

# Parental preferences and patterns of child care use among low-income families: A Bayesian analysis

by<sup>1</sup>

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## **Abstract**

Parents' selections of child care arrangements involve complex decisions made in the context of child and family needs, resources and constraints. This study analyzed data from a survey of low-income parents to examine the factors associated with the type of care arrangement used most often. We employed Bayesian estimation methods to account for the interrelated nature of parental employment and child care decisions. We incorporated parental preferences for characteristics of child care to predict the type of care setting based on a factor analysis of parent responses about the importance of different care characteristics. We found that latent factors that were associated with a higher probability of working, or of working more hours, also increased

the probability of using centers or family child care, and decreased the likelihood of using family, friend or neighbor (informal) care. In concordance with the existing literature, low-income families in Minnesota were more likely to use informal care for infants (relative to preschool-age children), and households with more educated parents were more likely to use centers. Hispanic families were less likely to use any form of non-parental care. Given the potential of high-quality child care to increase the well-being and developmental trajectories of low-income children, understanding parents' decisions about child care and employment is fundamental to improving child and family outcomes.

**Key words:** child care; low-income families; maternal employment; Bayesian estimation; parent preferences

## **1. Introduction**

The increase in mothers' labor force participation since the 1970s has been associated with a dramatic rise in the use of non-parental child care (Early & Burchinal, 2001).

Approximately 70 percent of American mothers with children under age 18 were in the labor force in 2016, and almost two-thirds of mothers with children under age six (U.S. Department of Labor Bureau of Labor Statistics, 2017). Nearly two-thirds (61%) of children under the age of five in the United States had a regular child care arrangement (Laughlin, 2013). In the US, there are a variety of public and private care options for children, although availability may be limited in some communities (Gordon & Chase-Lansdale, 2001). The options may include privately-run child care centers (both for profit and not for profit) and family child care providers (defined as someone who cares for children in her home, who may or may not be licensed by the state). Parents may also rely on relatives or friends to care for their children in either paid or unpaid arrangements. Among children with a regular non-parental care arrangement, 54 percent were in a center-based program, 25 percent were cared for by a relative, and 18 percent by a non-relative (not in a center) (Kim & Fram, 2009). In addition, there are publicly provided programs such as Head Start and state pre-kindergarten programs which are targeted at children of certain ages, although some are restricted to children in low-income families.

Given the variety of child care options in most communities, the type of child care used by a family reflects the outcome of a dynamic decision process that involves parental preferences about child care, their financial resources, and other constraints. Parental preferences about types of care reflect parents' experiences and values, and may also reflect cultural or social expectations (Chaudry, Henly, & Meyers, 2010; Meyers & Jordan, 2006). Parents' choices are constrained by the family's financial resources, including access to child care subsidies or other assistance. Other constraints may be imposed by work schedules, particularly nonstandard hours

or fluctuating schedules, and by the availability of transportation and relatives or friends who might provide care (Henly & Lambert, 2005). The availability and quality of different types of care in the community also constrain a parent's decision and, in addition, parents may lack information about the available options (Chaudry et al., 2011; Davis & Connelly, 2005; Johnson, Padilla, & Votruba-Drzal, 2017)

The main objective of this paper is to better understand the factors that influence the type of child care selected by low-income families. While there is a relatively large literature on parents' child care use (discussed below), fewer studies focus on low-income families. Low-income families may face tougher constraints due to both more restricted family resources and more limited options in the community (Crosnoe, Purtell, Davis-Kean, Ansari, & Benner, 2016; Gordon & Chase-Lansdale, 2001; Laughlin, 2013). Given that much of the non-parental care for children under age five is chosen by and paid for by parents (US Census Bureau, 2013), it is critically important to understand the role of constraints, availability, and preferences in the decisions of parents regarding young children's care. Research has demonstrated the importance of quality early care and education for both short and long-term development, particularly for children in low-income families (Belsky et al., 2007; Dearing, McCartney, & Taylor, 2009; McCartney, Dearing, Taylor, & Bub, 2007; Tran & Weinraub, 2006). Thus, understanding parents' use of child care has important implications for families and society.

## ***1.1 Background and prior research***

### *1.1.1 Studies of child care decisions*

Researchers have taken a number of different approaches to studying parents' child care decisions. Early studies of child care choice analyzed the relationship between type of care used and family and provider characteristics (for example, Hofferth & Wissoker, 1992; Johansen, Leibowitz, & Waite, 1996; Lehrer, 1983). Studies differ, however, in the dimensions of the child

care decision studied. For example, some studies have focused on the decision to use paid versus unpaid care (e.g., Ribar, 1992, 1995; Tekin, 2007a), while our work builds primarily on studies that analyze the different modes or types of care. Researchers typically characterize the type of care by whether the setting is in a home or in a non-residential building (i.e., a school, church or daycare center) and whether the care is provided by a relative, neighbor or friend. Commonly used categorizations in the US include child care centers, family child care (care provided in the caregiver's home to unrelated children), and relative care. These categories or types of care differ in a number of key dimensions that are likely to matter to parents. Center-based care is often viewed as a more school-like setting, and centers are generally open during regular working hours. Care by a provider in her home may be less reliable than center-based care if the provider gets ill and does not have a substitute, but may provide a more home-like atmosphere. Care by relatives and friends may be available during evening and weekend hours, and parents may feel more comfortable with a caregiver they know (Chaudry et al., 2011). Other features such as child-adult ratios, the age range of the children in care, and cost vary across these modes of care. Parents consider these differences across care types in the context of the family's needs and resources as well as the broader social and cultural context (Carrillo, Harknett, Logan, Luhr, & Schneider, 2017; Tang, Coley, & Votruba-Drzal, 2012).

A substantial body of work has established that patterns of child care use differ by socioeconomic group within the US, which may indicate the importance of barriers to access (Early & Burchinal, 2001; Fuller, Kagan, Caspary, & Gauthier, 2002; Lippman, Vandivere, Keith, & Atienza, 2008; Magnuson, Meyers, & Waldfogel, 2007; Meyers & Jordan, 2006). Compared to higher income families, families with low incomes tend to rely more on relatives for child care (Brewster & Padavic, 2002; Burstein & Layzer, 2007). Low-income parents often cite safety, convenience and relationship with the provider as key factors for choosing a

particular type of care (Burstein & Layzer, 2007; Chaudry et al., 2011; Mensing, French, Fuller, & Kagan, 2000; Peyton, Jacobs, O'Brien, & Roy, 2001). Practical concerns such as location, hours of care, and cost are important to low-income parents (Crosnoe et al., 2016; Henly & Lyons, 2000). Relationships also matter: through in-depth interviews with a small number of low-income mothers, Mensing et al. (2000) found that trusting the provider was the most important consideration in choosing a provider, followed by convenience or logistical considerations. Burchinal, Nelson, Carlson, & Brooks-Gunn (2008) found that social networks and neighborhood characteristics related to both the type and quality of care used by low-income families in Chicago.

The different types of child care arrangements families use also reflect parental priorities and values (Kim & Fram, 2009; Meyers & Jordan, 2006; Radey & Brewster, 2007). Studies that focus on the reasons parents report for choosing care arrangements attempt to understand parents' underlying preferences and priorities about the characteristics of care (Chaudry et al., 2011; Li-Grining & Coley, 2006; Lowe & Weisner, 2004; Mensing et al., 2000; Peyton et al., 2001). These studies emphasize the importance of the social context and role of extended family members in influencing parents' child care decisions (Chaudry et al., 2011; Johansen et al., 1996; Lowe & Weisner, 2004; Meyers & Jordan, 2006). The reasons for choosing a particular care arrangement reported by mothers are often related to the type of care chosen (Peyton et al., 2001). An alternative approach, asking parents about vignettes or combinations of care characteristics, attempts to understand how parents make decisions by weighing preferences and constraints (Leslie, Ettenson, & Cumsille, 2000; Shlay, Tran, Weinraub, & Harmon, 2005).

A growing body of literature incorporates measures of parental preferences or priorities into multivariate analyses of child care decisions. Early & Burchinal (2001), for example, found that differences across ethnicity and poverty status largely vanished when parent preferences for

care characteristics were included in the model. Burstein & Layzer (2007) found that attributes parents considered important in choosing care (e.g., cost, location, provider qualities) were important predictors of the use of family child care homes versus center care. Similarly, Coley, Votruba-Drzal, Collins & Miller (2014) found that parents who cited practical features such as cost, nearby location and sick-child care were more likely to choose home-based care over centers. They also found that parents who prioritized provider training and English proficiency used center care, particularly for children of preschool age. Similarly, Crosnoe et al. (2016) estimated much higher odds that children were in preschool compared to other forms of care (including parent care) when parents reported kindergarten readiness as an important outcome of preschool. Kim and Fram (2009) employed latent class analysis to identify four groups of parents based on their stated child care priorities and then used these groups to predict type of care selected. However, Tang et al. (2012) found that parents' preferred type of care was not significantly related to the type used. Rose and colleagues (2018) caution against equating use of a particular type of care with preference for it, as constraints and trade-offs may limit parents' realistic options. Other studies have included measures of parent opinions on the role of mothers, employment and child care more generally rather than specific characteristics of care arrangements (Liang, Fuller, & Singer, 2000; van Gameren & Ooms, 2009). Overall, the quantitative findings about the influence of parent preferences on child care decisions have been mixed, with measures of parent preferences found to be important in some studies but not all.

### *1.1.2 Studies of employment and child care decisions*

Morrissey (2017) provides a thorough review of key studies conducted since 2001 that examine the relationship between child care costs and mothers' employment decisions. She notes that while most studies find an inverse relationship between the cost of child care and the likelihood of mother's labor force participation, the size of the effect varied across studies and



may be shrinking over time. However, both Morrissey (2017) and Kalb (2009) point out that the employment effect of lowering child care costs tends to be larger for low-income women and for mothers with lower education levels.

The relationship between child care costs and mothers' employment creates an important methodological challenge for the study of selection of child care: decisions about employment and child care use are frequently made jointly and are interdependent (Coneus, Goeggel, & Muehler, 2009; Morrissey, 2017). If decisions about the type of care and employment are made simultaneously, unmeasured characteristics of the family and their environment likely influence both outcomes, causing correlation in error terms in a joint employment-type of care model. Because we anticipate correlation in the error terms, we expect that ignoring this interrelatedness will generate biased estimation of model parameters, and perhaps generate misleading policy conclusions. As described in more detail below, our Bayesian model allows us to include a measure of the unobserved characteristics (through the correlation of the child care and employment models), and thus reduce the risk of biased estimation of the parameters.

Previous studies have adopted alternative approaches to addressing the endogeneity of employment and child care decisions. Some studies focus on the child care decisions conditional on employment and include only employed mothers in the estimation (e.g., Del Boca, Locatelli, & Vuri, 2005; Hofferth & Wissoker, 1992; Suárez, 2013). Studies that simply include employment as a covariate in the child care selection model ignore the potential bias caused by the simultaneity of employment and child care decisions (Coley et al., 2014; Johnson et al., 2017; Kim & Fram, 2009; Markowitz, Ryan, & Johnson, 2014; Tang et al., 2012). However, Radey & Brewster (2007) tested their model with and without employment as a covariate and found few substantive differences in the results. Others include an estimate of the predicted

probability of employment in a multinomial logit model of child care mode decisions to reduce the potential for bias (Connelly & Kimmel, 2003; Davis & Connelly, 2005).

An alternative approach to account for the simultaneity of child care and employment decisions is to estimate multinomial models that combine categories of employment and child care modes. Powell (2002), for example, estimated the effects of wages and child care prices on five joint employment and type of child care options. Blau & Hagy (1998) used 14 combinations of employment, child care mode, and paying for care. While these studies account for the simultaneous nature of the employment and child care decisions, this approach cannot test whether unobserved heterogeneity is correlated across the two decisions. Blau and Hagy (1998) and Tekin (2007b, 2007a) used discrete random-effects models to account for correlation across the multinomial equations. As discussed below, our model also explicitly accounts for the correlation in the unobserved factors driving both employment and child care selection, through Bayesian estimation.

## ***1.2 Contribution to the literature***

In this study we analyze a multivariate model of the predictors of different types of care arrangements used by low-income families in the state of Minnesota. Building on the literature examining families' child care decisions, our main research question asks:

- What factors predict the type of child care used by low-income families, including parent preferences about the characteristics of care settings they value?

This study contributes to the growing body of literature that incorporates measures of parental preferences into multivariate analyses of child care selection. Our approach differs from most studies through the use of factor analysis to identify and summarize the important components of parent preferences. Parental preferences may help explain why two families with similar resources and constraints make different child care decisions, yet preferences are often not

directly included in multivariate analyses of child care choices. Including parental preferences along with other family characteristics and contextual factors can provide a more complete picture of how these are related to child care use (Crosnoe et al., 2016; Meyers & Jordan, 2006). In addition, we focus on low-income families, whose child care use is of particular interest to policymakers.<sup>2</sup>

We also address a critically important methodological issue by using Bayesian estimation methods to account for the possibility of unobserved heterogeneity driving both the employment and child care decisions. There is limited evidence currently available to determine whether accounting for the endogeneity of work and child care decisions would alter the conclusions of studies of this type. Our approach tests whether the unobserved factors influencing work and child care selection are correlated and provides an estimate of the extent of the bias that occurs when the endogeneity is ignored. If there is evidence of estimation bias, this would throw doubt on the validity of past studies of child care use that do not take this endogeneity into account. Thus, our second research question is:

- Is there evidence of correlation between the unobserved factors driving child care and employment decisions, and to what extent does ignoring this correlation bias results when estimating models of child care selection?

## **2. Methods**

### ***2.1 Theoretical Framework***

The theoretical model underlying our approach builds on what Casper and Smith (2004) refer to as the preferences-and-constraints model. Based on the economic model of the household, parents are assumed to select the care arrangement that maximizes their utility or

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<sup>2</sup> As noted below in the concluding section, while using data from only one state is a limitation, the data set contains rich information on parental preferences about child care in addition to family and child characteristics.

satisfaction subject to time and budget constraints (Becker, 1981; Connelly, 1992a). Parents have values and priorities with regards to the characteristics of different care arrangements, and these preferences may be influenced by social norms or cultural settings (Meyers & Jordan, 2006). These preferences may change as the child gets older and may vary with other child characteristics, as well as characteristics of the parents (such as education, income and ethnicity) (Coley et al., 2014; Li-Grining & Coley, 2006; Meyers & Jordan, 2006). While parents may prefer a certain type of care arrangement, such arrangements may not be affordable or even available in the local area (Coley et al., 2014; Davis & Connelly, 2005; Tang et al., 2012). Thus, in this model, the type of care arrangement chosen by parents reflects not only parents' preferences and values but also the constraints they face. Our approach thus incorporates aspects of Meyers & Jordan's (2006) accommodations approach into the economic choice model.

While some families use child care when the mother is not employed outside the home (Davis & Connelly, 2005), parents' employment and child care decisions are closely intertwined. Nonparental care arrangements for young children are usually a necessity in order for the parent(s) to be employed outside the home, but if no satisfactory care arrangement is available, the parent may be unable to work (Coneus et al., 2009). Our conceptual framework allows for the interdependence of the two decisions by including no non-parental care as one of the child care options and no (market) employment as one of the employment options, as described below.

## ***2.2 Empirical Approach***

We estimate and compare two models: (1) a multinomial logit child care selection model, and (2) a joint child care-employment model. In both models, we assume that the selection of child care is determined by the unobserved latent utilities of each option. Specifically, if  $U_j$  is the utility of option  $j$ , we assume the family selects  $j$  if  $U_j > U_k$  for all  $k \neq j$ . We assume that each utility is a function of observed characteristics of the  $i^{\text{th}}$  family and their environment,  $x_i$ , as

well as an error term capturing the impact of unobserved factors,  $\varepsilon_{ij}$ . If  $\beta_j$  is a vector of parameters determining the utility of option  $j$ , the utility of option  $j$  for family  $i$  is represented as  $U_{ij} = x_i' \beta_j + \varepsilon_{ij}$ . The specification of the model to be estimated is determined by the distribution of the vector of error terms  $\varepsilon_i$ . For the multinomial child care selection model (without the joint employment decision) we estimate a multinomial logit model, which makes the common assumption that the elements of the error vector are independent and identically distributed (i.i.d.) type 1 extreme value.<sup>3</sup>

Our joint child care-employment model includes a latent variable capturing the respondent's utility of employment,  $U_i^e = x_i' \beta^e + \varepsilon_i^e$ , where the  $e$  superscript indicates the employment component of the model. We assume that the respondent's observed employment status,  $E_i$ , is determined by the strength of this employment utility:

$$E_i = \begin{cases} \text{no employment if } U_i^e < 0 \\ \text{part-time work if } 0 < U_i^e < c \\ \text{full-time work if } c < U_i^e \end{cases}$$

Here,  $c$  is a cut point to be estimated. The model also includes latent utilities for each child care type:  $U_{ij}^c = x_i' \beta_j^c + \delta^c \varepsilon_i^e + \varepsilon_{ij}^c$ , where the  $c$  superscript indicates the child care component of the model. Thus, we have an additional term in the child care utility equation,  $\varepsilon_i^e$ , measuring the

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<sup>3</sup> One shortcoming of the multinomial logit model is that it requires the fairly strict assumption of independence of irrelevant alternatives (IIA). Because some alternatives may be inherently better substitutes, such as a relative being a closer substitute for parental care than center-based care, the IIA assumption may not hold. The use of a nested logit model partially relaxes this assumption, and should be considered as an alternative. As pointed out by Michalopoulos and Robins (2002), however, the nested logit approach allows one to assume correlation either among employment choices or among child care modes, but not on both dimensions. Our approach, like that of Blau and Hagy (1998) and Tekin (2007b) allows for correlation across the equations.

unobserved characteristics of the family that affect the respondent's employment status, and capturing a potential source of bias in more naïve models. If the parameter  $\delta^c$  is zero, the child care and employment decisions can be treated as exogenous and independently estimated without concern about bias from unobserved correlated variables. However, if  $\delta^c$  is different from zero, then we have to use a method of jointly estimating the models to avoid this bias.

Because  $U_i^e$ , and thus  $\varepsilon_i^e$ , are never observed, traditional estimation methods cannot be used for this model. However, data augmentation methods proposed by Tanner and Wong (1987) allow us to use Markov chain Monte Carlo methods to “observe” a value of  $U_i^e$  from its conditional distribution and use it to compute residuals from the employment equation to include as covariates in the child care utility equation. Because we are conditioning on the observed data, this value of  $U_i^e$  is sampled from the conditional distribution truncated to the range that matches the observed employment status (between 0 and  $c$  when the respondent chooses part-time employment, for example). We can then compute an observed value of  $\varepsilon_i^e = U_i^e - x_i'\beta^e$  for inclusion in the child care decision model for that replication of the Monte Carlo simulation.<sup>4</sup>

We assume a multinomial probit distribution for the child care model, and an ordered probit distribution for employment. The tractability of the normal distributions that underlie these assumptions facilitates the use of Bayesian inference, specifically the Gibbs sampler (Gelfand & Smith, 1990), to estimate the model parameters. In addition, the structural freedom of the multivariate normal covariance matrix estimated for the child care selection error vector gives us an additional means of testing the independence of irrelevant alternatives (IIA)

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<sup>4</sup> The Gibbs sampler used to estimate the joint model of employment and child care choice was implemented in the C programming language using three independent Markov chains. The plotted chains appeared to converge within 10,000 iterations. We continued the process through 15,000 iterations, selecting the final 2,000 observations in each chain to form our posterior sample of the parameter distributions.

assumption of the multinomial logit model described above, which implies independent, homoskedastic error terms.

## ***2.3 Data and Definitions of Variables***

### *2.3.1 Data Source and Analytic Sample*

The survey data were obtained from the Minnesota Child Care Choices study, a multi-year, multi-methods study conducted collaboratively by Child Trends, Wilder Research and the University of Minnesota.<sup>5</sup> As one component of the larger study, a three-year longitudinal survey was conducted by telephone with parents who had at least one child age six or younger and who had applied to receive financial assistance through Minnesota's welfare or child care subsidy programs. The sample was drawn from nine counties in Minnesota; these counties were selected for the original study based on their participation in a pilot study of a quality rating and improvement system and included two large metropolitan counties and seven mostly rural counties in southern Minnesota.

The study protocol was approved by the Minnesota Department of Human Services Institutional Review Board. In order to protect the identities of the families, information about the study was initially distributed to potential survey respondents at the county social services office. Potential survey respondents included all families with children under age 6 who came into the office during a set time period. Parents who agreed to participate in the survey were later contacted by phone by an independent research organization.<sup>6</sup> Nearly three quarters of the

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<sup>5</sup> Funding for the Minnesota Child Care Choices Study was received from the Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services. For more details on the survey itself, see Tout et al. (2011).

<sup>6</sup> Based on the IRB protocol, the survey firm was not allowed to contact potential participants directly nor to receive contact information for the families from the county agencies. The county staff were instructed to hand out packets of information about the study to all families with children under age 6. It is important to recognize the limitation that the sample is not a random draw of the low-income population in Minnesota due to the restrictions placed on the sampling design in the original study. Implications of the study limitations are discussed below.

families who agreed to participate in the study completed the baseline interview (323 of 437).<sup>7</sup> Although the survey followed families over time, for this study one observation for each family was randomly selected from the waves in which the family responded, using the first three waves of the survey.<sup>8</sup> This approach removes the risk of bias due to correlation in unobserved factors over time, while allowing for more variation in children's ages. Our sample included a total of 317 families.

Compared to all families who receive child care subsidies in Minnesota, the sample included more families receiving welfare benefits (65% vs 47%), reflecting the sampling strategy (*citation removed for anonymous review*). The share of sample families using center-based care was lower (50%) compared to 62% for all subsidy households. On other characteristics, such as the percentage who were single parents, the sample closely resembled the full subsidy caseload. We include family and child characteristics in the model in order to help control for these differences.

Detailed information was collected about the child care arrangements used for a focal child, who was selected at random among the children under age six in the family. The survey respondent ("parent") was the person in the household with the most knowledge about the focal child's care arrangements, usually the mother. The respondent was typically female (90.5% in Wave 1) and almost always the biological parent. The survey asked detailed questions about parents' child care priorities and preferences, parents' perceptions of the quality of their child

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<sup>7</sup> The other families did not participate because 16 were not ultimately eligible, 24 later refused to participate when contacted, and 74 could not be reached by telephone. Because the county staff did not track the number of study information packets distributed, an overall response rate could not be calculated.

<sup>8</sup> The first three waves of the survey were conducted approximately every six months between 2009 and 2011. The baseline sample included 323 families; 250 families responded in Wave 2, and 218 families did so in Wave 3. If a family responded in two waves, we randomly drew from the two waves; if a family responded in three waves, we randomly drew from the three waves.



care, family and child characteristics, parental employment, and use of public assistance programs.

### 2.3.2 *Dependent Variables*

*Type of care setting:* The care setting was categorized based on parental reports of the primary type of care used for the focal child at the time of the survey, summarized into four types: parental care only (15.8%); centers (34.7%); family child care (11.4%); and family, friends and neighbors (38.2%) (see Table 1 for descriptive statistics on the sample). We defined centers as child care centers, before and after school programs, nursery schools, preschools, pre-Kindergartens, and Head Start programs. Family child care (FCC) and family/friend/neighbor care (FFN) were identified by parental responses to questions about the setting and professionalization of the caregiver. All non-parental care in the child's home was classified as FFN. In-home settings that were not the child's home were considered FFN care unless the provider was identified by the parents as a professional babysitter or nanny, or caregiving was the provider's primary job and the provider cared for children not related to the respondent or the provider. These settings were considered FCC and may or may not have been licensed by the state.<sup>9</sup>

*Employment categories:* The joint model allows the parent's decisions with regard to child care to be intertwined with decisions about employment. In this study we focus on the decision to work at all as well as work full or part-time hours. The respondent's (typically the mother's) employment decision was categorized in an ordinal variable with three categories: (i) did not work for pay or hold a job in the past week ("no job," 51.7%); (ii) did work for pay or

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<sup>9</sup> We did not use licensing as a criterion for distinguishing between different types of care because in Minnesota anyone who cares for more than one other family's children is required to be licensed. Additionally, previous work had shown that parents often do not know or misreport license status of their providers.

hold a job with hours typically less than 30 in a week (“part time,” 14.8%); and (iii) did work for pay or hold a job with hours typically 30 or more during the week (“full time,” 33.4%). The cost and availability of child care are likely to influence a mother’s decision to work full or part-time (or at all) (Connelly & Kimmel, 2003; Morrissey, 2017). While other characteristics of one’s work schedule, such as working nonstandard or flexible hours, may be part of the parent’s work decisions that are potentially influenced by child care availability, given the sample size we focused on the main decision of whether to work at all and if so, more or fewer than 30 hours per week.

### *2.3.3 Predictors of Child Care Selection and Employment*

The predictors of type of child care in our model are guided by the theoretical model and previous empirical work. We expect the selection of child care type to be related characteristics of the focal child, of the respondent (usually the mother), and of the household. As discussed above, the availability of resources, the family’s social and economic context, and parent, child and household characteristics influence parents’ perceptions of what type of care is best for their children as well as what is available and accessible.

*Parent (respondent) characteristics:* In addition to employment status, parent characteristics included age and education. We anticipate that non-parental care will be less likely for children of older parents, and center-based care will be more likely when the parent has more than a high school education (Davis & Connelly, 2005; Tang et al., 2012). We grouped parent’s age into a categorical variable to allow for nonlinear effects: under 20 (7.9% of the respondents), 20-24 years (45.4%), 25-29 years (25.9%), and 30 years or older (20.8%, omitted category). The parent’s education, as measured during the first wave, was categorized as less than high school (completed 12 years of schooling or fewer and did not receive a high school diploma, 25.2%; omitted category), high school graduate (a high school diploma or the

equivalent, 34.4%), or more than high school (any education beyond a high school diploma, 40.4%).

*Child characteristics:* Focal child characteristics related to child care selection included the child's age and race and ethnicity category. Three time-invariant categories of race and ethnicity were created: white, non-Hispanic (29.0%, omitted category); Hispanic (12.9%); and non-white, non-Hispanic (58.0%).<sup>10</sup> The child's age was modeled categorically, based on the stages of child development and also on the ages at which regulations change child-caregiver ratios. The categories were defined as infants (0-15 months, 23.7%), toddlers (16-32 months, 28.7%), preschool (32-79 months, not yet in school, 40.3%; omitted category) and school age (in school or 80 months or older, 7.3%). We expect to see a greater tendency to select non-parental care for older children, particularly after infancy (Coley et al., 2014).

*Household characteristics:* Household characteristics included in our model capture family composition and the household's social and financial resources. The number of adults in the household was expressed as one adult (42.0%, omitted category), two adults (44.5%), or three or more adults (13.6%). We also included a series of binary variables to capture the presence of non-focal children in the household, for whom the respondent was the primary care giver ("siblings"), of various ages. Around 8.8 percent of children had a sibling under age one, 13.9 percent had a sibling age 1 to 2 years old, 19.6 percent had a sibling age 3 to 5 years old, and 29.3 percent had a sibling age 6 to 12 years old. Social resources relevant to care giving were measured in a dummy variable indicating whether the respondent said there was a family member or friend available to care for the child regularly (50.5% yes). Because care options may

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<sup>10</sup> We tested the impact of separating "Black, non-Hispanic" from "Other, non-Hispanic" and the two groups had statistically equivalent effects, so we have kept them as a single category.

vary between rural and urban areas (Burstein & Layzer 2007), we include a dummy variable for rural residence (26.8% rural).

*Comparison of the Multinomial Logit and Bayesian model predictors:* In the Bayesian joint model, the covariates are largely the same in both the child care selection and employment equations, with a few exceptions. Rather than focal child race, we include respondent race in the employment model. Similarly, rather than including the focal child's age, in the employment equation we include the presence of children of various ages, including the focal child (and siblings). We expect having children of various ages is likely to affect whether parents work, whereas the age of the particular (focal) child will affect the type of care selected for that child. For example, having a child under 12 months in the household is likely to affect the respondent's employment decision, whether or not that child is the focal child. The child care decision for the focal child will likely depend on the age of the focal child (e.g., if he or she is under 12 months), as well as the ages of any siblings.

#### *2.3.4 Factor Analysis of Parent Preferences about the Characteristics of Care*

Parents with similar demographic characteristics and facing similar economic constraints may nonetheless have different priorities and preferences about the characteristics of care settings. In order to test the importance of parental preferences in a multivariate model of child care decisions, previous studies have sometimes included multiple separate indicators of parental priorities for different features of care (Burstein & Layzer, 2007; Coley et al., 2014; Early & Burchinal, 2001; Johnson et al., 2017). Others have included one or more indicators of the preferred type of care in the selection model (Tang et al., 2012). In contrast, we employ factor analysis to develop a summary measure of parental priorities about characteristics of care.<sup>11</sup> We

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<sup>11</sup> Van Gameren & Ooms (2009) employed factor analysis to address the role of preferences in understanding mothers' labor force participation decisions jointly with the use of paid child care in the Netherlands. The survey questions in their study included opinions about the roles of

particularly focus on aspects of care settings considered to be related to the quality of care and supportive of child development (Tout et al., 2010) . The factor analysis was first developed in a previous study, which used the Minnesota survey data to study the relationship between child care subsidy receipt and parental employment (*Author, 2018*).

The factor analysis was based on a series of questions in which survey respondents stated the importance of different characteristics in a child care setting. Specifically, the respondents were asked the following questions:

Child care programs, teachers, and caregivers do many things when they care for children. I have a list of some of these things and would like to ask you how important each one is to the overall quality of a program. Your response choices for these items are extremely important, somewhat important, not very important, or not at all important.

How important is it that the provider...

- a. Talk with you each day?
- b. Use a curriculum or planning tool for teaching?
- c. Have a lot of books and learning materials?
- d. Provide a warm and caring environment with positive relationships between teachers and caregivers and children?
- e. Help your child get along with other children?
- f. Track your child's learning and development using an assessment tool?
- g. Have teachers and caregivers with formal education and training to work with young children?
- h. Have staff that are warm and friendly with your child?

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mothers and fathers in caregiving and appropriate settings for children rather than specific characteristics of care settings as in this study.

- i. Enroll children from different backgrounds, for example, race, ethnicity, and religion?
- j. Have caregivers or teachers who speak your family's native language with your child?

While some studies have included indicators of the importance of each characteristic as distinct explanatory variables (Burstein & Layzer, 2007; Coley et al., 2014; Early & Burchinal, 2001; Johnson et al., 2017), the responses to such questions are likely to be interrelated as parents may value and look for combinations of characteristics. Indeed, the responses to these questions were very highly correlated in the survey data. Most of the characteristics were reported by nearly all parents to be somewhat or extremely important, a finding in accordance with the literature (Coley et al., 2014; Early & Burchinal, 2001). By using principal factor analysis we can parsimoniously combine parents' responses to the ten questions and capture various dimensions of care settings in an overarching measure of parental preferences.

While a large majority of parents stated each characteristic was somewhat or very important, the factor analysis demonstrated that their responses about educational characteristics were consistently related. Based on an assessment of the eigenvalues, we determined that there was one dominant factor that had an eigenvalue greater than one (1.91). Characteristics of care settings related to education and child development weighed most heavily in the one dominant factor. These characteristics included using a curriculum or planning tool, tracking child learning, and having teachers with formal education (see the factor loadings in Figure 1). Other characteristics of care were important to parents but the patterns of responses were not strongly related. We therefore named this dominant factor "child development support as a parental priority." We included this factor in the models to account for variation in parent preferences

with regards to the importance of educational features of a care setting.<sup>12</sup> Because educational features were so strongly represented in this factor, we anticipated that higher values of the factor will be associated with the greater probability of selection of center-based care. While other studies have included parental preferences about the importance of cost, convenience, or hours of care, we deliberately focus on the educational features of care as parental preferences that will be related to the choice of care type but not related to employment per se. While these other preferences are important, they are likely to be correlated directly with the employment decision, and thus could potentially bias the estimation results.

### **3. Empirical Results**

We begin by presenting our results first for the multinomial logit model of child care use, then move to the joint model of child care and employment.

#### ***3.1 Multinomial Logit Model of Child Care Selection***

In Table 2 we present the parameters estimated for a multinomial logit child care selection model (which does not correct for endogeneity). While many of the signs are in the anticipated direction, multinomial logit parameters provide little intuitive understanding of the magnitude of changes in the independent variables. Therefore, we show estimated marginal effects from the multinomial logit model in Table 3. Marginal effects are defined here as the change in probability of selecting each child care option associated with a change in the variable being considered, assuming all other variables are held constant at their observed values. For example, relative to respondents having less than a high school education, respondents with more than a

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<sup>12</sup> Given that parents' preferences about care types and care characteristics likely change as children get older, we tested including interactions between the child development support factor and child age. The models with interactions suggested that higher values of the factor were associated with increased use of center care and FCC primarily for preschoolers, and less so for infants and toddlers. Given our finite sample size and the difficulties of presenting marginal effects for interactions (Karaca-Mandic, Norton, & Dowd, 2012), we do not present these models.

high school degree had a 14.9 percentage point increase in the estimated probability of selecting center-based care, with all other variables held constant. The probability of selecting FFN care was 10.8 percentage points lower for those with more than a high school education compared to those with less than a high school education (significant at the 10% level). Infants and toddlers were much less likely to be in center-based care (decreases of 19.2 and 16.7 percentage points, respectively, compared to preschool age children), and infants were much more likely to be placed in FFN settings (+17.8 percentage points). Families with a Hispanic focal child were much more likely to use parental care (+17.5 percentage points), and less likely to use centers (-16.3 percentage points) or FCC care (-8.7 percentage points), relative to families with a non-Hispanic, white focal child. Non-white, non-Hispanic focal children were associated with a shift in probability from centers (-20.6 percentage points) to FFN (+15.6 percentage points) or parental (+10.6 percentage points) care. Having at least one additional adult in the household decreased the probability of center care by at least 18.0 percentage points. Decisions about child care arrangements for the focal child were also related to the presence of other children in the family. Having a sibling under age one increased the probability of being in parental care by 19.8 percentage points. Having a sibling aged 3 to 5 years was associated with a reduction in center care (-13.7 percentage points) and an increase in FCC care (+14.3 percentage points).

The availability of family or friends to care for the child showed the most dramatic shift, increasing the probability of FFN care (+27.8 percentage points), and reducing the probability of center (-15.3 percentage points) and FCC (-9.3 percentage points) care. Living in a rural area significantly reduced the likelihood of choosing center care (-18.1 percentage points), likely due to the limited availability of centers in less densely populated areas. Finally, each standard deviation increase in the factor measuring the value the parent places on support for child development led to a 14.3 percentage point increase in the probability that center care was used,



and decreased the use of FCC (-4.4 percentage points) and FFN (-10.6 percentage points) care. Interestingly, a higher value placed on child development support did not appear to change the probability of parental care. In addition, an interaction term between respondent's education level and the factor measuring child development support was not statistically significant, so we did not include it in our final models.

### ***3.2 Bayesian Joint Model of Employment and Selection of Child Care***

The parameter estimates from the joint child care-employment model, which accounts for employment endogeneity, are shown in Table 4, with marginal effects shown in Table 5. A key finding is the evidence that  $\varepsilon_i^e$ , the unobserved factors that influenced employment, also influenced child care selection. The estimated parameter for the error term from the employment latent utility was a statistically significant predictor of using center or FCC care. This result means that unobserved factors that increased a respondent's probability of working, or working more hours, also significantly increased the probability the family will select center or FCC care for the focal child. Given this result, we might anticipate seeing bias in the multinomial logit (MNL) parameter estimates. However, the child care parameters estimated in the joint model were very similar in direction to those estimated by the MNL model, and the marginal effects showed similar substantive significance to the MNL results, within a percentage point or two in most cases. Possible reasons for this lack of evidence of estimation bias are discussed below.

While the employment component of the model was not the main focus of the study, the results accord with expectations and prior literature in that more than high school education, the ages of children in the household, and residing in a rural area strongly influence employment outcomes (full-time, part-time or no employment). Respondents with at least some education beyond high school had a higher probability of working full time than respondents without a high school education (+17.8 percentage points), and lower probability of no employment (-19.7

percentage points). An infant focal child increased the probability of no employment (+12.7 percentage points), as did the presence of a sibling under age 1 (+9.7 percentage points), with similar decreases in the probability of full-time employment. The presence of older siblings, age 6 to 12, increased the probability of full-time employment (+16.4 percentage points), balanced by a reduction in the probability of no employment (-18.4 percentage points). Residing in a rural area increased the probability of full-time employment (15.1 percentage points) and decreased the probability of no employment (-15.8 percentage points).

#### **4. Discussion and Conclusion**

Our approach adopts and expands the “preferences-and-constraints” theoretical framework for understanding parents’ child care decisions (Casper & Smith, 2004; Connelly, 1992b). Quantitative analyses of the type of child care selected that do not account for parental preferences and social or cultural context have been criticized as too simplistic (Chaudry et al., 2010; Meyers & Jordan, 2006). By expanding the multivariate model to include parents’ priorities with regard to features of child care settings, our approach addresses some of these concerns. We found parent preferences to be important determinants of child care selection, with families who value child development support more likely to select center care for their children, and less likely to select FFN care of their children, all else equal. Interestingly, these families did not trend away from parental care. Studies that include parental priorities in a multivariate analysis find similar results, although their measures of parental preferences differ from ours. Coley et al. (2014), for example, found that parents who stress the importance of provider training and the provider’s English proficiency had a higher probability of using center care over home-based care (either the child’s home or someone else’s; they did not distinguish between relative and nonrelative care). Kim and Fram (2009) found that parents who emphasized learning and quality used center care more often than other types. Among low-income immigrant parents,

Johnson and colleagues (2017) noted that parents who prefer a caregiver who can speak English or have a focus on kindergarten readiness were more likely to choose Head Start or public pre-kindergarten over an unsubsidized care arrangement. Similarly, Burstein and Layzer (2007) found that mothers who reported that the child's cognitive development was an important consideration in choosing care were much more likely to choose non-relative over relative care. Yet Tang et al. (2012) report that mothers' preference for center versus home-based care was not a significant predictor of type of care used after controlling for child, family and contextual factors. In contrast to Kim and Fram (2009), who identified four groups of parents based on choice factors, our factor analysis identified one latent factor, and parents who had higher values of this factor were more likely to choose center care. As with other studies that include parental preferences as a predictor of child care selection, the results must be interpreted with caution as it is possible that reported preferences reflect the type of care being used. Our factor analysis is based, however, on asking parents about the importance of characteristics of any child care setting, not on the specific reasons for choosing a particular provider.

An important contribution of our joint model is the ability to test the assumption about employment exogeneity, and our results confirm that researchers must consider the interrelated nature of the child care and employment decisions when modeling the factors related to child care selection. The results demonstrate that unobserved characteristics that increase the probability of working, or working additional hours, also increase the probability of using centers or FCC care and decrease the probability of using FFN care. Connelly and Kimmel (2003) similarly found that the number of hours of work (full or part time employment) was closely related to the type of child care used. Thus, studies of factors influencing child care decisions that include maternal employment as an exogenous factor in the model may have biased estimates. While we did not find evidence of large estimation bias when comparing the

multinomial logistic model of child care selection to the joint child care-employment model, we believe this result is specific to our particular sample and is unlikely to hold true more broadly. The sample includes only low-income families in Minnesota, which is a narrow segment of those making child care decisions. An avenue for future research would be to test the joint employment-child care model in a broader sample to assess the extent to which estimation bias is a problem. Analyses of child care selection models that treat employment as exogenous have the potential for biased results, and it is important to be aware of and test for these potential biases. Use of Bayesian methods and increasing flexibility in maximum likelihood estimation packages<sup>13</sup> allows for the explicit modeling of correlation in error terms across the employment and child care choice models.

The main factors that influenced child care decisions by this group of low-income families were similar to those found in other studies. Strong relationships were found between type of care and child age, with preschool children most likely to be in centers, and infants most likely to be in FFN care (Coley et al., 2014; Tang et al., 2012). The lower rate of formal care with the addition of other adults to the household suggests a strong substitutability between home care and formal care, as has been found in other studies (Coley et al., 2014; Han, 2004). The large marginal effects of the availability of friends or neighbors to care for children suggests that this type of care may be driven by access to such networks (Davis & Connelly, 2005). More educated parents seek more formal care—which may be due in part to higher incomes associated with higher education. Coley et al. (2014) find that more educated parents select center care over parent care even after controlling for income and employment (although they do not account for the endogeneity of either variable).

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<sup>13</sup> See, for example Roodman's `cmp` package in Stata (Roodman, 2011).

Patterns of type of child care used by race and ethnicity differed somewhat in this study from previous studies. Lower formal care use was observed for both Hispanics and non-White non-Hispanic children as compared with White, non-Hispanic children. While the low rate of Hispanic center care use was consistent with national trends, nationally Black children have higher rates of center care (Capizzano, Adams, & Ost, 2006). In the Minnesota sample used in this study, the non-white, non-Hispanic group includes immigrants and refugees from Asian and African countries. The lower use of center care and greater use of both parental care and FFN care is consistent with findings for immigrant populations in other studies (Radey & Brewster, 2007; Tang et al., 2012). In addition, some studies that control for differences in income, employment and household structure and parental attitudes find few differences in child care use patterns by race or ethnicity (Radey & Brewster, 2007).

#### ***4.1 Study Limitations***

Although this study addresses an important methodological issue in the analysis of child care selection, we acknowledge several limitations. We were not able to include certain variables often taken into account in similar studies, such as nonstandard employment schedules, the respondent's wage or receipt of welfare, due to concerns about the likely endogeneity of these variables. We were unable to parse out differences in selection factors for different types of center-based settings because the respondent was asked in the survey if the child attended a child care center, preschool, Head Start or pre-kindergarten program but was not asked to distinguish among them. Further, we do not specifically test for the effect of receipt of a child care subsidy on parents' child care selection. Other studies have shown greater use of formal or center-based care by those receiving subsidies (Johnson, Ryan, & Brooks-Gunn, 2012; Markowitz et al., 2014; Ryan, Johnson, Rigby, & Brooks-Gunn, 2011; Tekin, 2005). Previous studies have found that low-income parents who prioritize these care characteristics are more likely to apply for

subsidies in order to access center care, rather than receipt of subsidies leading to a change in parent preferences (Burstein & Layzer, 2007). In addition, our sample is restricted to low-income families, so we cannot address variation in child care selection factors for households at different income levels.

The generalizability of the results must be considered in the context of the specific sampling design. The sample was not intended to be a random sample of Minnesota households. In order to fit the purposes of the original study, the sampling approach focused on low-income households in the selected counties. Compared to a random statewide survey of Minnesota households using child care conducted about the same time, the sample respondents in this study were younger, had less formal education and lower incomes, were less likely to be employed and were less likely to be white, non-Hispanic (Chase & Valorose, 2010). Variation in patterns of use of child care may reflect these differences, although these characteristics were included in the multivariate models.

As with any survey, families who participated in the survey may have differed from those who did not agree to be contacted. In addition, attrition between waves of the survey increases concerns that the sample may not be representative of all low-income families in Minnesota. Most families participated when contacted, and attrition occurred primarily when the survey firm could not locate families. The small sample size limited our ability to test for subgroup differences (e.g., by age of child) or to detect small non-zero effects. The sample is from a few counties in one state, Minnesota, and thus we have limited variability in community-level child care and economic conditions (including child care prices or supply). We tested the inclusion of several ZIP code level community characteristics, including median house value, poverty rate and labor force participation rate, but these variables were not significant nor did they alter the substance of our findings. Future research, employing similar methods to account for interrelated

child care and employment decisions and larger, representative samples from different state policy and economic contexts, is needed to provide support for these findings.

#### ***4.2 Conclusion***

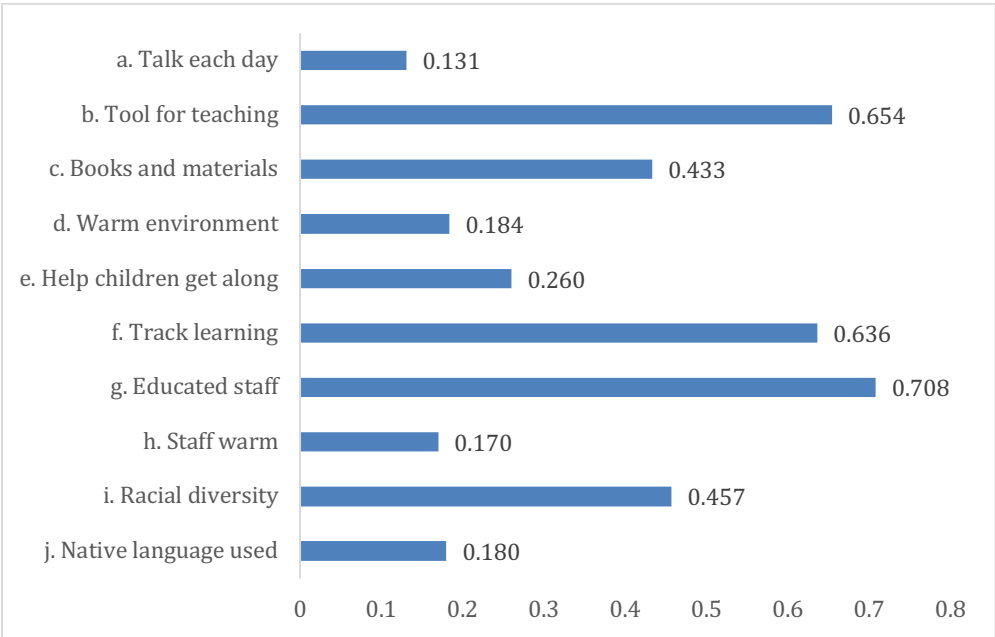
The goal of this study was to investigate the factors associated with the pattern of child care use of low-income families in the context of their underlying preferences and their employment decisions. Although parents face a variety of constraints that influence the type of care used — in terms of finding care with appropriate schedules, location, and cost — parents also have different preferences and priorities about the characteristics of care settings. We found that parents who placed a higher priority on supports for child development in the child care setting were more likely to use center-based care. The demonstrated importance of the parental priority factor in determining child care type points to the value of providing information to parents about how features of a child care setting can support children’s development. Online search tools and referral agencies can better help parents sort through child care options when they understand parents’ preferences and priorities. Resources to help parents locate and identify developmentally-supportive environments, for example in a child care Quality Rating and Improvement System (QRIS), may help to inform parents as they make child care decisions. In addition, given that center-based care is generally more expensive than other types of care (Child Care Aware of America, 2014), (with the exception of publicly-financed programs like Head Start), many low-income parents would benefit from subsidies to help pay for care. When parents have a subsidy they are more likely to select developmentally-supportive environments for their children (Krafft, Davis, & Tout, 2017).

Understanding the interrelated decisions about child care use and employment is fundamental to supporting and improving child and family outcomes through various policy initiatives. This study found that unmeasured factors associated with full-time employment also

induced parents to select centers more often. Thus, increasing the availability and affordability of care settings that provide developmental supports may facilitate employment of parents of young children. Given the importance of early childhood development and early childhood education as a means to improve wellbeing and reduce educational disparities (Barnett, 2008; Duncan & Magnuson, 2013), understanding and facilitating parents' decisions about the selection of child care is fundamental to supporting and improving child and family outcomes.



**Figure 1: Factor loadings for child development support as a parental priority**



Note: N=320

Source: Authors' calculations based on Minnesota Child Care Choices Survey Data

**Table 1: Descriptive Statistics for the Sample**

	Percentage
Type of care	
Center	34.7
Family child care (FCC)	11.4
Family, friend, neighbor (FFN)	38.2
Parental only	15.8
Respondent sex	
Female	90.5
Male	9.5
Respondent age	
Under 20 years	7.9
20-24 years	45.4
25-29 years	25.9
30+ years	20.8
Respondent education	
No high school degree	25.2
High school graduate	34.4
More than high school	40.4
Respondent employment	
No work	51.7
Part time work (<30 hrs)	14.8
Full time work (30+ hrs)	33.4
Child age	
Infant	23.7
Toddler	28.7
Preschool age	40.3
School age	7.3
Child race & ethnicity	
White, Non-Hispanic	29.4
Hispanic	12.6
Non-White, Non-Hispanic	58.0
Number of adults in household	
One adult	42.0
Two adults	44.5
Three or more adults	13.6
Presence of siblings/other children in the household	
One or more siblings age < 1 yr	8.8
One or more siblings age 1-2 yrs	13.9
One or more siblings age 3-5 yrs	19.6
One or more siblings age 6-12 yrs	29.3
Family/friend available	
No	49.5
Yes	50.5
Residence	
Urban	73.2
Rural	26.8

	Mean	Standard Deviation
Factor capturing parental priority for support of child development*	0.00	1.00
N (Observations)	317	

\*Note: By construction, the factor has a mean of zero and standard deviation of one.  
Source: Authors' calculations based on Minnesota Child Care Choices Survey Data

**Table 2. Multinomial Logit Parameter Estimates (Standard Errors) for Child Care Selection Model**

	Type of child care used		
	Center	FCC	FFN
Intercept	3.139*** (0.957)	-0.030 (1.259)	0.194 (0.929)
Respondent male	0.385 (0.676)	0.070 (0.896)	0.254 (0.614)
Respondent age			
Under 20 yrs	1.165 (0.924)	0.025 (1.488)	0.646 (0.885)
20 – 24 yrs	-0.119 (0.562)	0.314 (0.761)	0.794 (0.549)
25 – 29 yrs	0.190 (0.559)	0.377 (0.747)	0.235 (0.578)
Respondent education			
High school	1.070** (0.526)	1.429* (0.759)	0.775 (0.472)
More than high school	1.159** (0.493)	1.162 (0.760)	0.116 (0.446)
Focal child age			
Infant	-1.205** (0.528)	-1.118 (0.739)	0.194 (0.485)
Toddler	-0.781 (0.495)	0.459 (0.645)	0.200 (0.473)
School aged	-0.742 (0.779)	0.418 (1.010)	0.361 (0.728)
Focal child race & ethnicity			
Hispanic	-1.912*** (0.734)	-2.401** (0.999)	-0.941 (0.677)
Non-white, non-Hispanic	-1.777*** (0.663)	-1.543* (0.793)	-0.339 (0.622)
Other adults in the household			
2 adults	-1.417*** (0.444)	-0.963 (0.596)	-0.346 (0.428)
3 or more adults	-1.681** (0.671)	-0.385 (0.844)	-0.275 (0.589)
Presence of other children in the household			
One or more siblings age < 1 yr	-1.494** (0.620)	-1.318 (0.871)	-1.108** (0.546)
One or more siblings age 1-2 yrs	0.280 (0.572)	0.061 (0.790)	0.282 (0.573)
One or more siblings age 3-5 yrs	-0.917* (0.496)	1.002* (0.608)	-0.547 (0.445)
One or more siblings age 6-12 yrs	-0.024 (0.491)	-0.930 (0.661)	-0.084 (0.486)
Family or friend available to care for child	-0.465	-0.910*	1.070***

	(0.400)	(0.551)	(0.385)
Rural	-1.110*	1.093	-0.312
	(0.616)	(0.717)	(0.568)
Factor capturing parental priority for support of child development	0.572**	-0.535**	-0.403**
	(0.254)	(0.268)	(0.203)
N	317		

Notes: \*\*\* p<0.01; \*\* p<0.05; \* p<0.10

FCC=family child care; FFN=family, friends and neighbors. Base category is parental care only.

Reference values: Respondent age: 30 years or older; Respondent education: less than high school degree; Focal child age: preschool age; Focal child race & ethnicity: white non-Hispanic; Adults in the household: 1 adult.

**Table 3. Marginal Effects (Standard Errors) in Multinomial Logit Child Care Selection Model**

	Type of child care used (change in probability)			
	$\Delta P(\text{Center})$	$\Delta P(\text{FCC})$	$\Delta P(\text{FFN})$	$\Delta P(\text{Parental})$
Respondent male	0.037 (0.089)	-0.014 (0.053)	0.008 (0.086)	-0.031 (0.058)
Respondent age				
Under 20 yrs	0.139 (0.110)	-0.045 (0.070)	-0.002 (0.101)	-0.092 (0.084)
20 – 24 yrs	-0.096 (0.070)	0.001 (0.048)	0.146* (0.076)	-0.052 (0.065)
25 – 29 yrs	0.001 (0.069)	0.016 (0.048)	0.014 (0.075)	-0.031 (0.067)
Respondent education				
High school	0.064 (0.061)	0.049 (0.042)	0.007 (0.066)	-0.120** (0.057)
More than high school	0.149** (0.061)	0.047 (0.043)	-0.108* (0.064)	-0.087 (0.058)
Focal child age				
Infant	-0.192*** (0.063)	-0.044 (0.036)	0.178*** (0.068)	0.059 (0.057)
Toddler	-0.167*** (0.059)	0.060 (0.047)	0.089 (0.061)	0.017 (0.049)
School aged	-0.172* (0.090)	0.048 (0.076)	0.118 (0.101)	0.007 (0.074)
Focal child race & ethnicity				
Hispanic	-0.163* (0.088)	-0.087* (0.050)	0.075 (0.087)	0.175** (0.074)
Non-white, non-Hispanic	-0.206*** (0.069)	-0.056 (0.049)	0.156** (0.070)	0.106** (0.051)
Other adults in the household				
2 adults	-0.180*** (0.054)	-0.018 (0.036)	0.100* (0.055)	0.098** (0.044)
3 or more adults	-0.237***	0.032	0.112	0.093

	Type of child care used (change in probability)			
	$\Delta P(\text{Center})$	$\Delta P(\text{FCC})$	$\Delta P(\text{FFN})$	$\Delta P(\text{Parental})$
	(0.073)	(0.062)	(0.081)	(0.071)
Presence of siblings/other children in the household				
One or more siblings age < 1 yr	-0.118 (0.078)	-0.025 (0.052)	-0.055 (0.085)	0.198** (0.090)
One or more siblings age 1-2 yrs	0.018 (0.068)	-0.012 (0.046)	0.023 (0.076)	-0.029 (0.054)
One or more siblings age 3-5 yrs	-0.137** (0.058)	0.143*** (0.052)	-0.065 (0.062)	0.059 (0.054)
One or more siblings age 6-12 yrs	0.029 (0.060)	-0.061* (0.035)	0.014 (0.066)	0.018 (0.053)
Family or friend available to care for child	-0.153*** (0.048)	-0.093*** (0.033)	0.278*** (0.051)	-0.033 (0.042)
Rural	-0.181*** (0.062)	0.143** (0.057)	-0.010 (0.076)	0.047 (0.069)
Factor capturing parental priority for support of child development - increase by 1 standard deviation	0.143*** (0.029)	-0.044*** (0.015)	-0.106*** (0.025)	0.006 (0.022)

Notes: \*\*\* p<0.01; p<0.05; \* p<0.10

FCC=family child care; FFN=family, friends and neighbors

Reference values: Respondent age: 30 years or older; Respondent education: less than high school degree; Focal child age: preschool age; Focal child race & ethnicity: white non-Hispanic; Adults in the household: 1 adult

**Table 4. Bayesian Parameter Estimates (Standard Errors) for Joint Child Care-Employment Model**

	Type of child care used			Employment
	Center	FCC	FFN	
Intercept	1.461*** (0.478)	-0.702 (0.691)	-0.708 (0.693)	-0.626* (0.351)
Respondent male	0.271 (0.359)	-0.151 (0.475)	0.063 (0.345)	0.143 (0.254)
Respondent age				
Under 20 yrs	0.561 (0.487)	-0.588 (0.836)	0.302 (0.463)	0.133 (0.343)
20 – 24 yrs	-0.358 (0.319)	-0.058 (0.386)	0.450 (0.345)	0.268 (0.213)
25 – 29 yrs	0.028 (0.298)	-0.052 (0.412)	0.171 (0.306)	0.182 (0.209)
Respondent education				
High school	0.472* (0.284)	0.571 (0.396)	0.227 (0.248)	0.251 (0.189)
More than high school	0.620** (0.275)	0.416 (0.394)	-0.079 (0.266)	0.562*** (0.187)
Focal child age				
Infant	-0.651** (0.289)	-0.596 (0.435)	0.320 (0.309)	
Toddler	-0.553** (0.258)	0.446 (0.345)	0.115 (0.251)	
School aged	-0.530 (0.380)	0.496 (0.598)	0.160 (0.383)	
Respondent race & ethnicity				
Hispanic				0.021 (0.274)
Non-white, non-Hispanic				-0.304* (0.191)
Focal child race & ethnicity				
Hispanic	-0.830** (0.371)	-1.226*** (0.551)	-0.129 (0.360)	
Non-white, non-Hispanic	-0.858*** (0.306)	-0.820** (0.418)	0.178 (0.339)	
Other adults in the household				
2 adults	-0.731*** (0.231)	-0.339 (0.366)	0.032 (0.234)	-0.115 (0.158)
3 or more adults	-0.970*** (0.374)	0.155 (0.467)	0.120 (0.330)	-0.370 (0.236)
Presence of other children in the household				
One or more siblings age < 1 yr	-0.794** (0.339)	-0.514 (0.500)	-0.414 (0.326)	
One or more siblings age 1-2 yrs	0.233 (0.305)	0.112 (0.409)	0.181 (0.296)	
One or more siblings age 3-5 yrs	-0.557**	0.713**	-0.364	



	Type of child care used			Employment
	Center	FCC	FFN	
	(0.262)	(0.323)	(0.287)	
One or more siblings age 6-12 yrs	0.018	-0.674*	0.076	
	(0.254)	(0.413)	(0.264)	
Presence of any children in the household				
One or more children age < 1 yr				-0.365**
				(0.180)
One or more children age 1-2 yrs				0.223
				(0.166)
One or more children age 3-5 yrs				0.183
				(0.169)
One or more children age 6-12 yrs				0.321*
				(0.173)
Family or friend available to care for child	-0.307	-0.712**	0.760***	-0.025
	(0.255)	(0.346)	(0.394)	(0.148)
Rural	-0.696**	0.845***	-0.194	0.448**
	(0.296)	(0.384)	(0.296)	(0.197)
Factor capturing parental priority for support of child development	0.489***	-0.311**	-0.236**	
	(0.147)	(0.148)	(0.156)	
Error term in employment latent utility, $\varepsilon_i^e$	0.222**	0.288**	-0.032	
	(0.120)	(0.130)	(0.102)	
N				317

Notes: \*\*\* p<0.01; \*\* p<0.05; \* p<0.10

FCC=family child care; FFN=family, friends and neighbors. Base category is parental care only.

Reference values: Respondent age: 30 years or older; Respondent education: less than high school degree; Focal child age: preschool age; Focal child race & ethnicity: white non-Hispanic; Adults in the household: 1 adult

**Table 5. Marginal Effects (Standard Errors) in Joint Child Care-Employment Model**

Change in probability ( $\Delta P$ )	Type of child care used				Employment		
	$\Delta P(\text{Center})$	$\Delta P(\text{FCC})$	$\Delta P(\text{FFN})$	$\Delta P(\text{Parental})$	$\Delta P(\text{no work})$	$\Delta P(\text{PT})$	$\Delta P(\text{FT})$
Respondent male	0.056 (0.082)	-0.021 (0.046)	-0.009 (0.081)	-0.025 (0.056)	-0.049 (0.086)	0.000 (0.007)	0.049 (0.082)
Respondent age							
Under 20 yrs	0.110 (0.109)	-0.061 (0.063)	0.019 (0.099)	-0.067 (0.079)	-0.044 (0.115)	0.002 (0.014)	0.042 (0.103)
20 – 24 yrs	-0.122** (0.070)	-0.009 (0.045)	0.157** (0.071)	-0.025 (0.058)	-0.090 (0.071)	0.009 (0.009)	0.081 (0.064)
25 – 29 yrs	-0.009 (0.069)	-0.011 (0.045)	0.044 (0.069)	-0.023 (0.059)	-0.062 (0.071)	0.007 (0.009)	0.055 (0.063)
Respondent education							
High school	0.082** (0.040)	0.026 (0.027)	-0.036 (0.042)	-0.073** (0.040)	-0.087* (0.065)	0.013 (0.011)	0.074* (0.056)
More than high school	0.140*** (0.060)	0.027 (0.038)	-0.088* (0.062)	-0.080* (0.056)	0.197*** (0.064)	0.019** (0.010)	0.178*** (0.057)
Focal child age							
Infant	-0.097* (0.069)	-0.036 (0.034)	0.124** (0.072)	0.010 (0.059)	0.127*** (0.050)	-0.012 (0.010)	0.115*** (0.043)
Toddler	-0.082* (0.061)	0.073** (0.042)	0.031 (0.063)	-0.022 (0.052)	-0.059* (0.036)	0.005 (0.004)	0.055* (0.037)
School aged	-0.084 (0.079)	0.080 (0.073)	0.035 (0.089)	-0.031 (0.069)	-0.106 (0.084)	0.001 (0.009)	0.105 (0.088)
Respondent race & ethnicity							
Hispanic					-0.006 (0.095)	-0.002 (0.006)	0.008 (0.093)
Non-white, non-Hispanic					0.107* (0.068)	-0.008 (0.007)	-0.099* (0.063)
Focal child race & ethnicity							
Hispanic	-0.143**	-0.096**	0.078	0.162***			

Change in probability ( $\Delta P$ )	Type of child care used				Employment		
	$\Delta P(\text{Center})$	$\Delta P(\text{FCC})$	$\Delta P(\text{FFN})$	$\Delta P(\text{Parental})$	$\Delta P(\text{no work})$	$\Delta P(\text{PT})$	$\Delta P(\text{FT})$
Non-white, non-Hispanic	-0.181*** (0.063)	-0.072** (0.043)	0.157*** (0.065)	0.096** (0.043)			
Other adults in the household							
2 adults	-0.167*** (0.054)	-0.014 (0.034)	0.094** (0.053)	0.087** (0.042)	0.040 (0.055)	-0.003 (0.005)	-0.037 (0.051)
3 or more adults	-0.234*** (0.073)	0.049 (0.055)	0.120* (0.079)	0.065 (0.064)	0.127* (0.080)	-0.015 (0.012)	-0.111* (0.069)
Presence of siblings/other children in the household							
One or more siblings age < 1 yr	-0.130** (0.068)	-0.022 (0.048)	-0.036 (0.078)	0.188*** (0.078)	0.097** (0.047)	-0.011* (0.008)	-0.086** (0.041)
One or more siblings age 1-2 yrs	0.029 (0.067)	0.003 (0.044)	0.015 (0.069)	-0.047 (0.051)	-0.036* (0.027)	0.002 (0.003)	0.034* (0.025)
One or more siblings age 3-5 yrs	-0.116** (0.054)	0.121*** (0.046)	-0.071 (0.059)	0.065* (0.051)	-0.030 (0.028)	0.003 (0.004)	0.028 (0.026)
One or more siblings age 6-12 yrs	0.015 (0.057)	-0.065** (0.033)	0.028 (0.063)	0.023 (0.048)	-0.184** (0.097)	0.020* (0.012)	0.164** (0.086)
Family or friend available to care for child?	-0.133*** (0.048)	-0.088*** (0.030)	0.261*** (0.052)	-0.040 (0.042)	0.009 (0.051)	-0.001 (0.005)	-0.008 (.047)
Rural	-0.162*** (0.057)	0.133*** (0.048)	-0.014 (0.070)	0.042 (0.055)	-0.158** (0.069)	0.007 (0.005)	0.151** (0.068)
Factor capturing parental priority for support of child development	0.148*** (0.028)	-0.037*** (0.011)	-0.102*** (0.023)	-0.008 (0.019)			

Notes: For the marginal effects in the joint child care-employment model, because the models for work and care are estimated jointly, the variation in the focal child age affects employment by increasing or decreasing the number of children in various age groups. Likewise, having siblings of various ages affects employment through whether or not there are children in various age groups in the household.

\*\*\*  $p < 0.01$ ; \*\*  $0.01 < p < 0.05$ ; \*  $0.05 < p < 0.10$

FCC=family child care; FFN=family, friends and neighbors

Reference values: Respondent age: 30 years or older; Respondent education: less than high school degree; Focal child age: preschool age; Focal child race & ethnicity: white non-Hispanic; Adults in the household: 1 adult.

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