AVAILABILITY OF CHILD CARE IN THE UNITED STATES: A DESCRIPTION AND ANALYSIS OF DATA SOURCES*

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Lack of high-quality, affordable, and accessible child care is an often-cited impediment to a manageable balance between work and family. Researchers, however, have been restricted by a scarcity of data on the availability of child care across all U.S. communities. In this paper we describe and evaluate several indicators of child care availability that have been released by the U.S. Census Bureau over the last 15 years. Using community- and individual-level analyses, we find that these data sources are useful for indicating child care availability within communities, even though they were collected for other purposes. Furthermore, our results generally suggest that the data on child care availability are equally valid across communities of different urbanicity and average income levels, although it appears that larger geographic areas more accurately capture the child care market of centers than that of family day care providers. Our analyses indicate that center child care is least available in nonmetropolitan, poor communities, and that family day care is most available in nonmetropolitan, mixed-income communities. We discuss the benefits and limitations of the data sources, and point to directions for future data developments and research.

Lack of high-quality, affordable, and accessible child care is an often-cited impediment to a manageable balance between work and family. Demographic trends toward more dual-earner families and employed unmarried parents in the United States in the latter half of the twentieth century accentuate such concerns, as does political focus on reducing long-term welfare dependency through parents' employment. Child care options outside the home have expanded in recent decades in the United States as mothers have moved into the labor force in increasing numbers and policies related to child care have evolved (Casper and O'Connell 1998; Hofferth and Phillips 1987; Klein 1992; Meyers 1990; Tuominen 1991). Also, studies of welfare reform are increasingly considering families' access to child care (see, for example, U.S. Department of Health and Human Services 2000a). Yet surprisingly little is known about the presence and use of child care in communities across the nation, primarily because of limitations in data sources.

In this paper we describe and evaluate several indicators of the presence of child care providers in all U.S. communities, which have been made available by the U.S. Census Bureau over the last 15 years. As described in greater detail below, the sources include data on business establishments, of which child care centers are one kind, and population-based data, which include reports from workers in child care centers and from family day care providers. All of the data were collected for other purposes, and thus may or may not be fruitful for indicating availability of child care. We conduct a series of analyses to examine their usefulness for this purpose.

We begin by considering why indicators of child care availability are needed, both by reviewing prior research and by integrating theoretical concepts. In the empirical analyses described here, we use correlations among our alternative measures of child care availability to examine cross-time stability as well as convergent and discriminant validity (are in-

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dicators positively correlated with like constructs and uncorrelated or correlated negatively with unlike constructs?). Next, we present an analysis of construct validity: are theoretically predicted associations with other constructs revealed? Specifically, we look for substantively suggested inequalities in child care availability across communities of varying income level and urbanicity. We also predict individual-level arrangements for maternal employment and child care based on the measures of child care availability; again we look for the presence or absence of anticipated associations. In our conclusions, we discuss the benefits and limitations of the data sources and suggest ways in which they might be improved for child care research.

PRIOR LITERATURE

Child care typically is separated into three dimensions: cost, quality, and availability (Helbrun 1999). Cost generally is defined as the dollar amount a family pays per child, per unit of time for care. Quality is defined less easily: definitions range from structural measures such as teacher/child ratios to levels of developmentally appropriate stimulation. Availability is the degree to which a family has ready access to needed child care: this might include not only convenient geographical location but also the availability of slots for the right age range and the right time of day. The converse of availability is unmet need for child care, which occurs when a family needs assistance with the care of children but cannot find it (Queralt and Witte 1999). Availability and unmet need can be extended to encompass the two other key dimensions of child care. That is, care may be considered unavailable if it is physically present but too low in quality or too high in cost to be used. (For an analogous extension in unmet need for contraceptives, see DeGraff and de Silva 1996:140.)

The model of a competitive child care market has been applied productively to the study of child care costs and quality. This economic model suggests that an equilibrium between supply and demand will develop when prices are set at a level that consumers are willing and able to pay for a given degree of quality. Such studies are particularly useful in identifying unintended consequences of policy interventions: for example, that the initiation of more stringent state-level staff/child requirements is associated with lower average quality because high-quality firms exit the market (Chipty and Witte 1997). Prior empirical studies using an economic approach initially emphasized price: a consistent body of literature suggests that child care costs influence family choices about child care (for a review, see Connelly 1991). Recent economic studies also have begun to examine how the quality of child care affects family decision making (e.g., Blau and Hagy 1998; Chipty 1995; Hagy 1998; Michalopoulos, Robins, and Garfinkel 1991). Although these studies do not focus on availability per se, they demonstrate the need for an independent, comprehensive data source about child care providers in each family's local community. This is the case because the investigators often rely on reports of child care costs that were provided by sample members, and/or they have been forced to assume that the price of child care is proportional to its quality.

Little empirical research has estimated how the presence of child care varies across communities, in part because small-area measures of child care availability have not been nationally available. Rose-Ackerman (1982) provided one of the earlier analyses using state-level data in the United States; she found that subsidized child care was fairly responsive to indicators of demand, including female employment. In an econometric model based on characteristics of several communities in the United Kingdom, Webster and White (1997) found that lack of access to "private childminders" limited mothers' labor force participation. Edwards, Fuller, and Liang (1996) estimated a simultaneous model of supply and demand in about 100 U.S. counties; they found the predicted positive association with price for the former and negative association with price for the latter. Other localized studies of unmet need for child care have been conducted to inform welfare reform efforts within states, typically drawing on data maintained by local child care resource and referral agencies (e.g., Kreader, Piecyk, and Collins 2000; Siegal 2000).

A small set of studies also has examined how the presence of child care in a community relates to maternal employment in individual families. A study in the Netherlands found that greater availability of child care was associated positively with women's employment, although the association was reduced when local-area social norms were controlled (Van Dijk and Siegers 1996). In the United States, Stolzenberg and Waite's (1984) analysis of 1970 census data suggested that women with young children were more likely to be in the labor force when child care was more available in the county. Hofferth (1996) used the National Child Care Survey 1990, which covered a sample of 144 counties drawn to represent the United States; she found that neither measures of availability of child care nor measures of quality or price were related to mothers' returns to work in the year following a pregnancy (although family-friendly employer policies were important). Hofferth's analyses of availability, however, were restricted to mothers who had worked during the pregnancy. In her additional analyses, other contextual variables (e.g., suburban residence, local unemployment) were associated more strongly with entry into the labor force among mothers who were not employed during the pregnancy. At the more proximal level, the presence of coresident adults has been found to be an important facilitator of maternal employment; this finding suggests that they may help with child care (Figueroa and Melendez 1993; Heckman 1974).

WHY MEASURE CHILD CARE AVAILABILITY?

Below we focus on two concepts that highlight the importance of measuring the presence of child care in communities. The first relates to market failure in economics as well as to unmet need in health studies. The second relates to social science studies examining how individuals and families relate reciprocally to their communities. We offer these concepts, not only to emphasize the importance of national data

on the presence of child care in communities, but also to suggest the expected findings of an examination of construct validity in our empirical analyses.

Disparities in Child Care Availability Across Communities: Market Failure and Unmet Need

Market failure occurs when a competitive market solution does not coincide with a "Pareto-efficient" allocation of resources. The latter is defined by the situation of a community where no one can be made better off without someone else becoming worse off (Bator 1958). We focus on what Bator (1958:354) called *failure by structure;* we believe that this has the clearest implications for the number of child care providers in a community. (In our discussion, we will consider how improvements to our data source also could lead to studies of imperfect information and market disequilibrium.) A monopoly is a classic example of failure by structure: a case in point occurs in local markets when the population is insufficient to sustain enough competitors (see Barnett 1993; Fuchs 1996; Kronick, Goodman, and Wennberg 1993). Child care requires physical interaction between the child and the provider; in rural areas, the geographic dispersion of families may create monetary and nonmonetary costs that inhibit providers, especially those that offer large-scale child care facilities.

Unmet need highlights inequities that can occur even when market failure is not a problem. The crux of the concern is whether market solutions leave some families without adequate child care. Economists consider redistribution in response to such objections (raised either by others or by themselves) about allocating goods (child care) on the basis of price and ability to pay. Redistributive government intervention may allow families with lower incomes to use child care that is considered to be of acceptable quality (Council of Economic Advisors 1997; Reinhardt 1996), either through subsidies or vouchers aimed at families or through subsidies or incentives that encourage providers in communities with a large aggregate unmet need (General Accounting Office 1998).

These concepts may be particularly applicable to child care centers, where the fixed costs are substantial (Fuller and Liang 1996; Kahn and Kamerman 1987; Kravdal 1996; Meyers 1990; Tuominen 1991). In fact, Kahn and Kamerman report that large chain, for-profit child care providers identify profitable sites by looking for

> a major highway, a location between a middle-class residential area and a commercial area, a community with high female labor force participation rates and husband/wife families with two earners and incomes more than 50 percent above median family income. (1987:105)

As noted, public subsidies provide an alternative to private income to pay center fees in poorer, urban communities. Rural areas, because of their low population densities, may be unable to support center-based child care even when a substantial proportion of employed parents have access to public subsidies or private income (Bailey and Warford 1995). This analysis suggests that center child care will be least available in rural communities; in urban areas, communities with concentrated economic poverty or sufficiency may contain more families with the means to pay for child care than middle- or mixed-income communities, and thus will be advantageous sites for centers.

Family day care providers face some similar constraints but are generally expected to be more sustainable across different types of communities. Unlike child care centers, which require substantial investments of capital and evaluations of profitability, family providers require fewer start-up costs and can readily enter and exit the market, especially those operating the smallest, unregulated homes (Kahn and Kamerman 1987; Kisker and Ross 1997; J. Walker 1991:57; Webster and White 1997). Their smaller size may make them more viable across communities with large and small populations of children, although state and local policies for licensure, regulation, and residential land use may inhibit this presence in some areas (Ritzdorf 1993). Thus any systematic distribution of family day care by urbanicity and income should be produced by mechanisms other than those discussed above.[1]

The Presence of Child Care: The Intersection of Family and Community

In this paper we also can relate the measures of child care availability in the community to individual families' use of child care. Convergent validity is measured by simple associations between measures of the same kinds of care available in communities and used by families. For this kind of analysis, the elevated likelihood of sampling an individual respondent with a particular characteristic when that characteristic is more abundant in the area is not an impediment, as is usual in contextual-individual models. Instead the individual-level data provide a strong test of validation, given the substantial differences in respondents, reporting methods, and sampling strategies in our individual- and community-level data.

Even so, social scientists may wish to relate measures of child care availability to individual decisions not only in validating models but also in behavioral models. For example, as communities change, when families move to new communities, or when families enter a new stage of the life course, they may be susceptible to match and mismatch between their child care needs and preferences and those of their neighbors. Researchers might ask, Do families move selectively into areas that offer a closer match to their child care preferences? Are some families constrained from such

1. The 1996 welfare reform and its aftermath increased low-income parents' choices for subsidized care, including family day care. Also, facilitating the entry of family day care providers into the market is currently viewed as one mechanism for satisfying unmet need in communities of concentrated poverty (Illinois Department of Human Services 2000; U.S. Department of Health and Human Services 1998, 2000b). Our measure of family day care providers in 1990 precedes these developments, however.

moves—for example, because of additional locational preferences (being near family, being near work), financial limitations, or residential discrimination? Do families changes their attitudes or behaviors when they move into a different setting or when their setting changes? As an example regarding attitudinal changes, consider a community in which mothers historically stayed out of the labor force to care for young children. Through observing neighborhood women's increasing participation in market work and their use of varying kinds of nonmaternal child care, nonemployed mothers may come to view work and child care outside the home as acceptable options, or employed parents may change their preferences for different kinds of care. Also, insofar as families rely on local networks to learn about child care options, greater use of nonmaternal child care in the community may increase the number of knowledgeable network members.

Although data limitations preclude us from specifying a dynamic model of families' decision-making processes in this paper, we broaden our analysis to see how well these data perform in one limited behavioral model. Specifically, we expand the individual-level outcome of interest to examine how child care availability is associated with maternal employment and the kinds of care used by employed and nonemployed mothers. Controls strengthen the interpretation of these models. A family may choose a particular kind of care because of its financial constraints and preferences; these constraints and preferences are a portion of the demand to which providers respond. Controlling for past use of different kinds of child care adjusts for stable family constraints and preferences. In these models, we also control both for the mother's past employment and for the level of female employment in the community; thus we adjust for the mother's attachment to the labor force and for factors other than child care associated with the level of maternal employment in the community. We also control for other factors that have been found to relate to the mother's decision about employment and child care, including her own characteristics (ethnicity, wage, educational level, and traditional family values), those of the family (mother's marital/cohabitational status, nonmaternal family income, number of adults and children in the household), and those of the child (age and gender).

Although these models are suggestive, longitudinal data would allow stronger causal tests. In the discussion we suggest ways in which social scientists might connect longitudinal information about the child care market with longitudinal information about families to study their reciprocal associations. We also discuss the ways in which strengthening our data source by collecting information about prices and quality of child care could improve upon these basic associations between availability and use.

METHOD

Community-Level Data

Several data sources that can be used to indicate child care availability have been released at the ZIP code level during the last 15 years, and additional data developments are anticipated.

A special tabulation of the 1990 U.S. Decennial Census of Population and Housing (SpTab90) provides an indicator of the number of employees of child care centers and the number of family day care providers in each community (Fuller et al. 1998; also see Blau 1993 and Blau and Robins 1998, who use the Current Population Survey to examine child care employees). These data are based on the reported occupation of each household member among families that completed the Decennial Census long-form survey. For the present study, we focus on the number of child care center workers (1990 Census occupation codes: 155 = teachers, prekindergarten and kindergarten; 467 = early childhood teacher's assistants) and the number of family day care workers (code 466 = family child care providers; U.S. Bureau of the Census 1992). We use the reported *ZIP code of employment* rather than the ZIP code of residence to estimate the number of child care center employees and the number of family day care providers who work in each ZIP code.

The Economic Census (EC) and ZIP Code Business Patterns (ZBP) are data on *business establishments*, including child care centers, maintained by the U.S. Census Bureau (U.S. Bureau of the Census 1996, 1998b; also see Casper and O'Connell 1998 regarding these child care data). These data provide a grouped estimate of the number of child care center employees in each U.S. ZIP code. Data on child care establishments in U.S. ZIP codes are available from the 1987 and 1992 Economic Censuses (EC87 and EC92) as well as the 1994 and 1995 releases of the ZIP Code Business Patterns (ZBP94, ZBP95). We also use an unofficial release of the 1990 ZIP Code Business Patterns (ZBP90; personal communication, Jon Youngman, U.S. Census Bureau, May 14, 1998).

Because the true geographic boundaries of local child care markets are unknown, and may vary systematically by a community's population density and average income level, we consider three different geographic levels. The first two levels are the standard boundaries of the ZIP code and county. *ZIP codes* are the smallest level of geography for which child care data have been released nationally. *Counties* capture larger areas, which may approximate child care markets more closely.[2] Our third measure also attempts to approximate more closely the size of the area to which a fam-

2. We have the special tabulation of child care workers from the 1990 Decennial Census of Population and Housing at the ZIP code level only. Thus, for all measures, we created an approximate county-level count by aggregating the ZIP code counts. ZIP codes can cross county borders, so we apportion the ZIP code count to a county on the basis of the percentage of the ZIP code's population that lives in the county (Blodgett 1998). The business establishment data are released at the county level; we compared our approximations based on the ZBP94 and ZBP95 with the 1994 and 1995 County Business Patterns. The counts of child care workers themselves were correlated nearly perfectly ($r = 0.99$ for both 1994 and 1995). However, we found an upward bias in the aggregated ZIP code counts relative to the exact county counts. About 36% of the counts matched exactly. Just under 14% of the counts were smaller when the ZIP code counts were aggregated, with an average of about 35 fewer workers counted. About 50% of the counts were larger when the ZIP code counts were aggregated; on average, 77 more child care workers were counted.

ily may look for child care options. Unlike counties, however, this area is individualized to the family's ZIP code of residence. This measure recognizes that families are likely to look close to their home and may cross political boundaries, such as counties or even states, to gain access to care. Accordingly we created the *30-mile radius* measure by counting center child care employees and family day care providers in ZIP codes within a 30-mile radius of a particular ZIP code (including the central ZIP code itself). This is a rough approximation of more individualized geographic areas; in our conclusions we suggest directions for future research along these lines.

Presence of young children, female employment, income, and population density. We obtained a number of additional characteristics of the ZIP code from the 1990 Census of Population and Housing.

The number of children age 0–6 was used to identify the population of preschool children who might participate in nonmaternal care. We used this count as a crude indicator of the potential need for child care in the community. (In the conclusion we discuss ways in which unmet need for child care might be ascertained more precisely in future research.) To assess *potential unmet need* for child care, we divided the number of young children in the area by the number of child care workers. Thus, higher values on this ratio indicate more children per child care worker and consequently more potential unmet need for child care. For correlational analyses, we created a measure of *child care availability*: the log of the inverse of the potential unmet need measure. The log was taken because of the skewness of the unmet need measure. The inverse allows us to interpret more straightforwardly the direction of associations with our individual-level data: higher scores indicate greater availability.

As a measure of the general labor market quality in the area, we used the standard definition of the *unemployment rate* in each community: civilians age 16 and older who are unemployed relative to civilians age 16 and older who are in the labor force, either employed or unemployed. We also created a measure of *female employment outside child care* at each community level. To do so, we subtracted from the total count of employed women in the community the number of women who live in the area and are employed in child care. We then divided by the total number of women living in the community.

Finally, we classified all ZIP codes and counties by population density (metropolitan and nonmetropolitan) and income level (low, middle/mixed, and high). Communities were defined as metropolitan if half or more of the residents lived in a Standard Metropolitan Statistical Area (SMSA); otherwise they were defined as nonmetropolitan.

Although most ZIP codes and counties in the United States are quite heterogeneous as to household incomes, we identified areas of concentrated economic poverty and areas of concentrated economic sufficiency by using the following criteria: (1) *concentrated poor* areas were defined as communities in which the percentage of households with incomes less than $20,000 was 75% or more, or the percentage of households with incomes less than $20,000 was over 60% and the percentage of households with incomes $40,000 and above was less than 20%; and (2) *concentrated nonpoor* areas were defined as communities in which the percentage of households with incomes of $40,000 and above was 75% or more, or the percentage of households with incomes of $40,000 and above was over 60% and the percentage of households with incomes less than $20,000 was less than 20%. We selected the values of $20,000 and $40,000 as approximately 1.5 times and 3 times the 1989 poverty threshold for a family of four ($12,674). All other areas with valid income data were defined as *middle/mixed income*.

Population size. Our community-level analyses are not limited to a sample, but cover the entire population of ZIP codes and counties in the United States. We exclude a few subpopulations, however.

At the ZIP code level, we exclude the most sparsely populated areas, including ZIP codes in which half or more of the residents live on farms and ZIP codes containing fewer than 100 households and/or children. Because there are so few concentrated nonpoor, metropolitan ZIP codes (n = 29), we do not present descriptive statistics for them. Following these restrictions, we base our community-level analyses on the 24,043 remaining ZIP codes. Most of these are mixed-income; 11,207 are nonmetropolitan and 9,696 are metropolitan. In addition, there are 1,615 concentrated nonpoor, metropolitan ZIP codes, 416 concentrated poor, metropolitan ZIP codes, and 1,109 concentrated poor, nonmetropolitan ZIP codes. Although our 30-mile radius measures cover the area contained in a radius around the central ZIP code, we maintain these restrictions. Thus, if the central ZIP code has the above-mentioned characteristics, that 30-mile radius measure is excluded from our community-level analyses.

At the county level, we also exclude sparsely populated counties. In addition, because there are so few, we exclude the two nonmetropolitan and 25 metropolitan counties classified as concentrated nonpoor. Of the remaining 3,054 counties, most are classified as middle-/mixed-income: 2,170 are nonmetropolitan and 721 are metropolitan. In addition, there are 163 concentrated poor, nonmetropolitan counties. No counties are classified as concentrated poor, metropolitan.

Family-Level Data

To relate these community characteristics to families' arrangements for work and child care, we use the Children of the National Longitudinal Survey of Youth, 1979 Cohort (for a detailed overview, see Chase-Lansdale et al. 1991; for specifics about sampling and data collection, see Frankel, McWilliams, and Spencer 1983; Zagorsky 1997).

Analytic sample: Children of the NLSY79. Our study is restricted to children who were ages 3 to 6 in 1986. We would have preferred also to include children under age 3 in the analyses, or other waves from the longitudinal data file, but these addresses had not been geocoded. We restrict our sample in several other ways as well. We select only those 3- to 6-year-olds who usually lived with their biological moth-

ers (2,072 of 2,220 children). In addition, we omit 45 children whose family addresses, taken from the 1986 interview, could not be linked to a ZIP code and county.[3] We also exclude 12 children with missing data on the child care availability or female employment indicators and 58 children with missing family-level data. Finally, when a mother has two, three, or four eligible children in our age range, we randomly select one child (thereby excluding an additional 374 children). Thus our analytic sample comprises 1,583 preschool children (519 African American, 313 Latino, and 751 not African American/not Latino, primarily European American).

In the 1986 wave, Children of the NLSY79 includes all children born to the original NLSY79 participant females by the time the women were age 21–28 on January 1, 1986. As a consequence, the mothers gave birth for the first time in their mid-teens to mid-twenties (19 is the median age at first birth in our sample). Although the NLSY79 does not represent older mothers, it should not be considered a sample comprising exclusively adolescent parents or impoverished women. Over 25% of the mothers in our analytic sample had a first birth at age 20 or later; nearly two-thirds (65%) of the families contain two parents; and 73% of two-parent families and 37% of mother-headed families live above the federally defined poverty threshold (U.S. Bureau of the Census 1998a).

Measures: Children of the NLSY79. Descriptive statistics for the outcome variables (maternal employment and child care) are shown in the results; Appendix Table A1 provides the means and standard deviations of the family-level covariates.

Maternal employment and child care. The outcome variables measure the mother's employment and the child's nonmaternal care around the time of the 1986 survey. The mother reported how many hours she worked for pay during the survey week, as well as the number of hours per week the child usually spent in nonmaternal care over the last month. Although the questions about nonmaternal child care focus on care that is used regularly, they were not restricted to employed mothers. We categorized the types of care as follows: father care (father or stepfather), relative care (sibling, grandparent, or other relative beside the father), family day care (nonrelative in a private home), and center-based child care (day/group care centers; nursery schools/preschools; kindergarten, elementary, or secondary schools; nonrelative care outside a private home). Children could be reported as regularly spending time in more than one kind of care.

Family-level variables. Controls at the family level include the child's gender (male = 1, female = 0), child's age (in months), mother's ethnicity (two indicator variables of African American and Latina ethnicity; all others, primarily European Americans, are the omitted category), the schooling completed by the mother as of May 1 of the survey year (in years, 0–18), whether the family was headed by the mother (female headship = 1; mother married or cohabiting with a male partner = 0), the number of related adults (over age 17, excluding the mother's spouse or male partner) and the number of related children (ages 17 and under) in the household at the time of the interview, the mother's age at first birth (in years), the mother's traditional family values, the family's nonmaternal income (in dollars), the mother's hourly wage (in dollars), whether the mother had worked shortly before the child's birth (prebirth employment = 1; not employed = 0) and between the child's birth and third birthday (employed when child was 0–3 = 1; not so employed = 0), and dummy indicators of whether the child had ever spent time in relative child care, family day care, or center-based care between his or her birth and third birthday (yes = 1; no = 0).

Community characteristics. The sampling design of the NLSY79 influences the variation by social class and population density among the communities in which our study families lived. A multistage, stratified, and clustered sampling design was used for the NLSY79; the probability of selection was proportional to a measure of the area's population size at most stages. Thus more sample participants were selected from urban than from rural areas. In our analytic sample, more than three-quarters of families live in metropolitan ZIP codes (76%) or counties (76%). Close to 90% live in middle-/mixed-income ZIP codes, and 97% live in middle-/mixed-income counties.

After selection of one child per family, clustering of children within ZIP codes is minimal: 49% are the only study child living in the ZIP code; an additional 42% share a ZIP code with one to five other study children; fewer than 10% share a ZIP code with six or more other study children. As expected, clustering within counties is higher, but still relatively modest: 14% are the only study child living in the county; an additional 31% share a county with one to five other children in the study; 36% share a county with six to 15 other study children; the remaining 19% share a county with 16 or more. The logit and multinomial logit models reported below adjust for the sampling weights and clustering of children within ZIP codes or counties, depending on the level of the child care availability measure under analysis.

RESULTS

Summary Statistics for Communities: Number, Land Area, and Population Size

As expected, ZIP codes in nonmetropolitan areas are larger geographically than metropolitan ZIP codes (a median of about 75 to 100 square miles versus about 4 to 25 square

3. The ZIP code in which the family lived was identified on the basis of prior geocoding of the family's 1986 address (see Chase-Lansdale and Gordon 1996). Although the exact addresses—including ZIP codes—were not retained in this data file, we located children in ZIP codes based on the census tract or enumeration district in which they lived. Even though this link is less precise than ZIP codes reported in addresses, it appears to be fairly accurate. The majority of the census tracts and enumeration districts in our data are contained in a single ZIP code (60% in metropolitan areas; 57% in nonmetropolitan areas). Most of the remaining areas are located primarily in a single ZIP code: more than 90% of the children live in a census tract or enumeration district in which 60% or more of the population live in a single ZIP code. When a census tract or enumeration district crossed ZIP code boundaries, we assigned the ZIP code that contained the highest percentage of that census tract's or enumeration district's population, using the Geographic Correspondence Engine (Blodgett 1998).

miles). At the county and 30-mile radius level, land area is more equivalent across urbanicity: at the county level, the median is about 600 to 650 square miles in nonmetropolitan areas and about 550 square miles in metropolitan areas. The 30-mile radius areas contain a median of slightly over 2,800 square miles in nonmetropolitan areas, and between 2,600 and 2,800 square miles in metropolitan areas.[4]

As expected given population densities, the nonmetropolitan areas contain fewer children under age 7 than do the metropolitan areas. Nonmetropolitan ZIP codes contain a median of just 150 to 215 young children, in contrast to about 1,100 to 1,300 young children in metropolitan ZIP codes. Similarly, for counties and 30-mile radius areas, the median number of children is considerably smaller in nonmetropolitan than in metropolitan areas (counties: 1,000–1,700 versus 12,000; 30-mile radius areas: 8,500–14,000 versus 89,000–300,000).[5]

What do these summary statistics suggest? Although ZIP codes differ systematically in land area by urbanicity, the counties and 30-mile radius levels equalize by urbanicity the covered land area. Thus families in nonmetropolitan and metropolitan areas may travel approximately the same distances to reach child care at these geographic levels. The larger areas may capture the child care market for a parent who lives in a suburb and uses care in a nearby suburb or close to work in a central city. They also may capture the market for a parent who lives in a small nonmetropolitan town and travels to a larger town to work or for child care, or for a parent who lives on the outskirts of a nonmetropolitan city and travels into the city for work and child care. The metropolitan areas, however, are still more population-dense, even when land area is equivalent. Below we focus on the 30-mile radius measure, which appears to capture the child care market most accurately, especially for centers. We comment on different findings at the ZIP code and county level as relevant (extended tables at all three levels are available from the authors).

Stability and Convergent Validity of Child Care Availability Measures

Correlations among our multiple measures of child care availability indicate cross-time stability as well as convergent and discriminant validity (see Table 1). We expect substantial cross-year stability in our multiple measures of center employees in a community, given the above-discussed fixed costs of entry into the child care market. In the top four rows of Table 1 we see that all correlations among the business establishment measures are .63 or higher, indicating 40% or more shared variation. As would be expected, the correlations are strongest within type (Economic Census or ZIP Code Business Patterns). This is true even when measures across type are more proximal in years: for example, EC87 and EC92 are correlated more strongly than EC87 and ZBP90.

The Decennial Census measure of center workers is based on an entirely different respondent and reporting method than the business establishment measures. Thus correlations between the set of business establishment measures and the Decennial Census center measure provide a stronger test of convergent validity. Our measure of family day care workers from the Decennial Census allows us to look for discriminant validity as well. The last two rows of Table 1 provide evidence of such convergent and discriminant validity. The business establishment measures of the availability of center child care show a stronger positive correlation with the Decennial Census measure of center availability than with the Decennial Census measure of family day care availability. Correlations between the set of business establishment measures and the Decennial Census center measures range from .59 to .65 (35 to 43% shared variation). Furthermore, the business establishment indicator closest in historical time (ZBP90) is correlated most strongly with the Decennial Census measure of center availability.

We conducted two sensitivity analyses (detailed tables are available from the authors). We replicated these analyses at the ZIP code and county levels; although the results are highly similar, the evidence of convergent and discriminant validity is strongest at the 30-mile radius level. For example, the Decennial Census center measure shares more variation with the business establishment measures at the 30-mile radius level: at least twice as much as at the ZIP code level and at least 40% more than at the county level. We have also argued that child care availability may vary systematically by a community's average income level and population density. Thus, potential differences in convergent and discriminant validity by community type are a concern. When we examined the correlations between the set of business establishment measures and the Decennial Census measures within different types of communities, we found the same strong evidence of convergent and discriminant validity (higher correlations with the center measure than with the family day care measure), especially at the 30-mile radius level.

Description of Child Care Availability by Community Income and Urbanicity

Because of space constraints, we present graphs of the median potential unmet need for child care by income and urbanicity only for the 1990 Special Tabulation measures and only at the 30-mile radius level. (Especially at the 30-mile radius and county levels, the pattern of results for each of the business establishment indicators is highly similar to the pattern presented for the 1990 Special Tabulation center indicator; details are available from the authors.)

4. The large coverage of the 30-mile radius areas is sensible, given that we calculated these areas on the basis of the longitude and latitude of the ZIP code's "center." If the longitude and latitude of two centers are within 30 miles, we include the entire population (and area) of both ZIP codes in the 30-mile radius area. Thus the square root of 2,800 square miles—about 53 miles—might be reasonable for the length of one border of these areas.

5. The substantial number of children especially in concentrated nonpoor metropolitan 30-mile radius areas probably reflects the fact that these are suburban areas, primarily residential and largely populated by families. In poor and mixed-income metropolitan areas, some of the nearby ZIP codes may contain considerable space devoted to business and industry; in the nonmetropolitan areas, they may encompass large expanses of unpopulated land.

TABLE 1. CORRELATIONS AMONG MEASURES OF CHILD CARE AVAILABILITY AT THE 30-MILE RADIUS LEVEL

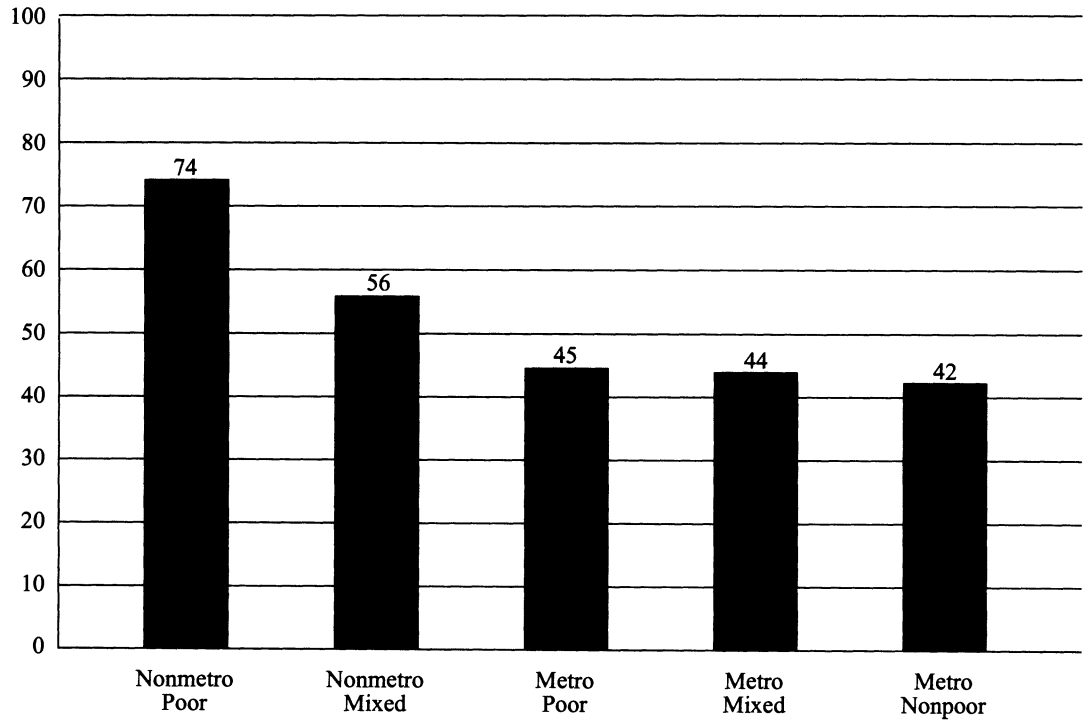
	Business Establishment Measures					Decennial Census
	EC87	ZBP90	EC92	ZBP94	ZBP95	SpTab90
Business Establishment Measures						
ZBP90	.69	—				
EC92	.82	.70	—			
ZBP94	.65	.82	.75	—		
ZBP95	.63	.81	.73	.96	—	
1990 Decennial Census (SpTab)						
Centers	.59	.65	.60	.64	.63	—
Family day care	−.13	−.10	−.10	−.04	−.06	.07

Notes: $N = 24{,}043$. EC = Economic Census. ZBP = ZIP Code Business Patterns. SpTab = special tabulation.

Center child care. Our analyses of child care centers reveal that the anticipated disparity by income within metropolitan areas is evident only at the ZIP code level. Yet the predicted elevated unmet need for centers in nonmetropolitan areas is clear, even in the 30-mile radius areas, which are of equivalent size in urban and rural communities.

In particular, in keeping with our expectations outlined above and with prior research (Fuller and Liang 1996), we find the least potential unmet need for child care centers in the poor and affluent metropolitan communities at the ZIP code level (details available from authors). However, when we take into account the number of young children and center child care workers in proximal ZIP codes (30-mile radius level), potential unmet need is similar across all metropolitan communities (see Figure 1). In terms of disparities by urbanicity, Figure 1 shows that unmet need is higher in non-

FIGURE 1. ILLUSTRATION OF POTENTIAL UNMET NEED FOR CENTER CHILD CARE: MEDIAN NUMBER OF CHILDREN PER CENTER CHILD CARE EMPLOYEE BY COMMUNITY URBANICITY AND INCOME COMPOSITION AT THE 30-MILE RADIUS GEOGRAPHIC LEVEL



Note: Metro = metropolitan; poor = concentrated economic poverty; mixed = middle-/mixed-income; nonpoor = concentrated economic sufficiency.

metropolitan than in metropolitan communities, particularly for poor, nonmetropolitan areas.

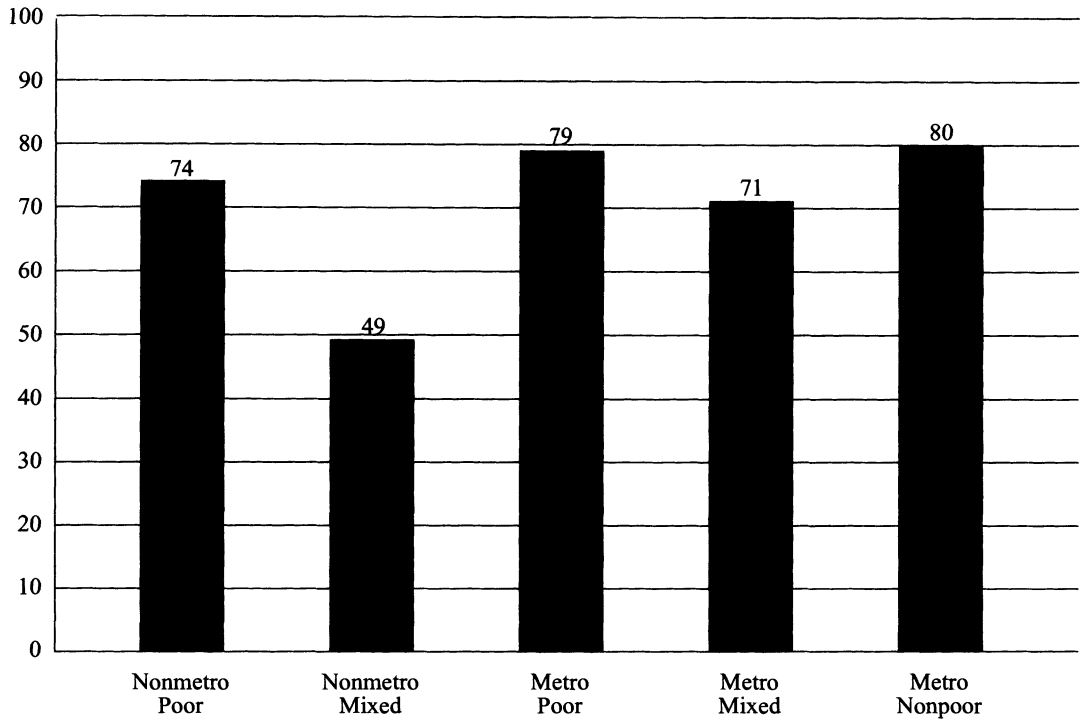
Recall that our data represent the population of all ZIP codes and counties. Thus, statistical hypothesis testing is not appropriate. However, we examined the degree of overlap among the distributions by community type, using the boundaries of the interquartile range. These analyses provide strong evidence of greater potential unmet need for child care centers in the nonmetropolitan, poor communities than in metropolitan communities. In particular, the *upper* bound of the interquartile range for the three metropolitan communities was at or below the *lower* bound of the interquartile range for the concentrated poor, nonmetropolitan communities. More specifically, most metropolitan communities contained 55 or fewer young children per center child care workers, whereas most nonmetropolitan poor communities contained 55 or more.

Family day care. As expected, family day care shows a different pattern of associations than center child care; in fact, it has the lowest unmet need in a nonmetropolitan setting. In particular, at the 30-mile radius level, we find the least potential unmet need for family day care providers in mixed-income, nonmetropolitan areas (see Figure 2). As with potential unmet need for child care centers, we considered the degree of overlap among the distributions of potential unmet need for family day care, using the boundaries of the interquartile range. Although in this case the bounds of the interquartile ranges overlap somewhat, the findings tend to confirm the lower potential unmet need in nonmetropolitan, mixed-income areas. Specifically, 75% of nonmetropolitan, mixed-income communities show 71 or fewer young children per family day care provider. In contrast, just 50% of the other communities have a measure of potential unmet need equaling 70 to 80 or less. Sensitivity analyses at the ZIP code and county levels also suggest that median unmet need for family day care is lowest in mixed-income, nonmetropolitan areas, although greater overlap is seen across community types at these levels than at the 30-mile radius level (details available from authors).

Prediction of Family-Level Arrangements Based on Child Care Availability

Next we examined associations between the availability of each kind of care in the community (center or family) and individual families' reported use of those kinds of care. As stated earlier, the community- and individual-level data come from independent sources, and these associations provide an additional strong test of convergent and discriminant valid-

FIGURE 2. ILLUSTRATION OF POTENTIAL UNMET NEED FOR FAMILY DAY CARE: MEDIAN NUMBER OF CHILDREN PER FAMILY DAY CARE PROVIDER BY COMMUNITY URBANICITY AND INCOME COMPOSITION AT THE 30-MILE RADIUS GEOGRAPHIC LEVEL



Note: Metro = metropolitan; poor = concentrated economic poverty; mixed = middle-/mixed-income; nonpoor = concentrated economic sufficiency.

ity. We first present the simple associations with *any use* of each kind of care across all measures of center availability (business establishment and population-based) and the one measure of family day care availability. Then, for the Decennial Census measures of availability, we consider whether these associations remain in a more behaviorally appropriate model. In the tables, we report all of these analyses at the 30-mile radius level. Except for associations between family day care availability in the ZIP code and an individual family's use of family day care, which we summarize below, the patterns of findings are generally similar, although they are of lesser magnitude and are less often significant at the ZIP code and county levels (details are available from authors).

Predicting use of center child care on the basis of availability. With weighting for sampling probabilities, about 25% of parents reported that the study child regularly had spent some time in center child care during the previous month. Table 2 presents the results of simple logit models predicting the child's participation in any center child care, based on each of the measures of child care availability at the 30-mile radius level.

In terms of convergent validity, the expected positive associations with use of center child care are consistently significant across all indicators of center child care availability at the 30-mile radius level. Interpreting the largest coefficient (SpTab90 center) with predicted probabilities, we find that the probability of using center care increases from 15% in a community with 100 young children per center child care worker to 34% in a community with 30 young children per worker. We also find evidence of discriminant validity: the association with the availability of family day care providers is negative, although insignificant.

Predicting family day care use on the basis of availability. With weighting for sampling probabilities, about 10% of mothers reported that the child regularly had spent some time under the care of a family day care provider during the past month. Table 2 also presents results of simple logit models predicting the child's participation in any family day care.

In terms of convergent validity, the association between the SpTab90 measure of family day care availability and individual families' use of family day care is positive and significant. The predicted probability of using family day care increases from 8% in a community with 100 young children per family day care worker to 15% in a community with 30 young children per worker. The associations with the child's participation in family day care also provide evidence of discriminant validity. The associations of family day care use with the availability of center care, although also positive, are smaller, and none are significant.

Sensitivity analyses: Interactions by urbanicity and average income. As we did at the community level, we considered the possibility that our measures of child care availability are valid only in communities of particular population density or urbanicity. To do so, we grouped children into three categories. Each contained at least 100 families (nonmetropolitan, all income types: 387 families; metropolitan, poor: 113 families; metropolitan, mixed and nonpoor: 1,083 families). Because most children lived in middle-/mixed-income communities, we also considered a simple interaction by metropolitan status (387 nonmetropolitan; 1,196 metropolitan).

Center child care. With weighting for the sampling probabilities, children are most likely to spend time in center care in the metropolitan, poor ZIP codes (39%), followed by the metropolitan, mixed/nonpoor ZIP codes (28%) and the nonmetropolitan ZIP codes (16%).

The results of these models by urbanicity and average income are presented in Table 3 at the 30-mile radius level. Across the metropolitan and nonmetropolitan communities, we generally find evidence of convergent validity, although the evidence is somewhat stronger in nonmetropolitan communities. In particular, except for some metropolitan poor communities whose small numbers in our individual-level sample make their estimates less precise, the associations between availability of center child care and use of center child care are all positive, as expected. Even so, the associations are most consistently significant in nonmetropolitan communities. In metropolitan mixed-income and concentrated nonpoor communities (Table 3, column 2) as well as all metropolitan communities (Table 3, column 5), the association between availability of center child care and indi-

TABLE 2. SUMMARY OF SIMPLE LOGISTIC REGRESSION MODELS PREDICTING FAMILIES' USE OF CENTER CHILD CARE AND USE OF FAMILY DAY CARE, BASED ON 30-MILE RADIUS MEASURES OF CHILD CARE AVAILABILITY

	Any Use of Center Care?	Any Use of Family Day Care?
Business Establishment		
EC87	0.55**	0.07
	(0.12)	(0.17)
ZBP90	0.79**	0.08
	(0.18)	(0.22)
EC92	0.49**	0.13
	(0.13)	(0.17)
ZBP94	0.68**	0.16
	(0.19)	(0.25)
ZBP95	0.61**	0.15
	(0.18)	(0.23)
Decennial Census (SpTab90)		
Center child care workers	0.90**	0.16
	(0.24)	(0.32)
Family day care providers	–0.09	0.60*
	(0.16)	(0.27)

Notes: $N = 1{,}583$. EC = Economic Census. ZBP = ZIP Code Business Patterns. SpTab = special tabulation. Numbers are coefficients from separate logit models, each with a single measure of child care availability as a predictor. Standard errors are in parentheses. Models adjust for sampling weights and clustering of families within ZIP codes.

*$p < .05$; **$p < .01$

TABLE 3. SUMMARY OF SIGNIFICANT INTERACTIONS BY COMMUNITY URBANICITY AND INCOME AT THE 30-MILE RADIUS LEVEL

	Model 1: Three Categories				Model 2: Two Categories		
	Metropolitan Poor (MP) (1)	Metropolitan Mixed and Nonpoor (MM) (2)	Nonmetropolitan (NM) (3)	Significant Contrasts (4)	Metropolitan (M) (5)	Nonmetropolitan (NM) (6)	Significant Contrasts (7)
EC87	–0.35	0.41*	0.64**		0.40*	0.64**	
	(0.55)	(0.17)	(0.19)		(0.16)	(0.19)	
ZBP90	0.41	0.56*	0.85*		0.58*	0.85*	
	(0.71)	(0.25)	(0.35)		(0.24)	(0.35)	
EC92	–0.61	0.26	0.68**		0.24	0.68**	
	(0.60)	(0.19)	(0.26)		(0.18)	(0.26)	
ZBP94	0.29	0.34	1.09**		0.37	1.09**	M vs. NM
	(0.74)	(0.25)	(0.28)		(0.24)	(0.28)	
ZBP95	0.11	0.22	1.17**	MM vs. NM	0.25	1.17**	M vs. NM
	(0.75)	(0.24)	(0.27)		(0.23)	(0.27)	
SpTab90 Center	–0.45	0.52	1.50**	MP vs. NM	0.49	1.50**	
	(0.64)	(0.33)	(0.45)		(0.31)	(0.45)	

Notes: $N = 1,583$. EC = Economic Census. ZBP = ZIP Code Business Patterns. SpTab = special tabulation. Numbers are coefficients from separate logit models, each containing the following predictors: a measure of center child care availability, dummy variable(s) to indicate urbanicity and income, and interactions between the dummy variable(s) and center child care availability. Standard errors are in parentheses. Models adjust for sampling weights and clustering of families within ZIP codes.

*$p < .05$; **$p < .01$

vidual use of center care is significant only for the indicators closest in calendar time to the 1986 Children of the NLSY (i.e., EC87, ZBP90). Furthermore, for some of the indicators measured later in calendar time, the interaction is significant between the coefficients in metropolitan and nonmetropolitan communities, revealing a significantly stronger positive association in the nonmetropolitan communities.

How might these differences by metropolitan status be interpreted? Given the larger number of families in metropolitan communities, differences in sample size cannot explain the less significant associations there. Predictions reveal meaningful associations in both metropolitan and nonmetropolitan communities. For example, using the 1990 Special Tabulation indicator, we find that in nonmetropolitan communities, the probability of using center day care increases from 7% when there are 100 children per center worker to 31% when there are 30 children per center worker. The corresponding percentages are 21% and 33% in metropolitan communities. Given these substantively relevant differences when centers are more or less available, and given the statistically significant association with temporally close indicators in both metropolitan and nonmetropolitan settings, we would interpret these findings as evidence of convergent validity in both rural and urban areas. Future research, however, should consider the potential for conceptually meaningful interactions by urbanicity.

Family day care. Descriptively, we found no significant differences in the percentage of children who spent time in family day care among the three categories of areas (by urbanicity and income) nor between the two categories (by urbanicity). Because only six children participated in family day care in metropolitan poor communities, we only estimated multivariate models predicting family day care with an interaction between family day care availability and the two-category metropolitan status indicator. None of the interactions were significant.

A Behavioral Model

As noted, our data have limitations for specifying a behavioral model, including our analytic sample's restriction to children age 3 to 6 at the time of the 1986 survey. However, using these data to estimate such a model is instructive for future research, and lets us consider the sensitivity of the associations reported above to alternative specifications of the outcome variable and to controls for additional community- and family-level variables.

The model we present is a multinomial logit.[6] We created an eight-category outcome variable based on the mother's report of her own work and the child's nonmaternal care. Above we considered any time the child spent in center

6. As a sensitivity analysis, we also estimated several multivariate probit models in which we allowed families to use more than one kind of child care and allowed for correlated disturbances across equations (maternal employment and four kinds of child care). Although not all of these models converged, we found consistency with three of the major findings from the multinomial logit model: (1) mothers were more likely to be employed when center child care was more available (ZIP code level); (2) families were more likely to use center child care when centers were more available (ZIP code and 30-mile radius levels); and (3) fathers were less likely to provide child care when family day care was more available (ZIP code level).

or family day care across primary and secondary settings; to make mutually exclusive child care categories for this specification, we coded only the primary type of nonmaternal child care. For employed mothers (those reporting any hours worked for pay), sample sizes permitted us to consider all five kinds of nonmaternal child care: none, center, family day care, father care, or other relative care. For nonemployed mothers, we collapsed together the categories of father care, other relative care, and family day care.

Table 4 presents the descriptive statistics for this outcome variable. As expected, although most children of nonemployed mothers did not regularly spend any time in nonmaternal child care, 10% regularly spent time in center child care, as did 8% in the care of a father, other relative, or family day care provider. In contrast, among employed mothers, just 8% did not report any regular form of nonmaternal child care. The kind of care used most by employed mothers was center, followed by relative other than the father, father, and family day care.

Center child care. We begin by summarizing findings for availability of center child care. There are 28 paired comparisons among the eight categories of the outcome variable. Because of space constraints, however, we only present one set of contrasts: we examine how availability of center child care is associated with each category of the outcome variable relative to the probability of mothers working for pay and placing their child in center care (see Table 5). We also present models only for the Decennial Census measures of center child care availability and only at the 30-mile radius level.

In the simple models without controls (Model 1), when center child care is more available, we see evidence that employed mothers make greater use of center child care. All coefficients for employed mothers are negative (indicating less use of that kind of care than of center care), and all but one are significant at least at the .05 level. We also see evidence that women are more likely to engage in paid work when child care centers are more available. Specifically, when the availability of center child care increases, women are significantly less likely to be not employed with no child care than to be employed and use center child care. This finding moves beyond the validating associations of center availability with center use presented above, and suggests that child care availability is associated with mothers' paid employment.

In Models 2–5 we add controls for family day care availability (2), the overall unemployment rate and the percentage of women employed outside child care in the 30-mile radius area (3), the child's prior participation in relative, family, and center care and the mother's prior work history (4), and household income and household size; child's gender and age; mother's ethnicity, traditional family values, wage, educational attainment, and age at first birth; and the metropolitan status of the family's ZIP code (5).

For employed mothers, several of the associations actually grow stronger across the models with additional controls: the contrast with (1) maternal employment and no child care, (2) maternal employment and use of family day care, and (3) maternal employment and use of father care. As we add controls, however, the association with maternal employment and care by a relative other than the father is generally reduced; it becomes insignificant in Model 4, which introduces controls for *prior* maternal employment and *prior* use of each kind of child care. Thus, among employed mothers, there is no evidence of a change from use of relative care to center care, although such changes are suggested for the other three categories of care (no child care, family day care, father care).

Among nonemployed mothers, we see in the top row of Table 5 that the coefficient for nonemployment and no child care relative to maternal employment with center child care is reduced by almost 30% in the final model. The standard error, however, also has increased by more than 50%, and the association remains significant at the .10 level. Thus we find weaker evidence of mothers moving into paid employment when center child care is more available.

Predicted probabilities reveal the substantive meaning of the coefficients in Model 5. Figure 3 presents these probabilities for scenarios with 30 children and with 100 children per center worker. The percentage of mothers employed and using center child care doubles (from 11% to 22%) when center child care is more available. In addition, the percentages of mothers employed and using no child care, family day care, and father care all decline by 40–60%. We also see the expected shift in the percentage of women not employed and not using child care: this decreases from 45% to 39% when center child care is more available. The increases in the percentage of women who are not employed but use some kind of care reflect coeffi-

TABLE 4. DISTRIBUTION OF SAMPLE MEMBERS ACROSS THE OUTCOME VARIABLE CAPTURING FAMILY-LEVEL ARRANGEMENTS FOR MATERNAL EMPLOYMENT AND NONMATERNAL CHILD CARE

	Number in Category	% of Total	% Within Maternal Employment Category
Mother Not Employed			
No nonmaternal child care	687	40	81
Father, other relative, or family day care	63	4	8
Center child care	85	5	10
Mother Employed			
No nonmaternal child care	53	4	8
Relative (not father)	205	13	26
Family day care	99	6	12
Center child care	283	18	35
Father	108	9	18

Notes: $N = 1{,}583$. "Number in category" values are the actual sample sizes. The percentages are weighted by the sampling weights.

TABLE 5. MULTINOMIAL LOGIT OF MATERNAL EMPLOYMENT AND CHILD CARE ARRANGEMENTS ON AVAILABILITY OF CENTER CHILD CARE: MODEL ESTIMATES FOR COMPARISONS WITH THE MOTHER EMPLOYED/CENTER CHILD CARE CATEGORY[a]

Outcome Category Compared With Omitted Outcome Category (Employed/Center Child Care)	Model				
	1	2	3	4	5
Mother Not Employed					
No nonmaternal care	–1.27**	–1.30**	–1.21**	–0.84*	–0.91†
	(0.30)	(0.31)	(0.37)	(0.40)	(0.47)
Father/relative/family day care	–0.23	–0.41	–0.07	0.25	0.31
	(0.55)	(0.55)	(0.67)	(0.72)	(0.74)
Center child care	–0.38	–0.37	–0.30	–0.19	–0.22
	(0.46)	(0.47)	(0.59)	(0.64)	(0.70)
Mother Employed					
No nonmaternal care	–1.21*	–1.40**	–1.84**	–1.54**	–1.51*
	(0.52)	(0.50)	(0.55)	(0.56)	(0.62)
Relative (not father) care	–0.78*	–0.79*	–0.80†	–0.47	–0.56
	(0.35)	(0.36)	(0.45)	(0.49)	(0.56)
Family day care	–0.68	–0.84†	–1.08*	–1.00†	–1.14†
	(0.44)	(0.44)	(0.52)	(0.56)	(0.62)
Father care	–1.07**	–1.07*	–1.72**	–1.43**	–1.59**
	(0.40)	(0.42)	(0.51)	(0.54)	(0.61)

Notes: $N = 1{,}583$. Numbers are coefficients for the center child care availability measure. Standard errors are in parentheses. The excluded outcome category is mother employed and using center child care. Model 1 includes one predictor variable: availability of center child care. Model 2 adds family day care availability. Model 3 adds the overall unemployment rate and the percentage of women employed outside child care in the 30-mile radius. Model 4 adds prior use of relative, family, and center care and the mother's prior work history. Model 5 adds household income and household size; child's gender and age; mother's ethnicity, traditional family values, wage, educational attainment, and age at first birth; and the metropolitan status of the family's ZIP code. The models adjust for sampling weights and clustering within ZIP codes.

[a]30-mile radius level; decennial census special tabulation indicator.

†$p < .10$; *$p < .05$; **$p < .01$

cients not shown in Table 5: nonemployed mothers are more likely to use child care—center as well as father, relative, or family day care—when center child care is more available in their community.

Family day care. We also include availability of family day care as a predictor in these behavioral models, and summarize key findings here (details are available from the authors). Unlike the findings for center care, the findings for family day care are most significant at the ZIP code level. Among the seven contrasts with employed mothers who use family day care, one is significant: more family day care in the ZIP code is associated with employed mothers' use of family day care rather than father care.

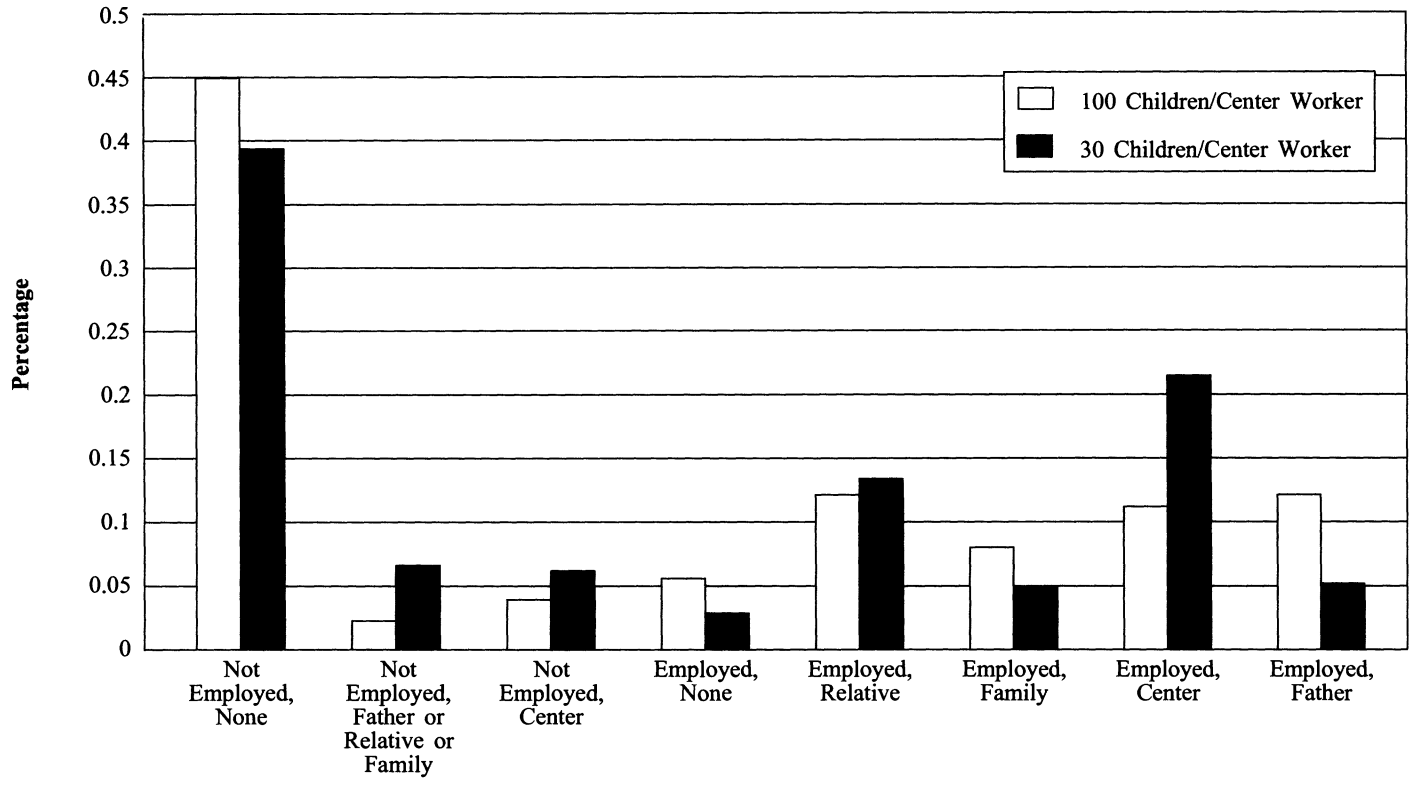
Another set of results, although unanticipated, adds support to the validity of the indicator of family day care availability. In Model 1 (with no controls), greater availability of family day care is associated with the mother's reporting that she worked for pay but did not use any nonmaternal child care, in contrast to five of the other seven categories. (The two nonsignificant coefficients involve the contrasts with mothers who used family day care, both the employed and the nonemployed.) Additional analyses reveal that the mothers who were employed but reported no use of child care were significantly more likely than other mothers to report occupations that were coded in the census child care occupational categories. Also, the measure of family day care availability (but not the measure of center child care availability) was associated positively with the mother's being classified as a child care worker in a private home (details available from authors).

To interpret the findings, we calculated predictions from Model 5 for scenarios with 30 and with 100 children per family day care provider in the ZIP code. Although the percentage of mothers in the employed/no child care category remains small, it increases by 50% (from 3.0% to 4.5%) when family day care is more available. The percentage of employed mothers reporting use of family day care also increases when family day care is more available (from 5.9% to 7.1%). The largest decline is seen for the mother employed/father care category, a decrease of about 30% when family day care is more available (from 7.6% to 5.3%).

CONCLUSIONS

This study reveals that several national data sources are useful for indicating availability of child care in communities across the United States, even though they were collected

FIGURE 3. PREDICTED PROBABILITIES BASED ON MULTINOMIAL LOGIT MODEL 5 IN TABLE 5



for other purposes. Associations across different community-level data sources, as well as between the community-level sources and individual-level data, provide evidence that the indicators capture variation in the presence of center child care and family day care in local communities. Furthermore, our results generally suggest that the data on child care availability are equally valid across communities of different urbanicity and average income levels.

Our analyses across three geographic levels are informative as well. Especially for center care, we see evidence that the 30-mile radius indicators, which encompass multiple proximal ZIP codes, perform better than the ZIP code and county indicators. The correlations between the set of business establishment indicators and the Decennial Census indicator of center child care availability are generally strongest at the 30-mile radius level, as are the associations between availability of center child care and individual-level families' use of center care. We also find the clearest evidence of inequality at the 30-mile radius level, where we learn that potential unmet need for center child care is greater in nonmetropolitan, poor communities than in all kinds of metropolitan communities.

We propose two major interpretations for this stronger performance of the 30-mile radius center child care measures; one is substantive and the other methodological. On the one hand, these findings may reflect a greater overlap between the 30-mile radius measure and families' true reference areas for center child care than is the case for the predefined ZIP code and county boundaries. Especially for families considering center care, child care markets may cover relatively large geographic areas. The 30-mile radius measure can capture these spaces. Counties also encompass large areas, but families may live near the border of such a predefined space. Families are located squarely in the middle of the 30-mile radius.

On the other hand, a methodological advantage for the 30-mile radius measure might explain its superior performance. As with all analyses of measures based on the population in an area, the size of the population *within each community* matters for the degree of variability of the true measure. As the size of the population contained in a geographic area increases, the variability of the true measure (here, the ratio of children to child care workers) should decline, all else being equal. Thus the true level of child care availability may vary more from year to year in the less heavily populated areas. Also, in these areas, measurement errors (miscounts of child care workers) would have a greater effect on our indicators of child care availability. Thus measures for

the larger areas may produce clearer indications of local availability, even if families in fact stay within smaller areas in their search for child care.

Regardless of the substantive or methodological explanation for the superior performance of the 30-mile radius indicators of center child care, we would *not* conclude that the presence of child care closer to the family is irrelevant. For example, parents might use different-sized reference areas for different kinds of care. Indeed, in the current study we find that availability of family day care is more often associated significantly with individual families' child care arrangements at the ZIP code level. In addition, averages and ratios within a given geographic area simply may not be appropriate for more localized models. Measurement of distance to the nearest provider avoids the methodological problems of small population sizes in small geographic areas. To measure such distances, researchers would require access to individual-level data that identified actual locations (longitude and latitude) for both families and child care providers. Although such research obviously is highly confidential, it is increasingly possible at sites such as the U.S. Census Bureau's Research Data Centers (U.S. Bureau of the Census 2000).

These kinds of longitude and latitude data also would allow researchers to move beyond our rough 30-mile radius measure and create user-defined boundaries for child care markets (defined by study participants or by the researcher). Such boundaries could be quite important. In metropolitan areas, for example, we found that differences between poor, mixed-income, and nonpoor ZIP codes in median potential unmet need for child care centers disappeared when we considered proximal ZIP codes within a 30-mile radius. Yet social, political, and transportation barriers may make child care in some of these nearby ZIP codes unusable. Thus boundaries could be improved by allowing researchers to define the geographic areas where families report that they would actually consider child care. Also, a parent might be more likely to change modes of care if a center opened somewhere on his or her route to work, as opposed to a distant location within a 30-mile radius of home. With longitude-latitude data on the location of child care centers, and knowledge of parents' routes to work, researchers could capture the presence of care along these transportation routes.

Limitations and Implications for Future Research

Several limitations exist in this research. The data on child care availability that we use capture more of the informal child care market than have previous data, such as some homes where family day care is provided. Other providers, however, are probably missed. For example, some neighbors may care for a small number of children for pay that they do not report to the IRS. The data from the Economic Census and ZIP Code Business Patterns explicitly exclude underground economic activity (Walker 1997). Although the Decennial Census of Population and Housing does not preclude reports of such work, providers may be reluctant to report this type of paid activity. We also miss unpaid exchanges of child care—for example, when neighbors regularly or occasionally take turns watching one another's children. In addition, all of the data sources used exclude volunteer caregivers—even in "above-ground" economic establishments—because the worker, in order to be counted, must have been paid and/or must consider child care his or her occupation. This omission probably underestimates availability, especially in areas where volunteers help staff child care facilities.

The business establishment data sources we employ also omit school-based programs including preschools, Head Start programs, and kindergartens operating in conjunction with schools. To our knowledge, although there are some available individual-level data about such school-based programs across the nation, none of these sources provide data fully comparable to the counts of child care employees used here (U.S. Department of Education 2000). Finally, as noted above, we utilize only a very rough approximation of potential unmet need.

How might the data sources we employ be improved to address these limitations and test conceptual models more effectively? Although the data are available, the Economic Census does not release statistics at the ZIP code level for establishments that do not have at least one paid employee (including self-employed persons). If these data were released, the Economic Census data could provide another national estimate of some family day care providers.

In addition, as it does for other industries, the Census Bureau might conduct a more highly detailed periodic survey of child care providers to capture additional information about slots, cost, quality, and hours. Data about slots would improve on the number of child care employees, on which we rely for estimates of availability. Questions about slots ideally would gather information on the number of age-specific groups in the provider's care, as well as on current enrollment and maximum enrollment in each group.

Further, the number of teachers and assistants in each group could be asked to estimate a teacher-child ratio, one measure of quality. These questions ideally would be structured to capture volunteers and other unpaid assistants more successfully.

The census also might gather actual fee structures to learn about cost. Rate studies by states that set payment structures for child care subsidies might help to inform the development of such data collection.

Finally, availability might be assessed more accurately through questions about hours of operation, including evening, night, and weekend care, and what happens on holidays and when children are ill.

Other sources also may help to fill some gaps in the existing data. For example, the National Association of Child Care Resource and Referral Agencies (2000) has initiated the development of a uniform system of child care information that has the potential to provide national information about availability of child care, although agencies are not equally well established across all states and their databases are often restricted to licensed providers. The new American Com-

munity Survey conducted by the Census Bureau (U.S. Bureau of the Census 1999) should provide better intercensal measures of communities' characteristics, and could be used to provide both measures of availability (persons employed in child care occupations) and measures of need (parental employment). For example, the release might tabulate nonparents and parents with children of different ages who are working in center child care, in family day care, as nannies in private homes, or in other occupations; who are in training or in school; or who are full-time homemakers.

Such longitudinal data are particularly important in view of the reciprocal relationships common to questions about child care. In the market itself, supply and demand are classically endogenous. If researchers possessed more complete longitudinal data on the child care market, they would be able to identify fluctuations in the market empirically, and to understand the degree to which the kinds of child care available in communities are influenced by local population changes (local fertility rates, new construction, in- or out-migration of young families, and movement of parents in and out of the labor force) and by changes in local, state, or national policy. Future researchers, using the more complete data we describe regarding accessibility, cost, and quality, also could examine parents' knowledge about the location of all possible providers and the cost and quality of care provided in those settings. (For discussions of imperfect information in the child care market, see Council of Economic Advisors 1997; Gormley 1999.)

In addition, such multidimensional studies would be more effective in identifying "hidden" inequities, across communities of varying population density and social class, in parents' sets of child care choices: that is, when availability is on par but of higher cost or lower quality in some communities. Further, such studies could show whether the availability of affordable, high-quality care is associated more strongly with families' child care choices than are child care options that are present in the community but are costly and/or of poor quality.

Finally, combining longitudinal data on families with longitudinal data on their local child care markets would help researchers to understand endogeneity in contextual-individual models as well. For example, to what extent do families strategically select their communities on the basis of child care characteristics? To what extent do changes in child care constraints within communities influence families' choices about employment and care?

The findings of this study suggest that child care researchers can draw on a broad array of data sources to indicate the availability of child care in a community. Also, fruitful results seem to emerge from modeling how families may be constrained by unmet need for child care in their local community. However, stronger tests of our conceptual framework regarding structural and attitudinal processes awaits future research. Ideally such research would employ longitudinal data that can capture more successfully the cost, quality, and location of child care and more precise measures of the need for child care services.

APPENDIX TABLE A1. MEANS AND STANDARD DEVIATIONS OF INDIVIDUAL-LEVEL DATA

	Mean	Standard Deviation	Min.	Max.
Mother is African American	0.33	—	0.00	1.00
Mother is Latina	0.20	—	0.00	1.00
Child Male	0.51	—	0.00	1.00
Child's Age in Months	57.36	13.26	36.00	83.00
Log of Nonmaternal Family Income (1986$)	9.39	0.73	0.00	11.35
Number of Related Adults in Household	1.40	0.99	0.00	8.00
Number of Related Children in Household	2.21	1.11	1.00	9.00
Mother's Educational Level	11.60	1.88	1.00	18.00
Mother Not Married Nor Cohabiting	0.35	—	0.00	1.00
Mother's Age at First Birth (Years)	19.08	2.35	13.00	26.00
Mother's Traditional Family Values	17.19	3.45	8.00	29.00
Child Prior Relative Care	0.37	—	0.00	1.00
Child Prior Family Day Care	0.17	—	0.00	1.00
Child Prior Center-Based Child Care	0.19	—	0.00	1.00
Mother Worked Before Pregnancy	0.56	—	0.00	1.00
Mother Worked When Child Was Age 0–3	0.75	—	0.00	1.00
Log of Mother's Wage Rate (1986$)	1.35	0.50	−1.17	3.91

Notes: $N = 1{,}583$. Statistics in this table are unweighted.

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