Time for a change? Predictors of child care changes by low-income families

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Abstract

Instability in child care arrangements can negatively affect children's development, especially in low-income families. However, few studies have examined what predicts changes over time in child care arrangements. This paper presents findings from a unique multi-year study tracking child care use in low-income families. We estimate rich quantitative models to analyze the relationship between child, household and care provider characteristics and four different types of changes. We find turnover in child care arrangements to be common in this low-income population. Over a period of six months, half of the children changed their primary provider. Child care changes were frequently related to job loss, changes in family composition or the changing availability of caregivers. While concerns have been raised that short spells of child care subsidy receipt cause child care instability, we found that subsidy use was not associated with higher rates of change. Additionally, we found that the lower a parent's assessment of the child's experience in a particular arrangement in the prior time period, the higher the likelihood of changing provider by the next survey wave. These results indicate that low-income parents recognize quality factors and change arrangements to improve the quality of care.

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Keywords: child care; child care instability; child development; low-income families; child care subsidy

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Introduction

Most American children spend substantial time in nonparental care arrangements prior to entering kindergarten. Nearly two-thirds (61%) of children under the age of five in the U.S. were in a regular weekly child care arrangement in 2011 (Laughlin 2013). Given the influence of child development in the first years of life on later outcomes (Shonkoff and Phillips 2000) and the amount of time children spend in nonparental care, the decisions that parents make in choosing care arrangements are critically important for children, their families, and for society as a whole. While parents are the primary decision-makers about children's nonparental care arrangements, concerns about the quality of those arrangements have increased policymakers' interest in parents' child care decisions. There is also concern that low-income families may be unable to recognize quality providers or may have limited access to higher quality care (Cryer, Tietze and Wessels 2002).

There is a substantial body of literature investigating how and why parents use different child care arrangements. The focus of this paper is an important and related question on which there is far less research: why do parents change their children's care arrangements? Adams and Rohacek (2010) note that changes in child care arrangements are quite common. Parents have selected a care arrangement and subsequently they may revisit that decision. Even if preferences are constant over time, changes in family circumstances, availability of care, and children's needs may occur. As parents become more informed about the current care arrangement and other options, re-ranking of choices may occur (Grace and O'Cass 2001, 2003).

Parents have many reasons for making changes in child care arrangements and in principle, any particular change may impact a child's development for better or worse, or not at all. However, research has shown developmental outcomes tend to be negatively impacted by

child care instability. Among children younger than 30 months, Howes and Hamilton (1992) found that changes in child care provider were associated with a decrease in children's emotional attachment to their caregiver. In addition, instability of care has been associated with poorer cognitive and language development (Tran and Weinraub 2006). The use of multiple arrangements or caregivers has been associated with behavior problems (de Schipper, Van IJzendoorn, and Tavecchio 2004; Morrissey 2009). There is particular concern about the impact of child care instability on low-income children, who may also experience frequent changes in parental employment, housing or family structure (Adams and Rohacek 2010). The evidence indicates child care instability is high among low-income populations (Lowe, Weisner, and Geis 2003). In addition, low-income families receiving child care subsidies experience frequent turnover in child care arrangements (Weber 2005).

The main objective of this paper is to identify the child, household and care provider characteristics that are related to changes in child care arrangements for low-income families. The specific research questions addressed are:

(1) How common are changes in type of care and in specific providers for low-income children?
(2) Which family and child characteristics or changes in those characteristics are associated with changes in care arrangements?
(3) Is there an association between receipt of a child care subsidy and changes in care arrangements?
(4) Does provider quality, as measured by parent reports about the child's experience in care, predict changes in care arrangements?

Few studies have examined changes in child care arrangements, and this study uses rich

longitudinal survey data on low-income families to track changes in their child care arrangements and in the family's circumstances. Understanding the drivers of changes in arrangements will help us understand why changes occur and the possible implications of changes for children's development.

Background

Choosing care

Although there is limited research on why parents change child care arrangements, there is a substantial body of literature on factors influencing parents' current child care arrangements. Numerous studies have found characteristics of children and families, as well as neighborhood factors and state policy differences, associated with child care decisions. Age of the child, race/ethnicity, and family income level have been associated with different child care usage patterns (Meyers and Jordan 2006). Parents of infants and toddlers tend to use more home-based and relative care and those with preschoolers are somewhat more likely to use centers (Iruka and Carver 2006; Chase and Valrose 2010). Several studies have focused on the constraints on parents' child care choices (for example, Hofferth et al. 1996; Gordon and Chase-Lansdale 2001; Hirshberg, Huang and Fuller 2005). For instance, greater availability of centers or of relatives is a significant predictor of the type of care used (Davis and Connelly 2005). Other studies have emphasized the importance of the social context of the child care decision (Meyers and Jordan 2006; Chaudry 2004; Lowe and Weisner 2004; Fuller, Holloway and Liang 1996). Additionally, there is concern that parents are unable to judge the quality of child care arrangements (Cryer, Tietze and Wessels 2002). While parental definitions of quality tend to be consistent with those of child development specialists, parents have been shown to over-estimate the quality of their

child care (Cryer and Burchinal 1997; Cryer, Tietze, and Wessels 2002). Even if parents do prioritize quality of care, they may not be able to pay for it (Shlay et al. 2005).

The pattern of child care use is different for low-income families than for those with higher incomes (Laughlin 2013; Adams, Tout and Zaslow 2007). Children in lower-income families are more often in parental and relative care and less often in center-based care (Capizzano and Adams 2003; Burstein and Layzer 2007; Adams, Tout and Zaslow 2007; Laughlin 2013). Joesch and Hiedemann (2002) find that demand for non-relative care falls as income rises up to a threshold, beyond which hours of non-relative care rise with income. Knowing and trusting the provider is important to many low-income parents (Sandstrom and Chaudry 2012; Lowe and Weisner 2004). There is also evidence that low-income parents choose arrangements based on practical concerns, such as location, hours, and cost (Peyton et al. 2001; Kim and Fram 2009; Sandstrom and Chaudry 2012). Parents' choices, particularly in low-income neighborhoods, are also influenced by the care options that are available (Fuller et al. 2002). However, research has shown that the availability of a government subsidy to help pay for child care increased the affordability of certain types of care for low-income families (Collins, Layzer, and Kreader 2007). Specifically, parents using child care subsidies were more likely to use center-based care (Tekin 2005; Weinraub et al. 2005; Burstein and Layzer 2007; Wolfe and Scrivner 2004). Most of these studies examine the type of care used at a single point in time, providing limited information on the stability of the care arrangements.

Child care instability

Estimates of child care instability depend on the definition of a change and the data source. Using national data, Blau and Robins (1998) found that among employed mothers, 21% of those using unpaid care switched to paid care, and 21% switched from paid to unpaid care over a one-

year period. Finer distinctions in care types showed higher rates of turnover (Blau and Robins 1998). Tran and Weinraub (2006) reported that nearly 40% of infants in a national study changed child care arrangements at least once during the first 15 months of life. Miller (2005) found that more than half of low-income children changed arrangements at least once in two years. Overall, the evidence indicates that most children experience multiple nonparental child care arrangements before entering kindergarten.

While most studies focus on the current child care arrangements, analysis of changes in child care arrangements can help illuminate whether these represent positive changes or negative instability. Blau and Robins (1998) found that the transitions between different child care types were related to the age of the youngest child in the household and the availability of other adults in the household, especially the child's maternal grandmother. They also conclude that child care changes were correlated with changes in maternal employment, and while turnover among providers of child care was high, this had only a small effect on changing type of child care (Blau and Robins 1998).

The factors driving a change in child care arrangement may differ from those that were most important for the original decision. Grace and O'Cass (2003) found that switching child care centers was typically not related to factors that were easily observed beforehand such as price, location and hours. Parents who switched centers identified failure to provide an age-appropriate environment with adequate, competent, and caring staff as the main driver of child care changes in an Australian study (Grace and O'Cass 2001). In Chaudry's (2004) ethnographic study of 42 low-income working mothers in New York City, many of the care changes were related to the quality of care or preference for a provider, as well as to changes in family composition, housing and employment. Changes in the availability of a provider can also cause

disruptions in care arrangements. A survey of Minnesota families found that 12% of arrangements ended because the provider closed or stopped providing care (Chase and Valorose 2010).

Some studies have noted high turnover in child care arrangements among low-income children receiving child care subsidies. In Oregon, half of child care arrangements paid by subsidy lasted less than three months, and within a year, 70% of children had at least one change in their primary child care provider (Weber 2005). In Wisconsin, Ha, Magnuson and Ybarra (2012) estimate that children had nearly three subsidized providers on average over their time on subsidy from under age 3 to age 5. They also found a positive relationship between number of subsidy spells and number of subsidized providers. Changes in child care arrangements for families using subsidies may be related to short spells of subsidy use or to program requirements and procedures (Adams and Rohacek 2010; Chaudry 2004; Lowe and Weisner 2004; Meyers et al. 2002; Weber 2005).

The few existing studies of child care changes mostly rely on retrospective reports from parents of changes in arrangements. An important exception is Lowe, Weisner, and Geis (2003), who collected detailed contextual information on child care changes for a small group of families in the New Hope project through repeated home visits. Hynes and Habasevich-Brooks (2008) used longitudinal data to track changes in the quality of child care arrangements over time. Weber (2005) and Ha, Magnuson, and Ybarra (2012) analyzed longitudinal administrative data to measure instability in arrangements, but only while children were in the child care subsidy program. This study builds on this literature by using data from a longitudinal survey of low-income parents and compares the primary child care arrangement reported for the focal child across survey waves. This approach is likely to be more reliable than retrospective reporting and

includes both subsidized and unsubsidized arrangements. This study therefore contributes higher quality data on child care changes for low income families, as well as examining the important but under-researched predictors of changes in child care arrangements.

Conceptual framework and econometric model

We utilize panel survey data in order to model the probability of changing child care between two waves of data collection. The conceptual framework underlying our approach is a discrete choice model of the parent's child care change decision. In a simplified form, the standard consumer choice model posits that the parent selects a child care arrangement to maximize her utility subject to budget and time constraints. A change in arrangement occurs when at the time the parent reevaluates, there is an option with greater utility than the current one.

Why might the current arrangement no longer be the preferred option? In some cases, the care needs of the child may change. In other cases, family circumstances, such as work schedule, income, or place of residence may have changed. The provider may close her child care business. Changes in child care costs may cause the parent to reevaluate. Finally, the parent may become more informed over time about the quality of the care arrangement, and may reassess care options based on the new information. To capture these dynamics, the models include changes in explanatory variables between the previous and subsequent waves along with time invariant and previous period characteristics. Using panel data also helps account for potential endogeneity in the explanatory variables.

The basic empirical model can be written:

$$\Delta CC_{it+1} = f(\boldsymbol{X}_i, \boldsymbol{Z}_{it}, \Delta \boldsymbol{W}_{it+1}) \quad (1)$$

where ΔCC_{it+1} is the outcome, an indicator for whether child *i* was in a different child care

arrangement at time t+1 than time t. The vector $\boldsymbol{X}_i$ is composed of time-invariant child and family characteristics. The vector $\boldsymbol{Z}_{it}$ includes previous period time-varying child, family, and care setting characteristics, such as the type of care during the previous period. The vector $\boldsymbol{\Delta W}_{it+1}$ denotes changes that occurred between survey waves, such as the addition of a new baby to the family. We estimate this empirical model using a probit, which is commonly used to analyze the probability of a discrete event such as change in child care. Since we have detailed data on arrangements over time, we examined four different outcomes: 1) changes between types of nonparental care (e.g., center, family child care provider, or family, friend and neighbor care), 2) changes in specific nonparental provider, 3) changes from nonparental care to parental care only (i.e., exits from nonparental care), and 4) changes from parental care only to nonparental care. We expect different factors to be related to changes into and out of nonparental care, as well as between types of nonparental care and specific providers, thus requiring estimation of separate models.

Data, subsamples and definitions of variables

The data were obtained from a multi-year longitudinal parent survey conducted as part of the Minnesota Child Care Choices study[1] (Tout et al. 2011). The 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 cash assistance or child care subsidy programs. The sample was restricted to parents living in one of seven participating counties at the time of the baseline survey. For each family, one child under age six was randomly designated to be the focal child; detailed information was collected about the child care arrangements used for this

[1] The Minnesota Child Care Choices study was conducted by Child Trends, the University of Minnesota and Wilder Research with funding from the Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.

child at each wave. The survey respondent was the person with the most knowledge of the focal child's care arrangements, usually the mother.[2] The survey asked detailed questions about parents' child care preferences, parents' perceptions of the quality of their child care, and family and child characteristics. We use data from the first three waves of the survey, which were conducted in 2010 and 2011, with about six months between waves. The baseline sample included 323 families, out of which 250 (77.4%) also completed the wave 2 survey and most of these (210) also completed the wave 3 survey. Thus, there are 250 children for whom we can track their child care arrangements across at least two survey waves.

Subsamples

Because we are looking at four specific types of changes, we define subsamples for each model to include only children who could potentially experience the specific type of change being examined. If a child is in nonparental care for two waves in a row, that child is included in the subsample used in the analysis of changes between nonparental types (Model 1) and also in the model for specific nonparental provider changes (Model 2). In order to model the probability of changes from nonparental care to parental care only (Model 3), we included any child observed in nonparental care in at least one wave and then observed in a subsequent wave either still in nonparental care or having changed to parental care. Thus the Model 3 subsample includes all the children in the subsample for Models 1 and 2, plus children who started in nonparental care and moved to parental care in the subsequent wave. Finally, for Model 4, which examined the probability of changing from parental care only to nonparental care, the subsample included any child observed in parental care during one wave and then observed during the subsequent wave

[2] Because less than 10% of respondents were male, for simplicity of language we use the female pronoun to refer to the respondent.

either still in parental care only or having changed to nonparental care. Children with responses for all three survey waves had two observations (i.e., the potential for two changes). For example, suppose a child was observed in nonparental care in wave 1, parental care in wave 2, and still in parental care in wave 3. This child would be included in Model 4 as an observation that could experience a change from parental to nonparental care (based on waves 2 & 3). This child would also be included in the subsample for Model 3, as an observation that could experience a change from nonparental to parental care (based on waves 1 & 2). If a child had two observations that met the criteria for one of the subsamples (e.g., the child was in nonparental care in all three waves), then one observation for the child was randomly sampled to avoid potential within-child correlation between observations.

We categorize care arrangements into four types: (i) centers, (ii) family child care (FCC), (iii) family, friend or neighbor care (FFN), and (iv) parent care (no regular nonparental arrangement). We defined centers as child care centers, before and after school programs, nursery schools, preschools, pre-kindergarten programs, or Head Start programs. In the literature, the distinction between family child care (FCC) and family/friend/neighbor care (FFN) is sometimes based on whether the family child care provider is licensed or registered with the relevant state agency. Parents are often unable to report accurately on the license status of the provider, so we chose not to rely on that information. Instead, we categorize providers as FCC or FFN based on a set of questions about the setting and provider. All care in the child's home and care by relatives was classified as FFN. Otherwise, the parent was asked if the provider was a professional babysitter or nanny, if caregiving was the provider's primary job, and whether the provider cared for children not related to the respondent or the provider. If the parent answered

yes to these questions, the provider was classified as FCC. Otherwise, the provider was considered family, friend or neighbor (FFN) care.

Covariates

A rich variety of child, respondent and family variables were used in the models to predict changes in child care arrangements. The explanatory variables are the same across all models, with the exception of the model for changes from parental to nonparental care. For those using parental care, the variables for previous type of nonparental care, child care experience, and child care subsidies are not relevant. Demographic characteristics included the race/ethnicity and age of the focal child. Three categories of race and ethnicity were used: white, non-Hispanic; Hispanic; and non-white, non-Hispanic. 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 infants (0-15 months), toddlers (16-32 months), preschool (32-79 months, not yet in school) and school age (in school or 80 months or older). We expect to see changes from parental to nonparental care as children reach preschool and prekindergarten age. We tested including child gender, but it was not statistically significant in any of the models.

Other key predictors of changes include the type of care in the previous period and whether the focal child's care was subsidized. Receipt of a child care subsidy was coded as 'yes' if the parent responded that, at the time of the survey, she received help paying for the focal child's care from the child care assistance program or from a welfare or social service agency, and 'no' otherwise.[3] Current receipt of a subsidy would be endogenous with the current arrangement decision; therefore we include previous receipt to predict a change in arrangements

[3] Measures of subsidy receipt based on survey data may be inaccurate, although Johnson and Herbst (2013) found that parent reports coincide to a high degree with those of child care providers.

by the time of the next survey wave. Having a subsidy in the previous period may allow parents to access their preferred care arrangement and therefore make it less likely that parents will switch providers by the time of the next survey wave. On the other hand, disruption in subsidy receipt may lead to a disruption in a care arrangement.

Several characteristics of the parent and household were expected to be associated with changes in child care arrangements. Respondent's education was measured at the baseline and categorized as less than high school, high school graduate (a high school diploma or the equivalent), or more than high school (any education beyond a high school diploma). Parents with more years of education tend to use more center care (Huston, Chang, and Gennetian 2002; Wolfe and Scrivener 2004), so we expect that certain types of changes in care arrangements will be associated with education. We included the number of children other than the focal child age five years and under, and age six to twelve, as decisions about child care for the focal child are likely to be affected by care decisions for other children. We also included the poverty rate in the zip code area where the child lived at the time of the previous survey wave (2000 U. S. Census). This variable controls for neighborhood conditions that may affect child care availability (Fuller et al. 2002).

Parents may change care arrangements if they are unsatisfied with the child's experience in care. Because parents do not directly experience most aspects of the service themselves, there are concerns that they will have difficulty assessing the quality of the child care arrangement. Surveys that ask parents directly about their satisfaction with current child care arrangements report a very high rate of satisfaction (e.g., Chase and Valrose 2010). In our study, respondents were asked a series of questions about how frequently their child had a variety of important experiences with their child care provider. In order to identify a systematic pattern in parents'

responses we conducted a factor analysis using six items about the child's experience. From this analysis, we developed a measure of child experience with his or her caregiver during the previous period to predict subsequent changes.[4]

Changes in household composition and in the economic conditions of the household are likely to be related to changes in child care arrangements. The number of adults in the household was categorized as one adult, two adults, or three or more adults and indicator variables were included in the models for whether a household gained an adult (moved to a category with more adults), or lost an adult (moved to a category with fewer adults). The survey asked parents whether a friend or family member was available to care for the child regularly. Given the strong relationship between availability for caregiving and type of care chosen (Davis and Connelly 2005), we include indicators for whether there was a change in availability between the two survey waves.[5] 'Loss of family/friend available' means that in the previous period such a person was available, and they were not in the subsequent wave. A separate indicator variable was included for 'gain of family/friend available' to account for the opposite situation.

The literature suggests that instability in employment and child care are closely linked, so we included indicator variables for changes in employment. Respondents were categorized based on their employment status as working full time (at least 30 hours per week), part-time, or not working. A respondent was considered to have gained employment if she moved from no employment to employment, or if she moved from part-time to full-time employment. Movements out of employment or to part-time from full-time employment were coded as a separate indicator for 'loss of employment.' Another indicator of the family's financial situation

[4] The appendix provides further information on the factor analysis, including the specific questions and factor loadings.

[5] Changes in the availability of non-relative caregivers is also an issue, as a child care provider may go out of business. We are unable to include information about changes in supply due to lack of data.

is whether or not the family's income is below the federal poverty line for a family of the same size. Indicator variables were created for whether a family was below the federal poverty line in the initial period, and then above poverty in the subsequent period, or above the poverty line and moved to below it. Separate variables for moving in and out of poverty were used to allow for differential effects on child care arrangements.

To capture any volatility due to relocation, a dummy variable was used to indicate that the family changed zip codes between survey waves. We expect relocations to be associated with changes in child care arrangements as parents tend to seek child care close to home (Chase and Valrose 2010). We also included an indicator for whether there was a new baby in the household. Caring for a new infant is expected to influence the child care arrangements for the older sibling.

Description of the study samples

Table 1 provides descriptive statistics for each of the three subsamples. Recall that the observations in each subsample include the children 'at risk' for the particular type of change being modeled. Most of the descriptive statistics are similar across the subsamples. Between one-third and 40% of respondents in the subsamples had exactly a high school education, with more having education beyond high school among those using nonparental care. The children in the study samples were majority non-white, non-Hispanic. The child's age distribution varied somewhat by subsample, with infants more frequently observed in parental care. Around 40% of those in nonparental care were in a center in the previous period, around 15% were in FCCs, and 45% were in FFN care. Of children in nonparental care, a majority (59-64%) were receiving a child care subsidy in each of the subsamples.

Children experienced a number of changes in their family's circumstances in the six months from the previous survey wave to the subsequent wave. Around 10% moved above the

poverty line, and around 10% moved below, consistent with research indicating poverty durations are generally short (Rank and Hirschl 2001). About 10% of the families experienced a change in the availability of friends and family available to provide child care, although 22% of those in parental care in the previous wave gained availability. Roughly 10% of the households experienced an increase and 10% had a decrease in the adults in the household, with the exception of those using parental care, where twice as many (24%) experienced a decrease in the number of adults. Notably, decreases in employment status were less frequent (around 10%) than increases in employment (20% to 36% across the samples). Only around 5% of households added a new baby between the two periods. About 20% moved zip codes, which may be an underestimate of the number of residential relocations but is similar to a recent national estimate for low-income families (Ihrke, Faber and Koerber 2011).

[Table 1 near here]

Results

Changes in child care arrangements

Table 2 shows the frequencies of the different types of primary care arrangements in each survey wave, using data from the full sample. Most of the children had at least one nonparental care arrangement. In Wave 1, when the focal children were younger, the most popular type of care was family, friend and neighbor (FFN) caregivers (44.6%), followed by centers (31.3%) About the same percentage of focal children were in parental care only (12.4%) as were in family child care (FCC) settings (11.8%) in the first survey wave. This rate of parental care is low, but

consistent with findings for other low-income families (Ehrle, Adams and Tout 2001). As the focal child ages, the use of center care increased steadily, to 37.6% in Wave 2 and 45.2% in Wave 3. The use of FFN care correspondingly decreased in each of the later two waves. FCC care declined very slightly, to 9.7% by Wave 3, while parental care only (those with no nonparental care arrangement) first increased in Wave 2 and then decreased in Wave 3.

[Table 2 near here]

Table 3 presents the transition matrix showing the percentage of children in each type of care in the first wave broken out into the type of care in the second wave, and a similar matrix for Wave 2 to Wave 3. The diagonal terms in Table 3 show continuity of type of care, while off-diagonals show changes. There was a high degree of persistence in type of care for centers and family child care, with approximately 70% of children in centers and in FCC remaining in those types of care between waves. In contrast, the children in FFN care moved into other types at a higher rate. The majority of children observed initially in parental care only began a nonparental care arrangement between survey waves.

Despite the relative stability of certain types of care, many children experienced changes in specific primary care provider. Over half of children changed primary provider between waves, with 56.4% changing between Wave 1 and Wave 2, and 52.2% changing between Wave 2 and Wave 3. If we look only at children in nonparental care, 48.9% changed to a new primary (nonparental) provider between Waves 1 and 2, and 43.8% did so between Waves 2 and 3. Thus, roughly half of children experienced a change in primary provider in the six months between

survey waves. In the next section we describe the models estimating the factors associated with these different types of care changes.

[Table 3 near here]

Binary probit models of changes in arrangements

Table 4 presents the estimated marginal effects of the predictors on the probability of a particular change in child care arrangement for each of the four models. Here we define a marginal effect as the percentage-point change in the probability of a change in child care arrangement when there is a one-unit change in a continuous variable, or a change from the reference value for binary or categorical variables.

Model 1: For children in nonparental care arrangements, what predicts a change in the type of care?

Over one quarter (28%) of children who were in nonparental care in two successive waves changed type of provider. These changes were significantly related to the age of the child, child ethnicity, previous subsidy receipt, and previous type of nonparental care (as shown in Table 4, Model 1). The focal child was significantly less likely to experience a change in the type of nonparental care if he or she was an infant in the previous survey wave (-16.9 percentage points), or received a child care subsidy in the previous period (-13.5 percentage points). The focal child was significantly more likely to experience a change in the type of nonparental care if he or she was non-white, non-Hispanic (+12.4 percentage points), was in family child care (FCC) during the previous period (+24.6 percentage points compared to those in centers), or was living in a zip

code area with a higher poverty rate during the previous period (+1.2 percentage points per percentage point increase in the poverty rate).

As expected, a loss of family and friend availability was associated with a significantly higher probability of changing type of care (+26.1 percentage points). Interestingly, although it is not significant, gaining friend and family availability led to a higher probability of changing care, suggesting that changes in care options lead to changes in type of care, regardless of the direction of change in availability.

Model 2: For children in nonparental care, what predicts a change in specific provider?

Model 2 in Table 4 presents the model for changes in the specific primary provider. Among children in nonparental care arrangements in successive waves, nearly half (47%) changed primary provider in the six months between survey waves (Table 1). A significant increase in the probability of changing primary provider was associated with being Hispanic (+30.2 percentage points), or non-white, non-Hispanic (+15.6 percentage points), relative to white, non-Hispanic children. If a child was in FFN care previously, there was an increase in the probability of changing provider relative to those in centers (+21.1 percentage points). At the same time, either a gain or a loss of family/friend availability significantly predicted a change of primary provider (around +25 percentage points). Gaining adults in the household was associated with a significant decrease in the probability of changing provider (-20.6 percentage points).

A key variable of interest is the 'child experience factor,' which captures the parent's perception of the child's experience in the care setting. The value of this factor for the initial care setting was significantly associated with changing providers by the next survey wave. A more positive experience with the provider in the previous period (a higher value of the factor) was associated with a statistically significant lower probability of making a switch to a new primary

provider. A one unit increase in the factor is slightly more than a one standard deviation change, and predicts a 10.1 percentage point lower probability of leaving the provider. Conversely, lower values of the child experience factor mean a significantly higher probability of changing providers. This result indicates that despite the many constraints low-income parents face, they do make care changes based on their perceptions of the quality of their child's experience with the provider.

Model 3: For children in nonparental care, what predicts dropping out of nonparental child care?

Among children in nonparental care, 17% of children dropped out of all nonparental care arrangements. As shown in Model 3 of Table 4, Hispanic children were significantly more likely to exit nonparental care than white children (+18.7 percentage points). The focal child had a significantly lower probability of having completely exited nonparental care if he or she received a child care subsidy during the previous period (-17.4 percentage points) or had a parent with more than a high school education (-13.3 percentage points relative to parents with less than high school education).

The number of children in the family was associated with changes from nonparental to parental care. Each additional child five and under, and each additional child six to twelve years of age, as measured in the previous period, was associated with an increase in the probability (around +7 percentage points) of leaving nonparental care. Adding a new baby in the family also significantly increased the probability (+23.9 percentage points) that the focal child moved from nonparental care to parental care only. If the respondent no longer had a friend or family member available to care for the focal child, the probability of leaving nonparental care was higher (marginal effect +12.7 percentage points, coefficient significant at the 10% level). Decreases in

employment were associated with a higher probability (+19.2 percentage points) of a child switching out of nonparental care and back to parental care only.

Model 4: For children in parental care, what predicts a switch to nonparental care?

Even though there were relatively few children in parental care (N=50), we still are able to identify factors with strong statistical significance in predicting a change to nonparental care. As Model 4 of Table 4 shows, the probability of leaving parental care for nonparental care for a Hispanic child was significantly lower (-81.1 percentage points) than for white, non-Hispanic children. If the parent had more than a high school education, the focal child was significantly more likely to begin using nonparental care compared to children whose parents had no high school degree (+49.5 percentage points). Higher zip code level poverty in the previous year predicted a significantly lower probability of moving to nonparental care (-1.5 percentage points per percentage point of poverty). If a family was below the federal poverty line and moved above the line in the subsequent survey, the focal child was significantly more likely (+30.1 percentage points) to have switched from parental to nonparental care. Dropping from above to below the poverty line was associated with a lower probability (-40.8 percentage points) that the focal child left parental care, compared to those with no change in family poverty status. Note that these results control for changes in employment status. An increase in the number of adults in the household also predicted a significantly higher probability (+22.3 percentage points) of leaving parental care. If a family moved (changed zip codes), the focal child was significantly more likely (+27.9 percentage points) to change from parental to nonparental care. Other variables had expected signs but were not statistically significant, which may have been a result of the small sample size.

[Table 4 near here]

Alternative specifications to determine the robustness of the results

We experimented with several alternative specifications of the model to investigate the sensitivity of the results. Additional variables were not statistically significant and their inclusion did not substantively alter our conclusions. The age of the respondent has been shown to be related to child care decisions in other studies, however, dummy variables for respondent age categories were not statistically significant in our models, and were therefore excluded. We also tried including median housing value in the models as a control for differences in child care prices (Davis and Li 2009). The estimated effect was always very close to zero and never statistically significant. Most importantly, while employment status is likely to be endogenous with child care use at a point in time, our change models assume that the unobserved time invariant characteristics of respondents that make employment endogenous have been differenced away. As a check on this assumption, we ran all the models both with and without employment changes, and there were no substantive differences in the results.

Discussion and conclusions

A number of researchers have found that a substantial proportion of young children, especially low-income children, experience changes in care arrangements (Adams and Rohacek 2010). This study confirms the previous findings. Half of the children in this low-income sample were found to have switched primary providers in six months. While nationally nearly 40% of infants changed child care arrangements at least once during the first 15 months of life (Tran and Weinraub 2006), we find higher rates of change among young low-income children. Our data

demonstrate even more frequent changes than have been previously observed in comparable low-income populations. For instance, in Miller's (2005) welfare-to-work evaluation, more than half of children changed child care arrangements at least once in two years; we found the same rate of change in six months.

Switching child care arrangements creates a disruption in the life of a young child. However, while some child care changes may be harmful to a child's development, other changes may be beneficial or neutral. Lowe, Weisner and Geis (2003) and Adams and Rohacek (2010) distinguish between changes that are predictable or intentional and those that are involuntary or unpredictable. Changes that are predictable are expected to be less problematic for child development. By studying the different factors associated with child care changes made by families, we demonstrate the importance of the drivers and context of these changes to understanding their potential impact on children. Although previous studies have asked parents the reasons why they ended a care arrangement, this study is one of few analyzing the child, family and provider characteristics associated with those changes. Our results show that having a new baby in the family increased the likelihood of exiting nonparental care (for the older sibling). This type of change is probably both predictable and intentional. Parents also were more likely to switch type of care for preschool age children than for infants. Switching to a child care center as children age likely reflects parents' desire to place children in settings that will enhance their academic skills, as these arrangements are often perceived as focused on preparation for school.

Some changes were related to demographic characteristics. We found that children whose parents had more years of education were more likely to move into nonparental care and less likely to return to parental care only. Hispanic children were significantly more likely to leave

nonparental care for parental care and less likely to leave parental care. Other research has shown that Hispanic children are more likely to be in relative care and less likely to be in center care than children in other racial/ethnic groups (Capizzano, Adams, and Ost 2006). Whether these differences are due to family preferences or the constraints these families face in terms of child care access cannot be determined from our data, but is a topic with important policy implications and worthy of further research.

A number of studies link changes in employment with child care arrangement instability, although the direction of causality is not always clear (Adams and Rohacek 2010). While some studies have found that instability of child care arrangements is associated with job loss (Hofferth and Collins 2000), others report that employment instability leads to disruptions in care arrangements more often than the reverse (Chaudry 2004; Miller 2005). In this study, a reduction in employment was associated with an increased probability of dropping out of nonparental care arrangements altogether. Surprisingly, however, gaining work between survey waves was not associated with a shift to nonparental care. Overall, we found the relationship between changes in employment and changes in nonparental provider or provider type to be weaker than we expected, as the estimated effects were not statistically significant in all but one instance.

Some of the changes in child care arrangements observed in this study were related to changes in the availability of caregivers, and may have been involuntary or unpredictable. Using family or friends for child care is predicated on having someone available and willing to provide care for the child. In some instances these changes may have been intentional or predicted; nonetheless, FFN care was associated with an increase in the probability of changing provider or type of care. Changes in household composition also predicted certain types of child care changes. Gaining adults in the household was negatively associated with changing primary

(nonparental) providers, and positively associated with entering nonparental care. Adding an adult to the household may increase household income, making nonparental care more affordable. However, we have limited information about these adults. Future research is needed to investigate the role that household composition changes play in child care decision-making.

The potential impacts of child care instability are particularly salient for children in low-income families, some of whom may receive child care subsidies. Previous studies have noted high turnover in child care arrangements among families using child care subsidies (Weber 2005; Chaudry 2004; Lowe and Weisner 2004). In this study, however, receipt of a subsidy in the previous period was associated with a reduced likelihood of switching to parental care or changing type of nonparental care. Parents using subsidies may have access to a greater variety of providers than other low-income families and may be less likely to switch care because they are more likely to be using their preferred type of care. Gordon and Högnäs (2006) found that mothers who were using their 'ideal' form of care were less likely to change child care arrangements for their infants. Similarly, Wolfe and Scrivner (2004) reported that families using a child care subsidy all year were less likely to report a desire to change providers. However, our finding that subsidy use was not associated with more instability in care arrangements may be specific to Minnesota, where the median subsidy spell length of 8 months is longer than in other states (Davis et al. 2013; Meyers et al. 2002).

One type of intentional change would be a move to higher quality care, which may have benefits that offset possible negative effects from disrupting the care arrangement (Adams and Rohacek 2010). Previous research suggests that parents overestimate the quality of the care arrangements they are using (Mocan 2007; Cryer and Burchinal 1997) and low-income parents are more likely to focus on practical issues than quality in selecting arrangements (Peyton et al.

2001; Kim and Fram 2009). However, our study confirms that of Lowe, Weisner, and Geis (2003) that parents were more likely to switch providers if they perceived the child's experience in the previous period to be of lower quality. Contrary to concerns that parents are ill-informed and cannot advocate for quality (Cryer, Tietze and Wessels 2002), we find that even with the constraints faced by this low-income population, parents recognize and prioritize the quality of their children's care arrangements.

This study has several limitations that might be addressed by further research. The data were from families who had applied to receive financial assistance through Minnesota's welfare or child care subsidy programs. Due to the sampling approach, the results may not be representative of all low-income families. Families receiving assistance through TANF or child care assistance may face work requirements and thus may have different child care needs and constraints. Differences in policies and local characteristics of the child care market across states may make it difficult to generalize these findings unless one considers the local context. We also had limited information on provider-initiated reasons for ending a care arrangement (such as leaving the business). Finally, causality – which change occurred first and whether one led to the other directly – cannot always be determined without additional information since parents simultaneously reported the primary care arrangement for the focal child at each survey date and changes in employment and family composition.

Additional research on the frequency and causes of changes in child care arrangements will increase understanding of parents' decisions about child care and the constraints and challenges they face. Qualitative research on families' reasons for making changes would complement this quantitative analysis. To a large extent, the concern over instability in child care arrangements arises from the potential impact of multiple disruptions, especially those that are

unpredictable and unintentional (Lowe, Weisner, and Geis 2003; Adams and Rohacek 2010). The data used in this study capture changes every six months and may undercount the total number of care changes experienced by a child if additional changes occur between survey waves. Some low-income families reported different care arrangements for the focal child in every survey wave. In addition, child care changes frequently occur in a context of other family disruptions, including changes in housing, parental employment, and family structure. The cumulative impact of these changes on children – not just the disruption of caregiving relationships – is a concern, particularly for low-income children (Adams and Rohacek 2010). Further study of the causes of child care instability in the context of the lives of children in low-income families will help us understand the potential impacts on children's social and cognitive development.

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Appendix: Factor analysis of child's experience with provider

Factor analysis is a statistical method for parsimoniously combining related information from a number of variables into a single (or a few) factor variables (Harman 1976). In this instance, we used factor analysis to combine respondents' answers to six questions about the focal child's experience with his or her childcare provider into a single 'child experience factor.' To assure equal weight across respondents, and to provide greater variation in the age of the focal child, we selected at random one observation per respondent across the survey waves.

The survey questions used in the factor analysis were intended to provide information about respondents' perceptions of their child's experience with their current childcare provider. Respondents were asked about the frequency of six items that may characterize the child's childcare experience. Respondents were asked the following questions: How often would you say:

(1) My child gets a lot of positive, individual attention.

(2) My child likes the caregiver or provider.

(3) There are lots of creative activities such as art, music, dance, and drama.

(4) The caregiver provides activities that are right for my child and fit my child's needs.

(5) My child is learning new things and new skills.

(6) My child gets a chance to run around and play outside.

Parents rated the frequency of these activities as never, rarely, sometimes, usually, or always, as summarized in Table A1.[6] Half or more of parents indicated that each activity

[6] Refused and don't know were coded as missing, and observations with those values were excluded from the factor analysis and multivariate models. These questions were not asked for children in parental

occurred always. Given the high correlation among the responses, we conducted a factor analysis to model the underlying latent variables that would reflect the variation in the data.

[Table A1 near here]

The first step in using the factor analysis is to examine the eigenvalues. The eigenvalue associated with a factor represents the amount of the variance of the variables explained by that factor (Kim and Mueller 1978). One factor, which we call the child experience factor, had an eigenvalue of 1.78. All other factors had eigenvalues less than one. Factors with eigenvalues less than one are not considered reliable (Kaiser 1960).

In the second step, we examined the relationship between the child experience factor and its underlying variables. The scoring coefficients, shown in Table A2, tell us how the factor is obtained as a weighted sum of standardized versions of the underlying variables, with the scoring coefficients being the weights placed on each variable. Factor loadings are the correlation coefficients between a variable and the factor, therefore higher factor loadings indicate a variable is more closely related to the factor. Uniqueness is the percent of variance in a given variable not explained by the child experience factor. A higher uniqueness means little of the variance is explained by our child experience factor; a lower uniqueness means that more of the variance is explained.

Table A2 presents the relationship between the child experience factor and its underlying variables. It can be seen that the dimensions of child experience that were weighted most heavily were learning new skills and appropriate activities. That the child likes the caregiver and has

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care. In Wave 2 this question was not asked of individuals who had not changed providers, so Wave 1 values were used.

creative activities received a moderate weight. That the child received a lot of attention had a smaller weight, and playing outside received the least weight. While the different dimensions of child experience varied in terms of their factor loadings, all were clearly contributing related information about a child's experience and therefore all were retained.

[Table A2 near here]

Figure A1 shows the distribution of the child experience factor among the random subsample that was used to create it. As both the distribution of the underlying variables (Table A1) and the distribution of the child experience factor show, child experiences are highly concentrated among higher values. Respondents generally describe these positive child experiences as always occurring. The child experience factor therefore identifies the common thread of a child's experience across these different dimensions.

[Figure A1 near here]

Table 1: Descriptive statistics for the subsamples

	Sample for Models 1 & 2: Children in nonparental care in two consecutive survey waves	Sample for Model 3: Children in nonparental care	Sample for Model 4: Children in parental care
Respondent Education (%)			
Less than High School	21.0	22.2	30.0
High School	33.3	35.8	40.0
More than High School	45.7	42.2	30.0
Child Race/Ethnicity (%)			
White	30.1	30.2	28.0
Hispanic	8.6	10.6	16.0
Non-White, Non-Hispanic	61.3	59.2	56.0
Child Age (%)			
Infant (0-15 months)	23.7	24.3	34.0
Toddler (16-32 months)	30.1	29.8	24.0
Pre-school age (33-79 months, not yet in kindergarten)	41.4	40.9	42.0
School age (80 months or older or in kindergarten)	4.8	5.0	0.0
Child care subsidy received in initial period (%)	64.0	59.2	n.a.
Type of Child Care in Previous Period (%)			
Center	44.1	41.7	n.a.
Family Child Care (FCC)	14.5	13.3	n.a.
Family/friend/neighbor (FFN)	41.4	45.0	n.a.
Change Variables (%)			
From below poverty to above poverty	8.6	8.7	12.0
From above poverty to below poverty	8.6	9.6	12.0
Loss of family/friend availability	10.2	11.9	12.0
Gain of family/friend availability	9.7	9.2	22.0
Moved (changed zip code)	21.0	19.3	18.0
Loss of adults in household	12.9	11.9	24.0
Gain of adults in household	10.8	12.8	8.0
New baby in household	4.8	6.9	6.0
Loss of employment	11.3	13.3	6.0
Gain of employment	22.6	20.2	36.0
MEANS (Standard Deviations)			

	Sample for Models 1 & 2: Children in nonparental care in two consecutive survey waves	Sample for Model 3: Children in nonparental care	Sample for Model 4: Children in parental care
Number of additional children age 5 and under	0.41	0.43	0.68
	(0.71)	(0.73)	(0.87)
Number of additional children age 6-12	0.33	0.37	0.44
	(0.59)	(0.65)	(0.70)
Zip code level poverty rate	12.2	12.0	13.0
	(7.87)	(8.25)	(9.13)
Child experience factor	0.03	0.01	n.a
	(0.90)	(0.90)	n.a
Binary Dependent Variables			
Parental to Nonparental Changes (%)			
No			30.0
Yes			70.0
Nonparental to Parental Changes (%)			
No		82.6	
Yes		17.4	
Changed Type of Nonparental Care (%)			
No	72.0		
Yes	28.0		
Changed Nonparental Provider (%)			
No	53.2		
Yes	46.8		
N (observations)	186	218	50

Table 2. Primary type of care used by focal child, by survey wave

	Percent of observed children		
	Wave 1	**Wave 2**	**Wave 3**
Center	31.3	37.6	45.2
Family child care provider (FCC)	11.8	10.8	9.7
Family, friend or neighbor caregiver (FFN)	44.6	34.4	32.3
Parental care only	12.4	17.2	12.9
Total	100.0	100.0	100.0
N (Observations)	323	250	217

Table 3. Changes in primary type of care used by focal child across survey waves

Wave 1 to Wave 2	***Diagonal terms show no change in type of care*** ***Off-diagonal terms indicate a change in type of care*** **Percent of observed children**				
			Wave 2		
	Center	FCC	FFN	Parental	Total
Wave 1					
Center	**70.0**	0.0	17.5	12.5	100
FCC	10.3	**69.0**	17.2	3.4	100
FFN	22.9	6.4	**53.2**	17.4	100
Parental	31.3	0.0	28.1	**40.6**	100
Wave 2 to Wave 3					
			Wave 3		
	Center	FCC	FFN	Parental	Total
Wave 2					
Center	**75.0**	0.0	17.9	7.1	100
FCC	13.0	**69.6**	13.0	4.3	100
FFN	27.5	2.9	**56.5**	13.0	100
Parental	30.3	9.1	30.3	**30.3**	100
Observations: N=250 observed in both Wave 1 & 2, N=209 observed in both Wave 2 & Wave 3					

Table 4. Estimated marginal effects (and standard errors) for binary probit models

Relevant subsample of observations	Children in nonparental care in two consecutive survey waves		Children in nonparental care	Children in parental care
Dependent Variable =1 if a change in child care arrangement occurred between survey waves	Model 1: Probability of change in type of care	Model 2: Probability of change in nonparental provider	Model 3: Probability of change to parental only	Model 4: Probability of change to nonparental care
Baseline/Invariant				
Child				
Child Race (White, non-Hispanic omitted)				
Hispanic	0.030	0.302**	0.187**	-0.811***
	(0.108)	(0.136)	(0.094)	(0.065)
Non-White Non-Hispanic	0.124*	0.156*	0.013	-0.210*
	(0.070)	(0.083)	(0.054)	(0.112)
Child Age (Preschooler Omitted)				
Infant	-0.169**	-0.131	0.072	-0.035
	(0.079)	(0.093)	(0.062)	(0.162)
Toddler	-0.087	-0.105	0.051	0.007
	(0.079)	(0.085)	(0.058)	(0.130)
School Age	0.111	0.179	0.037	
	(0.178)	(0.159)	(0.108)	
Child Experience Factor	-0.004	-0.101**	-0.029	
	(0.031)	(0.042)	(0.025)	
Child Previous Type of Care (Center Omitted)				
Previous FCC	0.246**	0.077	-0.114*	
	(0.109)	(0.112)	(0.068)	
Previous FFN	0.050	0.211**	-0.012	
	(0.078)	(0.090)	(0.067)	
Previous child care subsidy receipt	-0.135*	0.012	-0.174***	
	(0.078)	(0.085)	(0.061)	
Respondent				
Respondent Education (Less than High School Omitted)				
Respondent has a high school degree	0.009	0.014	-0.025	0.321**
	(0.092)	(0.100)	(0.073)	(0.134)
Respondent has more than a high school degree	-0.069	-0.042	-0.133**	0.495***
	(0.086)	(0.097)	(0.064)	(0.138)
Household				
Additional children age 5 and under	0.026	0.034	0.067**	0.120
	(0.046)	(0.050)	(0.031)	(0.091)
Additional children age 6-12	0.035	-0.039	0.073*	0.111
	(0.060)	(0.065)	(0.040)	(0.087)
Zip code level poverty in base year	0.012***	0.001	-0.002	-0.015**
	(0.004)	(0.005)	(0.003)	(0.008)

Relevant subsample of observations	Children in nonparental care in two consecutive survey waves		Children in nonparental care	Children in parental care
Dependent Variable =1 if a change in child care arrangement occurred between survey waves	Model 1: Probability of change in type of care	Model 2: Probability of change in nonparental provider	Model 3: Probability of change to parental only	Model 4: Probability of change to nonparental care
Changes				
Respondent				
Respondent Employment Changes (No Change Omitted)				
Lost work	0.144	0.082	0.192**	-0.151
	(0.109)	(0.109)	(0.089)	(0.309)
Gained Work	-0.025	0.019	-0.048	-0.202
	(0.075)	(0.085)	(0.055)	(0.161)
Household				
Changes in Poverty (No Change Omitted)				
From Below FPL to Above	-0.065	-0.016	-0.074	0.301***
	(0.100)	(0.124)	(0.058)	(0.051)
From Above FPL to Below	-0.084	0.070	0.119	-0.408***
	(0.097)	(0.125)	(0.102)	(0.133)
Changes in friend/family availability (No Change Omitted)				
Lost friend/family availability	0.261**	0.268**	0.127	0.135
	(0.114)	(0.114)	(0.084)	(0.168)
Gained friend/family availability	0.123	0.247**	-0.069	0.230*
	(0.118)	(0.107)	(0.064)	(0.124)
Moved	-0.059	0.113	-0.082	0.279***
	(0.074)	(0.090)	(0.054)	(0.071)
Changes in Adults (No Change Omitted)				
Lost adults in household	0.171	0.147	-0.062	-0.176
	(0.106)	(0.109)	(0.059)	(0.176)
Gained adults in household	0.067	-0.206**	0.118	0.223***
	(0.110)	(0.100)	(0.089)	(0.070)
New baby in household	0.078	0.255*	0.239**	-0.024
	(0.152)	(0.140)	(0.114)	(0.219)
N (Observations)	186	186	218	50

*p<0.10 **p<0.05 ***p<.001

Standard errors in parentheses

NOTE: All marginal effects calculated at observed values, and the reported marginal effects are the average of estimated individual marginal effects. For binary variables, marginal effects are calculated as a change from 0 to 1. For categorical variables, marginal effects are calculated as a change from the base category. In Model 4, the five school age observations all switched to nonparental care (perfectly predicted switching) and so were dropped from the model.

Table A1. Underlying distribution of child experience variables

	Never	Rarely	Sometimes	Usually	Always
Attention received	2	2	20	64	203
Likes caregiver	1	1	8	23	258
Creative activities	11	7	57	47	169
Appropriate activities	1	3	20	38	229
Learning new skills	3	2	36	40	210
Play outside	17	19	53	58	144

N=291

Table A2. Scoring coefficients, factor loadings, and uniqueness of child experience factor

Variable	Scoring Coefficient	Factor Loading	Uniqueness
Attention received	0.155	0.421	0.823
Likes caregiver	0.213	0.525	0.725
Creative activities	0.216	0.577	0.667
Appropriate activities	0.303	0.687	0.529
Learning new skills	0.302	0.680	0.538
Play outside	0.076	0.258	0.933

Figure A1. Distribution of child experience factor