joesch, 2002).

Using the zip code of the household in the household survey data, we merged our five state child care survey data with the Rural-Urban Commuting Codes (RUCA), Version 2. RUCA codes represent a continuum of rural and urban categories based on census track measures mapped to zip codes of population density, urbanization, and functional relationships as measured by work commuting flows (U.S. Department of Agriculture, 2005; WWAMI Rural Health Research Center, 2005). While the RUCA codes' census track designations are based on the same theoretical constructs of metropolitan and micropolitan used to classify counties, making these designations at the census track level is a more geographically precise categorization system enabling application to zip codes (U.S. Department of Agriculture, 2005). As described later when we describe our variables, for the purpose of this paper, we define rural as zip codes outside a metropolitan areas and use the associated RUCA codes for identifying these areas.

Sample

For the bivariate analyses, our samples consist of those families in the data set using center or family child care. Center care includes Head Start, nursery schools, and preschools. Family child care is defined as non-relative care in a provider's home. These care types are typically licensed and regulated by the state, though we are unable to verify whether or not the care is actually licensed. For the multivariate analyses, the samples are further split by age of child since child care use patterns can vary substantially by age of child. Infants are defined as children birth through 23 months. Toddlers are defined as 24 to 35 months. Preschoolers are defined as 36 to 59 months.

Before splitting the data into separate samples for the analyses, we dropped cases with missing values on independent variables, with the exception of income. For income, which had a larger number of missing values than other variables and for which there is a commonly used method for imputing income, we used two techniques to impute income. First, for those families indicating they received public benefits available to low-income families, we substituted the mean income of other families in that state also receiving those benefits. For families with missing income not receiving public assistance, we used multiple imputation methods. Multiple imputation techniques use the relationship among other relevant variables to predict the missing value. The variables we used to predict missing income included mother's education, single parent status, mother's employment status, and mother's ethnicity.

We created a flag variable to indicate if one of these two methods was used for imputing the original missing value. We included this flag in our preliminary models. Results of these models showed substituting income in these ways did not have a significant effect on our dependent variables and did not significantly bias our results. Thus, this flag variable was dropped in the models presented in this paper. In total, 433 of the original 1,644 cases were dropped from the five-state data due to missing values.

Our final samples for the descriptive analyses consisted of 951 families using center care and 398 families using family child care. The sample sizes for each age group and type of care are presented in Tables 3 and 4 with the multivariate results. Since some families use more than one type of care, the same case for a child of a given age may be in both the center and family child care sample. Population estimates from the dataset suggest that 11% of infants, 25% of toddlers, and 37% of preschoolers used center care. The percent of infants, toddlers, and preschoolers using family child care was 11, 15, and 12, respectively.

Analysis

All estimates were weighted to reflect annual child care estimates, the age distribution of children within each state, and the probability of selection. In addition, each state's sample was given equal weight in the analysis so as not to skew results towards patterns in larger states. First, we produced descriptive statistics on the independent variables in the center and family child care samples. We tested for significant differences between families in rural and non-rural areas using two-sample t-tests comparing differences in

means. Next, we conducted multivariate analyses separately by age of child for children in each type of care. Thus, we present multivariate results for a total of six models.

For the multivariate analyses, we used Ordinary Least Squares (OLS) regression to address our research questions. Only child care variables specific to each model were included. In other words, the models for center care use the center care ratios, subsidy receipt, and cost variables, and the family child care models use the corresponding family child care variables.

Measures

Dependent variables. Our dependent variables for the models were the child:adult ratios for center and family child care. These variables are continuous and operationalized as the number of children per adult. Parents using each type of care were asked how many children are in the room and how many adults are in the room with the target child. The answer to these two questions were used to construct the parent-reported child:adult ratios for each type of care.

Independent Variables. Table 1 presents the definitions of the independent variables included in our model. Our main independent variable, rural designation of the zip code in which the household resides, was constructed using RUCA Codes (Version 2) (WWAMI Rural Health Research Center, 2005) merged with our five state data by zip code. We used the Office of Rural Health Policy standard of designating rural areas as RUCA codes between 4 and 10. These codes are defined as zip codes outside a metropolitan area and include categories of micropolitan, small town, and rural tracks with secondary flows of 10-30 percent to larger urban areas (U.S. Department of Agriculture, 2005; U.S. Department of Health and Human Services, 2006).

Our other primary independent variables of interest included whether or not parents receive a government subsidy to help pay for child care and the cost parents report paying for care. Government subsidy for child care is a dichotomous variable measuring whether or not a parent reported receiving a government child care subsidy for each type of care they used. Thus, the measure is specific to center and family child care. Cost to parents of child care was constructed from parental amounts paid for child care. Parents provided their own unit for the dollar amount they provided (hourly, weekly, monthly). All costs were converted to an hourly amount based on hours per week of care used. Costs were standardized within each state to account for differences in cost of living and year of data collection among each state's data.

We also included a dichotomous variable for those parents who indicated they pay nothing for care. In order to assess the relationship between cost and quality for those

Table 1

Variable Names and Definitions

Variable	Definition
Dependent Variables	
Center Ratio	The number of children per adult in center care
Family Child Care Ratio	The number of children per adult in family child care
Independent Variables	
Rural	Household resides in a ZIP code designated as rural (1=yes, 0=no)
Child is African American/Latino	Child is African American and/or Latino (1=yes, 0=no)
Household Income	Household income standardized to mean zero and standard deviation of one[1]
Mother's Education	Mother's education in years
Child's Age	Child's age in years
Center Subsidy	Household receives a government child care subsidy for center care (1=yes, 0=no)
Center Cost	Cost paid by parents for center care in dollars standardized to mean zero and standard deviation of one
Center Cost Zero	Parent reports paying no money for the center care used (1=yes, 0=no)
FCC Subsidy	Household receives a government subsidy for family child care (1=yes, 0=no)
FCC Cost	Cost paid by parents for family child care in dollars standardized to mean zero and standard deviation of one (1=yes, 0=no)
FCC Cost Zero	Parent reports paying no money for family child care used (1=yes, 0=no)

parents who do pay for care, we need to control for these instances. Other than subsidy receipt, other possible reasons why parents may not pay for the care they use include Head Start attendance (where parent fees are not typically charged), receipt of outside help to pay for child care (such as from a relative or private agency), or lack of charges by the provider. We constructed interaction variables between rural status and cost of child care and child care subsidy receipt to test for differential patterns of the relationship between these variables and quality in rural and non-rural areas.

We control for several characteristics of children and families that may influence quality of care received including child's ethnicity (whether or not the child is African American or Latino), child's age (in years, within each age group where appropriate), mother's education (in years), and household income (standardized within states). Finally, we included a set of dichotomous variables for state of residence to control for unmeasured differences between states, including differences in state-level regulatory policies for maximum child:adult ratios in licensed facilities.

Results

Though not reported in the tables, 26% of families with children birth to five use center care and 12% use family child care. It is these families that comprise the samples of children using center care and family child care. Descriptive statistics on the independent and dependent variables for the sample of children in center care and family child care are presented in Table 2. Table 2 also presents descriptive statistics on these variables by rural and non-rural status for each sample. All population estimates are weighted, thus, the proportion of the sample residing in rural and non-rural areas does not correspond directly with the estimates of the percent of the population in rural and non-rural areas presented in Table 2. In describing the results in Table 2, we first present estimates for each care type sample and then discuss the rural and non-rural differences. Again, all financial estimates (household income, child care costs) are presented in standard deviation units for comparability across data collection years and states in the five-state data. These variables were standardized within each state before our sample selection criteria was applied.

The mean child:adult ratios for all children birth to five in center care was 5.47, which prior research, reviewed earlier, indicates could be an underestimate (Willer et al., 1991). While not reported in this table, average center child:adult ratios for infants, toddlers, and preschoolers were 3.87, 4.65, and 5.99 respectively. Twenty percent of the population (reported as .20 in the table) resides in rural areas and 26% are African American or Latino. The household income of families using center care was .37 of a standard deviation above the mean for each state. Mean years of mothers' education was 14.54. The age of the children in center care was just over 3 years (3.17). Twenty-seven percent of the sample reported receiving a subsidy and 21% reported paying nothing for center care. For those who did pay, the cost of center care for this sample was slightly higher (.06 of a standard deviation) than each state's sample. We did not find any significant differences in the means of the variables for families using center care residing in rural and non-rural areas other than child's age. Children in non-rural areas using center care were significantly more likely to be older (3.26 years) than children in rural areas using center care (2.80 years).

For families using family child care, mean child:adult ratios was 2.48 children per adult. Though not reported in the table, child:adult ratios for infants, toddlers, and preschoolers in family child care were 2.58, 2.42, and 2.43, respectively. As we would expect, family child care ratios vary less by age of child than do center care ratios because children in family child care are typically in mixed age groups. Twenty-five percent of the population using family child care was rural, and 24% of the children were African American or Latino. Household income was 23% of a standard deviation higher than each state's sample. Mother's education averaged 14.6 years and average child age was 2.44 years. Fifteen percent of families received subsidies for family child care and 30% reported not paying for it. The cost paid for family child care was slightly lower than each state's sample (-.06 of a standard deviation less). We found no significant bivariate differences in family child care child:adult ratios for families in rural and non-rural areas.

Though not significant, child:adult ratios were slightly higher in non-rural areas for both center and family child care. For families using family child care, household income was significantly and slightly higher in rural areas compared to non-rural areas (.35 of a standard deviation higher compared to .19). However, mothers in non-rural areas compared to rural areas had significantly more years of schooling (14.76 vs. 14.15 years of school), though the size of this difference was small.

Tables 3 and 4 present results of the OLS regression of child:adult ratios in center and family child care on the independent variables for each age group. We included interactions between rural locale and our key variables of interest—child care subsidy receipt and cost of child care to the parent. All models control for differences between the five states with a set of four dichotomous variables, though these coefficients are not presented in the tables, but are available upon request. Though not presented in these tables, the sample for each model consists of children using center care and family child care for each age group of child. Eleven percent of infants, 25% of toddlers, and 37% of preschoolers are in center care. Eleven percent of

Table 2

Population Means and Standard Errors for Dependent and Independent Variables Separately for the Center and Family Child Care (FCC) Samples by Rural and Non-Rural Status

Variable	Sample Using Center Care			Sample Using Family Child Care (FCC)		
	All (N=951)	Rural (N=267)	Non-Rural (N=684)	All (N=398)	Rural (N=100)	Non-Rural (N=298)
Dependent Variables						
Center Ratio	5.47 (.31)	4.98 (.57)	5.59 (.19)	-	-	-
Family Child Care Ratio	-	-	-	2.48 (.22)	2.13 (.18)	2.60 (.19)
Independent Variables						
Rural	.20 (.12)	-	-	.25 (.16)	-	-
Child is African American/Latino	.26 (.05)	.25 (.07)	.26 (.06)	.24 (.03)	.24 (.03)	.24 (.03)
Household Income[1]	.37 (.09)	.34 (.08)	.38 (.10)	.23 (.06)	.35 (.09)	.19* (.03)
Mother's Education	14.54 (.10)	14.53 (.06)	14.54 (.13)	14.60 (.07)	14.15 (.17)	14.76* (.14)
Child's Age	3.17 (.18)	2.80 (.09)	3.26** (.16)	2.44 (.26)	2.22 (.06)	2.52 (.27)
Center Subsidy	.27 (.04)	.32 (.02)	.26 (.06)	-	-	-
Center Cost	.06 (.04)	.00 (.13)	.08 (.02)	-	-	-
Center Cost Zero	.21 (.03)	.26 (.02)	.20 (.05)	-	-	-
FCC Subsidy	-	-	-	.15 (.02)	.19 (.03)	.13* (.01)
FCC Cost	-	-	-	-.06 (.06)	-.16 (.07)	-.02 (.05)
FCC Cost Zero	-	-	-	.30 (.05)	.37 (.04)	.28* (.05)

Note. Numbers in parentheses are standard errors of the population estimates. Differences between rural and non-rural areas are significant at **p < .05, *p<.10. The proportion of the sample that is rural or urban does not correspond directly with the estimates of the percent of the population rural and urban presented in Table 2 because the population estimates are weighted.

[1] Population estimates for these standardized variables do not equal zero because costs are standardized within each state on the full sample.

infants, 15% of toddlers, and 12% of preschoolers are in family child care.

Table 3 presents results for the center care models. We focus our discussion of results primarily on the key variables of interest—rural status and child care cost and subsidy receipt and interactions between them. When controlling for other factors, infants in rural areas were significantly more likely to experience higher child:adult ratios, and preschoolers in rural areas significantly more likely to experience lower child:adult ratios in center care. Only for preschoolers does cost paid by parents affect the size of the child:adult ratios. Higher cost is significantly associated with lower child:adult ratios. For both infants and preschoolers, receiving a government subsidy for child

Table 3

OLS Regression Estimates of the Effect of Rural Status, Center Care Cost and Subsidy Receipt, and Demographic Variables on Center Care Child:Adult Ratios

Variable	Infants (N=176)	Toddlers (N=166)	Preschoolers (N=609)
Rural	.79** (.22)	.23 (.22)	-.76 (.33)
Center Variables			
Center Cost	-.32 (.24)	.07 (.37)	-.15* (.06)
Center Cost Zero	-1.52* (.56)	-.97 (.82)	-.49 (.37)
Center Subsidy	2.07* (.92)	1.36 (1.40)	.92** (.23)
Demographic Variables			
Household Income	-.16 (.10)	.19 (.15)	.51** (.14)
Child is African American/Latino	-1.42** (.31)	-.50 (.31)	-.71 (.56)
Mother's Education	.12* (.05)	-.04 (.08)	-.11* (.04)
Child's Age	.16 (.30)	-	.52** (.13)
Rural*Center Cost	.95 (.47)	-.81* (.37)	.70 (.44)
Rural*Center Subsidy	-1.03 (.82)	-.85 (1.40)	.55 (.70)
Constant	1.67 (1.12)	4.44** (1.42)	4.65*** (.58)
R^2	.28	.16	.09

Note. All models control for unmeasured differences between states with a set of four dichotomous variables. The coefficients for these state variables are not reported here. Estimates are significant at ***p<.01, **p < .05, *p<.10.

care is significantly associated with higher child:adult ratios. Also, when parents reported not paying for child care, for reasons other than subsidy receipt, infants were more likely to experience lower child:adult ratios. The only significant interaction we found between rural status and child care cost or subsidy receipt was for toddlers. Toddlers were more likely to experience lower child:adult ratios in rural areas as cost paid by parents increases.

In terms of other variables, African American and Latino infants were more likely than children of other races to experience lower child:adult ratios in centers. Infants whose mothers had more education were more likely to experience slightly higher child:adult ratios, but the opposite was found for preschoolers. For preschoolers, household income was positively associated with higher child:adult ratios as was child's age, the latter of which is expected. While the significant effects for education and household income are not in the expected direction, the size of these effects is small. A possible explanation for the African American and Latino effect for infants is discussed later.

Table 4

OLS Regression Estimates of the Effect of Rural Status, Family Child Care Cost and Subsidy Receipt, and Demographic Variables on Family Child Care Child:Adult Ratios

Variable	Infants (N=132)	Toddlers (N=87)	Preschoolers (N=179)
Rural	.49 (.52)	-1.27*** (.17)	-.26 (.47)
Family Child Care Variables			
Family Child Care Cost	-.02 (.42)	.05 (.16)	-.08 (.26)
Family Child Care Cost Zero	-2.84*** (.31)	-1.35 (.69)	-1.95** (.46)
Family Child Care Subsidy	3.61** (1.17)	.85 (.69)	1.21** (.40)
Demographic Variables			
Household Income	.23 (.23)	.39 (.23)	.03 (.34)
Child is African American/Latino	-.95 (.69)	-.19 (.33)	-.27 (.20)
Mother's Education	.18 (.09)	-.12 (.09)	.14 (.15)
Child's Age	-.59* (.23)	-	-.17 (.17)
Rural*FCC Cost	-.17 (.30)	-1.61*** (.22)	-.25 (.23)
Rural*FCC Subsidy	-.89 (1.15)	.51 (.85)	-.26 (.28)
Constant	.61 (1.38)	6.03*** (1.11)	2.20 (1.52)
R^2	.37	.46	.29

Note. All models control for unmeasured differences between states with a set of four dichotomous variables. The coefficients for these state variables are not reported here. Estimates are significant at ***p<.01, **p < .05, *p<.10. Numbers in parentheses are standard errors.

Table 4 presents the results for family child care. Toddlers in rural areas were significantly more likely to experience lower child:adult ratios. The size of this effect increases as cost paid by parents increases (the significant interaction between rural status and cost). We found no other significant main or interaction effects with rural status on family child care ratios. However, for families with infants and preschoolers who report not paying for the family child care they use, not including receipt of child care subsidies, child:adult ratios were significantly lower. Similar to the pattern found for center care, infants and preschoolers receiving child care subsidies for family child care were significantly more likely to experience higher child:adult ratios. We found no significant effects of demographic characteristics on the size of the child:adult ratios other than child's age within the infant category. Younger infants were significantly more likely to experience lower child:adult ratios.

Discussion

Our research is based on more geographically precise methods for designating rural status than most prior research. We designate rural status at the ZIP code rather than county level. In addition, many studies addressing economic security, employment, and child care in rural areas are often based on convenience samples of low-income rural populations. These samples do not represent the range of experiences and characteristics in rural areas. Our sample is based on representative samples from five states—Illinois, Mississippi, Ohio, South Carolina, and Washington.

We found few significant differences in the demographic characteristics of our samples of families using center and family child care by rural and non-rural status. Lack of significant demographic differences between the rural and non-rural samples may be suggestive of recent demographic trends minimizing previously established differences between rural and urban areas. For instance, poverty in rural areas is generally thought to be higher than urban areas, but recent research shows rising rates of poverty in the nation's cities compared to the rest of the country, so this pattern may be changing (The Brookings Institution Metropolitan Policy Program & Population Reference Bureau, 2006).

Our multivariate findings point to a complex picture of child care quality in rural and non-rural areas that varies by age of child. Rural areas do not show consistently higher or lower quality care as measured by child:adult ratios. For center care, the pattern changes based on age of children. For infants, rural areas are more likely to have higher child:adult ratios and lower child:adult ratios for preschoolers in center care. One explanation is that due to higher geographic dispersion, operating infant care with higher child:adult ratios may be one way in which rural centers are able to provide more costly infant care at all. For family child care, toddlers in rural areas were more likely to experience lower child:adult ratios, which could be due to the overall size of family child care homes in rural vs. non-rural areas. Small family child care homes located throughout rural areas may be one way in which family child care meets demand in large geographic areas.

The relationship between quality, cost, and subsidy receipt was more consistent. The cost paid by families for child care was associated with the size of the child:adult ratios in the direction we expected for preschoolers in center care and toddlers in rural areas in both centers and family child care arrangements—greater cost is associated with lower child:adult ratios. We also found, in some cases, that children in families who report not paying for child care, net of subsidy receipt, experience significantly lower child:adult ratios. While seemingly counterintuitive, two explanations may help explain this finding. First, this finding may be indicative, in part, of those families using Head Start or Early Head Start programs, which are generally higher quality than other similar licensed settings due to national Head Start standards. These programs generally do not charge fees. Second, parents who report receiving non-governmental outside help to pay for child care may be a unique population. This outside help may increase parents' ability to secure higher quality care. Additional research should examine the content of this non-governmental monetary support for child care and the characteristics of families who receive it.

Our most striking finding is the relationship between child care subsidy receipt and child:adult ratios. For every age group except toddlers, receipt of government subsidies for both center and family child care is significantly associated with higher child:adult ratios regardless of whether the family resides in a rural area or not. This finding is contrary to the federal Child Care and Development Fund program goals, which are to allow low-income families to access high quality child care while pursuing employment activities. While these subsidies may help parents access licensed care for their children that they otherwise could not afford, the quality of this care may be poor relative to the quality of care available to other children. Since public reimbursement rates for child care subsidies are often well below the recommended federal guidelines of 75% of the child care market rates, operating with higher child:adult ratios may be one way in which licensed facilities are able to make financial ends meet when serving publicly subsidized children. Given that low-income children are in a position to especially benefit from high quality programs, this finding is definitely a cause for concern.

Finally, another finding warrants further investigation. African American and Latino infants were more likely to experience lower child:adult ratios in center care than children of other races. This finding may be due to participation in higher quality Early Head Start programs.

While this study has significant advantages over other analyses examining rural and non-rural differences, namely the ability to designate rural locale at the zip code rather than county level, some limitations still apply. First, that level of geographic precision has challenges, as well. While many families may reside in a rural zip code, their child care arrangement may be in a nearby zip code that is not rural or vice versa. Second, though we use a federal standard set by the Office of Rural Health Policy to designate counties as rural, no clear conceptual definition of rural and non-rural exists, even at the census track or zip code level. Third, our sample is only representative of five states, and the findings are not nationally representative. Fourth, distinctions between family child care and family, friend, or neighbor care are not always clear. Some overlap between these categories of care may be present in parents' responses to the care categories. Finally, our measure of child care quality focuses only on

one aspect of quality. While child:adult ratios are found to be correlated with other measures of structural and process quality within child care settings (Lowe-Vandell & Wolfe, 2000), higher child:adult ratios, in some cases, may be offset by higher quality in other dimensions, such as higher teacher qualifications. Looking at child:adult ratios provides only a limited view of overall child care quality.

Policy Implications

The policy implications of these findings are clear. Many vulnerable children—children in low-income families qualifying for government child care assistance—are more likely to be in lower quality care as measured by child:adult ratios. Since higher quality care is more expensive to provide, and low-income families are usually unable to cover the costs of high quality child care, center-based and family child care programs may need financial incentives to take children receiving child care subsidies. These incentives could take the form of higher reimbursement rates tied to the provision of higher quality care. Changes in regulations could be another approach for improving the quality of care for all children but incentives would still be needed to provide higher quality care specifically for low-income children receiving child care subsidies. In addition, adequate financing for substantially improving quality through a regulatory approach would need to be in place to balance affordability and access for families.

Our findings indicate that some of our most vulnerable children may be at risk of experiencing lower quality care as measured by child:adult ratios regardless of whether or not those children reside in a rural area. Future research should investigate at the program level the incentives and disincentives for serving children of families receiving child care subsidies. Evaluations of incentive programs for serving children on child care subsidies and the impact of these incentives on quality should be performed.

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