

Costs of Work: Effects of Parental Work Scheduling on Childcare Arrangements

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Acknowledgements

I would like to acknowledge the feedback provided on various iterations of this paper by Sandra Smith, Jennifer Johnson-Hanks, David Harding, Daniel Schneider, Lisa Gennetian, and Elayne Oliphant. I would like to thank Rupa Datta (NORC) for facilitating access to NSECE data. This research was conducted with support from grant 90YE0183 from the Office of Planning, Research, and Evaluation (Administration for Children and Families, U.S. Department of Health and Human Services).

Abstract

This study analyzes relationships between parental working schedules and a range of childcare outcomes for young children in low-income single-mother and two-partner households. The 2012 National Survey of Early Care and Education (NSECE) is used to develop work schedule typologies and evaluate the effects of work scheduling on a broad set of childcare outcomes: use of center-based, home-based, and relative care; complexity and continuity of childcare arrangements; and receipt of subsidized care. Nonstandard schedules are strongly associated with increases in childcare complexity, decreases in continuity, and shape the sorts of care that children receive in single-mother households but much less so in two-partner households. In two-partner households the largest effects are in households in which both partners work a standard schedule. Findings point to the cumulative disadvantage that accrues to the children of single mothers, especially those working nonstandard and nontraditional shifts.

Word Count:

Main Body: 8,800

Main Body and References: 9,950

Key Words: Family; Low-Income Families; Early Childhood; Work Hours; Time Use; Child Care Arrangements

Introduction

Working conditions matter for families as well as for workers themselves. Over the last several decades, as labor protections have weakened and working conditions have deteriorated by a number of standards – including in terms of safety, compensation, and scheduling – researchers have explored how aspects of work may affect those to whom employees are connected. Particular attention has been paid to the consequences of evening- and night-shift schedules – referred to here as nonstandard schedules – for workers’ children. Nonstandard scheduling has been linked to cognitive and behavioral problems among young children (Han 2004; Joshi and Bogen 2007) and a range of behavioral and relationship problems among adolescents (Davis, Crouter, and McHale 2006; Dunifon, Kalil, and Bajracharya 2005; Han 2005, 2006, 2008; Han, Miller, and Waldfogel 2010; Strazdins et al. 2006, 2004). One of the mechanisms presumed to underlie these effects is that workers with such schedules tend to employ childcare arrangements that are less stimulating and developmentally productive (Han 2004; Kimmel and Powell 2006; Loeb et al. 2004).

This line of research provides an entry point for understanding the effects of nonstandard work schedules on childcare outcomes, but there are a number of questions that remain either unasked or unanswered. First, this literature has been primarily concerned with questions of what types of care – center-based care, informal or semi-formal home-based care, or relative care – parents choose. The literature on childcare and children’s development, however, suggests a set of other outcomes deserving attention, including those related to childcare stability and the use of childcare subsidies. Second, most of the research on childcare choice deals with work schedules of only one parent, typically the mother, ignoring the potentially exacerbating or mediating effects of the other parent’s schedule (if they are present in the household). Third, research to

date has relied almost exclusively on traditional shift definitions and has failed to explore the emergence and effects of new working schedules.

In this paper, I employ the 2012 National Survey of Early Care and Education (NSECE) to investigate the effects of parental work scheduling on a set of childcare outcomes. Analyzing single-mother and two-partner households separately, I show how work schedules affect the use of home-based, relative, and center-based care; childcare complexity; childcare continuity; and the use of subsidized childcare. In both single-mother and two-partner households I rely on working schedules derived from the scheduling data rather than impose increasingly ill-suited traditional definitions. In two-partner households I take the work schedules of both partners into account; this is the first paper to consider the effects of two-partner scheduling on childcare outcomes. It is also the first to explore these questions in the wake of the Great Recession; nearly all previous analyses of this topic rests on data collected in the 1990s.

This paper contributes to the literatures on work, family, and childcare choice. The central theme, however, is inequality. Younger, less-educated, and low-income workers are increasingly forced into jobs in which they are required to work nonstandard or untraditional schedules (Enchautegui 2013; Hamermesh 2002; Presser 2003). The children of these individuals already face an array of disadvantages relative to their peers in higher-income households: they receive less financial investment (Herbst 2015; Kornrich and Furstenberg 2013), parents spend less time caring for them (Guryan, Hurst, and Kearney 2008; Ramey and Ramey 2009), and the time that is spent is less targeted to developmental needs (Kalil 2015; Kalil, Ryan, and Corey 2012). My goal here is to show that the work schedules that are available to their parents can serve to *further* disadvantage them. Given strong evidence for the importance of stable and

developmentally-supportive early care and education in preparing young children for their school-age years, additional stratification at these young ages is especially pernicious.

The paper proceeds as follows. In the next section I discuss the literatures on work scheduling and on childcare in greater depth. In the third section I lay out my research questions and hypotheses. In the fourth section I discuss data and methods. I present conclusions in the fifth section and close with a discussion of the findings.

Background: The Consequences of Nonstandard Work

Nonstandard scheduling typically refers to working a majority of hours outside of the traditional “standard” day shift, often defined as 8 am to 4 pm, Monday through Friday (Presser 2003). As of 2010, roughly 28% of all American workers held some type of nonstandard schedule (Enchautegui 2013). Such schedules are not evenly distributed across the labor market. Nonstandard schedules are more common for men, less-educated workers, minorities, and those working in the service and retail sectors (Enchautegui 2013; Hamermesh 2002; Presser 2003). Workers tend to take these jobs not because they prefer nonstandard hours but because such an arrangement was a prerequisite of the job (or no better job was available) (Enchautegui, Johnson, and Gelatt 2015; Presser 2003). Nonstandard schedules were not always so unevenly distributed. Hamermesh provided compelling evidence that, between the early 1970s and the late 1990s, the burden of evening and night work shifted to those at the bottom of the income distribution (Hamermesh 2002).

A number of authors have attempted to analyze the causal effects of nonstandard schedules, especially effects on the children of workers. Research has demonstrated links between nonstandard schedules and cognitive and behavioral problems among young children (Han 2004; Joshi and Bogen 2007) and a range of behavioral and relationship problems among adolescents

(Davis et al. 2006; Han 2005, 2006, 2008; Han et al. 2010; Strazdins et al. 2006, 2004). Two mechanisms have been proposed to explain this linkage. First, nonstandard schedules have been associated with increased worker depression and stress; such factors may diminish the quality of parent-child interactions and negatively affect the child (Han 2005). Second, nonstandard schedules may lead parents to employ childcare arrangements that are less stimulating or developmentally productive. Research has demonstrated that mothers working nonstandard hours rely mostly on co-parental, relative, or family (informal) daycare for their childcare needs; those working standard shifts are more likely to use formal center-based care and less likely to rely on co-parents (Enchautegui et al. 2015; Han 2004; Kimmel and Powell 2006). Research that explicitly tests mediation by these two factors has yielded mixed results. Han (2005) finds evidence that home environment, maternal depression, and childcare quality explain nearly all of the effect of nonstandard scheduling on cognitive outcomes. Strazdins and colleagues (2006) and Joshi and Bogen (2007), by contrast, suggest a lingering direct effect of nonstandard schedules even after controlling for varying sets of factors linked to family functioning and childcare choice.

The qualitative literature lends support to the idea that parental nonstandard work will affect the types of care children receive. Center-based childcare, which many low-income mothers appear to strongly desire for their children (Chaudry 2006; Levine 2013; Mensing et al. 2000; Sandstrom and Chaudry 2012), is typically limited to standard working hours of operation; mothers with nonstandard or unstable schedules often report that this is an infeasible option for them (Chaudry 2006; Pearlmutter and Bartle 2003; Scott, London, and Hurst 2005). Center-based care is also least likely to offer flexible payment schedules which low-income mothers report relying on in many cases (Henly and Lyons 2000). From the supply side, low-income

areas are often considered poor markets for center-based care, reducing the available nearby options (Pearlmutter and Bartle 2003; Scott et al. 2005). Family members, by contrast, are often reported to be essential supports in maintaining steady employment and childcare arrangements, especially for those working nontraditional hours (Chaudry 2006; Scott et al. 2005).

The two major previous quantitative analyses of the effects of parental work scheduling on childcare – papers by Han (2004) and Kimmel and Powell (2006) – have a number of limitations. First, both rely on data collected in the early 1990s; no subsequent analyses have addressed these questions with more recent data. Second, neither address the interplay of male and female schedules in partnered households. Kimmel and Powell do not include paternal schedules in analysis, while Han treats maternal and paternal working schedules as independent from one another in analyses. Third, both offer limited generalizability. Han’s study is based on the NICHD Study of Early Child Care, which was non-representative of all households with children; low-income households – those most likely to experience nonstandard work schedules – were under-represented in the data. Kimmel and Powell’s paper, while based on the Survey of Income and Program Participation (SIPP), limited analysis to married households and thus tells us little about the experience of unmarried couples or single-mother households. Finally, fourth, both focus only on the type of care employed. That is, both papers analyze the relationship between work schedule and the likelihood of selecting a certain type of care (relative care, center-based care, informal home-based care, etc.).

This final limitation is particularly noteworthy because a growing body of literature has highlighted other mechanisms that may link characteristics of childcare arrangements – particularly childcare instability – to children’s social and behavioral problems (Sandstrom and Huerta 2013). Instability, while an under-defined concept, has typically been operationalized in

one of two ways. First, a number of authors have examined the effects of discontinuities in care (changes in care arrangements). Cryer and colleagues (2005), for instance, find that toddlers evince increased distress when moved between caregiver classrooms, while Loeb and colleagues (2004) provide evidence that children maintaining the same care arrangements over time display greater school readiness than those changing arrangements. There is additional evidence that continuity of care is positively associated with language development (Tran and Weinraub 2006) and negatively associated with externalizing behavior problems (Pilarz and Hill 2014).

Second, instability is often construed of as multiplicity of care (having more than one provider at a given time). Both Morrissey (2009) and Claessens and Chen (2013) find that children in multiple care arrangements exhibit fewer prosocial tendencies and more behavioral problems (although in both cases the latter finding applies only to certain sub-groups). Pilarz and Hill (2014) find similar effects of care multiplicity on externalizing and internalizing behavior problems. Care multiplicity appears to account for much of the observed positive association between maternal work and boy's aggressive behaviors in one study (Youngblade 2003). Tran and Weinraub's (2006) analysis of care multiplicity suggests that quality plays a mediating role: multiple low-quality providers limit development of language skills while multiple high-quality providers appear to be a net benefit.

There is reason to expect that parents working nonstandard or nontraditional shifts may be at greater risk of having children in "unstable" (discontinuous or multiple) care arrangements. A number of ethnographic and small-sample interview studies have documented the difficulties that low-income working mothers face in establishing stable, trusted childcare arrangements (Chaudry 2006; Henly and Lyons 2000; Levine 2013; Mensing et al. 2000; Sandstrom and Chaudry 2012). Both Chaudry (2006) and Scott and colleagues (2005) highlight the relationship

between nonstandard or unpredictable working schedules and complex, unstable sets of childcare arrangements. These authors also highlight the links between the two dimensions of childcare instability: more care providers – especially providers such as relatives who may not view childcare as a proper job (Henly and Lyons 2000) – may lead to greater turnover in care providers. Home-based and relative care – the care options most available to low-income families – appear especially prone to breakdown, thus requiring more frequent rearrangements of care (Chaudry 2006; Scott et al. 2005).

Quantitative evidence on the link between nonstandard parental work schedules and care instability is, however, limited. Presser (2003), working from National Survey of Families and Households (NSFH) data from the late 1980s and early 1990s, finds that households in which mothers work nonstandard (and especially weekend) shifts are more likely to employ multiple non-parental care providers. By contrast, Morrissey (2008), also working from data from the early 1990s (NICHD Survey of Early Child Care and Youth Development), finds no evidence that nonstandard maternal work schedules predict care multiplicity. These analyses of the link between parental work scheduling and childcare multiplicity both rely on data that is at least 20 years old, do not account for joint scheduling in two-partner households, and do not explore effects on continuity of care.

Questions related to the links between nonstandard work and childcare choice and stability – especially for low-income households – must take into account the U.S. childcare subsidy system. Availability and affordability of childcare was a concern of policymakers when debating the 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA). Their solution was the 1996 Child Care Development Block Grant Act (CCDBG), which mandated a significant increase in federal funding for childcare via a consolidation (and expansion) of

several extant programs under the auspices of the Child Care and Development Fund (CCDF, re-authorized in 2014). The act also allowed states to transfer a certain percentage of Temporary Assistance to Needy Families (TANF) funds to childcare programs. The states have established varying licensing standards, evaluation techniques, and enforcement practices for childcare providers, as well as varying eligibility requirements and benefit levels for residents. The program is under-utilized; among those children in households meeting Federal eligibility parameters, only 15% received subsidized care in 2012 (Chien 2015).

There is reason to believe that there are links running in both directions along all axes of the conceptual triangle defined by “work schedule,” “childcare outcomes,” and “subsidy receipt.” Working schedule, for instance, is likely to affect subsidy receipt. Rachidi (2016) finds, using data drawn from urban, unmarried mothers, that children whose mothers work nonstandard shifts are less likely to receive subsidized care. This effect may be due to lower likelihood of selecting center-based care and higher rates of relative care; ethnographic research suggests that the process of securing subsidies for relative care can be especially burdensome (Chaudry 2006; Pearlmutter and Bartle 2003). Subsidized care can potentially help to increase continuity of care, regardless of working schedule. Among parents whose children do receive subsidized care, nonstandard work shifts are not associated with differences in continuity of that care (Henly et al. 2015).

Finally, a methodological question also looms: if working schedules are increasingly divorced from traditional shift definitions, what do we miss by continuing to use those categories? Previous research suggests that many of the working schedules that would be included in the traditional “standard” category in fact begin prior to normal starting times and end either significantly earlier or later than the traditional definitions would suggest (AUTHOR n.d.). Do

these new nontraditional “off-standard” schedules allow parents to use the same sorts of care as “standard” workers, or do the children of employees with such schedules experience childcare outcomes more similar to the peers with parents who work nonstandard schedules?

Research Questions & Hypotheses

In this paper I explore the ways in which the consequences of work scheduling reverberate through the lives of employees and their families. I focus my analyses on one particular subpopulation: households with children under age five who fall below 200% of the poverty line. Households with children below school age are typically in greatest need of care, and those living at or below the poverty line represent the most vulnerable population. They may also be the population whose members are most likely to work a nontraditional schedule (Enchautegui 2013; Hamermesh 2002; Presser 2003). I analyze single-mother and two-partner households separately. Joint scheduling in two-partner households necessarily yields different work schedules than are present in single-mother households, and thus direct comparison of the two groups is untenable.

The literature outlined above suggests a number of hypotheses about the relationship between work scheduling and childcare outcomes. There appears to be a clear hierarchy in the desirability of certain types of care. Center-based care is held in high regard, care by relatives is generally considered trustworthy but can pose problems, and home-based care is least trusted (Chaudry 2006; Henly and Lyons 2000; Levine 2013; Mensing et al. 2000; Sandstrom and Chaudry 2012). Each also has its limitations. Center-based care is less available in certain places and operations are often restricted to the day shift (Chaudry 2006; Pearlmutter and Bartle 2003; Scott et al. 2005). Home-based care is more widely available, but may not be open for overnight care. Relatives, if available, can be called on even at irregular times but may be less reliable (Chaudry

2006; Henly and Lyons 2000; Scott et al. 2005). Based on this evidence and following previous analyses (Han 2004; Kimmel and Powell 2006), I anticipate that households with one or more members working a nonstandard or nontraditional schedule will make less use of center-based and home-based care and more use of relatives, who will prove the best option for covering evening and night work. Two-partner households in which both partners work a standard shift will likely make more use of all three types of care than those with a single standard schedule. While non-working households may still value non-parental care for any number of reasons – encouraging sociality, developmental benefits, etc. – I expect such households to make less use of all three types of care.

I also test the relationship between work scheduling and two dimensions of care stability. It seems plausible that children whose parents work nonstandard or nontraditional shifts will hold more complex childcare arrangements than their peers. Two-partner households in which both partners work a standard shift likely have more complex care arrangements than similar households in which only one partner works. Non-work likely reduces childcare complexity. I anticipate that households with nonstandard or nontraditional work schedules should display less continuity of care than those with standard schedules. Two-partner households in which both partners work a standard shift likely have less continuous care arrangements than similar households in which only one partner works. Non-work, however, should increase continuity of care.

Subsidies often prove hard to win and hard to put into use. I hypothesize that households in which one or both members have a nonstandard schedule will be less likely to make use of subsidies. I expect that two-partner households in which both partners work a standard shift will also be less likely to make use of subsidies than households with a single standard schedule, if

only because the former offers fewer opportunities for either partner to handle the necessary bureaucratic processes. I expect non-working households to make less use of subsidies as receipt is, in most states, linked to working a set number of hours.

Data & Methods

This paper uses data from the 2012 National Survey of Early Care and Education (NSECE), a nationally-representative study of the supply of and demand for childcare. The study was comprised of four surveys which collected data from households with children under the age of 13, center-based childcare providers, individual workers at those centers, and providers of both formal (registered, licensed) and informal (non-registered) home-based childcare. I make use of the household survey, which gathered data from 11,629 households from 755 communities across all 50 states and the District of Columbia. A large subset of these households – representing just over seven million households – meet my sample restrictions. Data were collected primarily through computer-assisted in-person interviews, though a minority were conducted via computer-assisted telephone interviewing (information on the address-based survey design and sampling can be found in Bowman et al. (2013)).

The NSECE has a number of unusual features, foremost among which are the detailed parental schedules. In most surveys that collect schedules, data are gathered either from a single specific day (as in the American Time Use Survey) or with reference to an abstract “usual” day (as in the May supplement to the Current Population Survey). They are also most often collected from a single individual and not from both members of a couple (Lesnard 2008); again, the American Time Use Survey presents an example. The NSECE, however, collects work schedule data for the respondent and their partner (if present in the household) for a full seven-day week. This

allows for an unprecedented glimpse into how families with children organize working schedules.

I employ sequence analysis and clustering methods to develop week-level typologies of parental working schedules from these data. I briefly summarize that process here; additional details can be found in AUTHOR n.d.

Schedule data are stored as person-level vectors of states where each entry in the vector refers to what the person was doing during a given 15-minute period. There are 672 entries in the course of a seven-day week, running from 12 am Monday until 11:59 pm Sunday (four 15-minute blocks per hour * 24 hours per day * 7 days per week = 672). While the NSECE allowed for four possibilities for each state (“work,” “school,” “training,” or “other”), I simplify to just two: “work” and “other” (with the latter including both “school” and “training”). I remove all vectors except those from members of heterosexual couples (because of the relatively small number of same-sex couples in the data) and from single mothers (because single-father households are likewise quite rare in the data). I then split the schedule data into two groups: individual lines from single-mother households and paired lines from two-partner households.

I split up the week-long schedules from single mothers into a series of days (each individual thus has seven 96-entry vectors). Following Lesnard (2008, 2010), I employ Dynamic Hamming Distance (DHD) matching, a variant of OM in which the cost of transitioning between states varies with time. DHD matching is well-suited to a time-varying process like employment. To establish the necessary multi-dimensional substitution matrix I rely solely on the transition rates between states at each point in time. I use the resulting dissimilarity matrix and employ the non-hierarchical Partitioning Around Medoids (PAM) algorithm to derive clusters from the data (Studer 2013). The final selection of clusters involved weighing both fit statistics and the

descriptive potential of each additional group. This is, admittedly, a somewhat subjective process, but a necessary one. Adjudicating number of clusters by fit statistics alone would frequently lead to a clearly-inadequate two-cluster solution: workers and non-workers. I attempted to select more clusters where (a) the additional cluster offered a qualitatively new pattern relative to those already selected and (b) the additional cluster did not result in significantly worse average silhouette width across all clusters. Silhouette width is a measure of the tightness and separation of clusters; it runs on the interval $[-1,1]$. Average silhouette width (ASW) allows for evaluation of overall clustering validity. The ASW of the seven-cluster solution for single-mother person-days is .762, which suggests that a strong structure has been identified (Rousseeuw 1987; Studer 2013)

I then re-configure the data into a week format; each single mother has a sequence of seven days where each day is represented by the cluster to which it has been assigned in the previous step. I run a second sequence analysis and clustering exercise, again using the PAM algorithm, across this set of person-week sequences. The end result is to categorize each single mother's week (ASW of .751). Each week-level cluster is primarily but not exclusively made up of days of the associated type; weekends are particularly likely to be non-working regardless of cluster.

Analysis and clustering of two-partner households follows a very similar pattern, but with one major change at the beginning: I combine male and female schedules to produce a single household-level schedule. This results in four possible values for each 15-minute interval: "both partners working," "female partner working," "male partner working," and "neither working." Following the same model as above, I derive a time-varying substitution matrix, output a dissimilarity matrix via DHD matching, and then derive clusters of couple-day schedules (ASW of .587). I again re-configure these into a week-level format where each couple's week is

represented as a sequence of clusters; I perform a second sequence analysis and clustering across these sequences to derive a categorization of couple-weeks (ASW of .636). For two-partner households I find that Ward's Minimum Variance Method performs better than PAM at both the day and week level.

Because this process results in a relatively large number of schedules in both single-mother and two-partner households, I combine similar schedules in order to demonstrate effects. Table 1 provides the prevalence of each of the schedules, by household type, and the groups into which they are combined.

TABLE 1 HERE

For single mothers there are seven schedule types. Within the sample of low-income households with young children, the majority (65.5%) of all single-mothers are non-workers. This should not be taken to mean that they do *no* work, only that they do relatively little. The next most common type is a standard schedule (a modal schedule of 8 am to 5 pm); 12.9% of single-mothers hold such a schedule. There are three schedule types that resemble a standard schedule, but with important differences: "Short" schedules that fall within standard hours but consist of less work; "Early" schedules which both start and end earlier in the day than standard schedules; and "Long" work days which start around 9 am and run late. These three – which I refer to interchangeably as "Off-Standard" or nontraditional schedules – make up 14.4% of the sample. Finally, there are two nonstandard type schedules – evening and night shifts – which combine for 7.2% of the sample.

In low-income two-partner households with young children, I likewise divide seven schedule types into four groups. The first group is, again, "Non-Work," which accounts for 32.4% of all two-partner households. The second group is "Dual Standard," wherein both male and female

partner work a standard day shift; this group makes up 14.0% of the sample. The third group is made up of couples where either the male or female partner works a standard schedule and the other partner does not work. I term these “Single Standard” households; they make up 49.3% of the sample. The last group – “Nonstandard” – is made up of three schedule types: male partner working a standard shift with female partner working evening or night; female partner working a standard shift with male partner working evening or night; and male partner working evening or night with female partner not working. All told, these three combine for 4.2% of the sample. Note that there is no nontraditional or “Off-Standard” group for two-partner households. Partners within these households are almost certainly working such schedules, but they do not emerge as a separate group in the sequence analysis and clustering process.

I developed six dependent variables from the NSECE which allow me to test the hypotheses laid out above. The first three outcome measures relate to the total amount of time that children spend in each of three types of childcare: center-based care, home-based care, or care provided by relatives. The NSECE determines, for each enumerated provider, what sort of care (if any) that individual or organization provides for each child in the household. This acknowledges that certain providers may offer different sorts of care for different children. I coded regular, paid care provided by an individual with no prior relationship to the household as “home-based” care. Such care could occur either in the respondent’s home – as with a nanny or babysitter – or at another location. An individual who provides regular, paid care, and who has a previous relationship with the household or an individual who provides regular, unpaid care and may or may not have a prior relationship is counted as “relative” care. Center-based care consists of care offered by Head Start, public pre-kindergartens, community-based care centers, and all other organizational care.

I output a set of variables that capture the number of hours per week every child spends in each of these types of care. If a child has more than one provider of a given type (e.g., they attend two different private childcare centers during the week), I aggregate to get the total care *by type* rather than by provider. I average across all children under age 5 in a household. On average, children under age five from low-income households spend 1.5 hours per week in home-based care, 6.2 hours in center-based care, and 7.9 hours in relative care. The distribution of all of these variables is right-skewed because of the large number of households that do not make use of the given type of care. As an example, while *all* children under age five from households under 200% of the poverty line only receive an average of 1.5 hours per week of home-based care, the average *among those who receive any care of this sort* is 30.1 hours per week.

The fourth and fifth dependent variables capture aspects of childcare instability. The fourth is childcare complexity, which is a measure of how complicated childcare arrangements are. I introduce this as an alternative to the more-common measure of care multiplicity. To derive this measure I made use of the NSECE childcare calendars. Much as with the parental schedules, respondents are asked to account for care arrangements for all children under age 13 in the household for the previous seven days. Respondents are able to designate one of a set of previously-enumerated childcare providers for each 15-minute block over that period. As with parental schedules, each child schedule consists of a vector of 672 states. Each state can take on one of 16 values (or a “missing” value); these values correspond to parental care, care by one of the previously-enumerated childcare providers (there is a maximum of 11 such providers per child in these data), unattended periods, care by a not-previously-enumerated relative, care by a non-relative provider not previously enumerated in the survey, and time spent in school. A child

who receives nothing but parental care for the course of the week simply stays in that state for the full 672-block vector. A child who has a 9-to-5, Monday-Friday nanny switches regularly between parental care and care of that provider over the course of the vector. Other children may have more providers and more variable schedules over the course of the week.

For each child-week, I calculated the turbulence of the sequence. Turbulence is based on the number of distinct subsequences that can be extracted from each sequence as well as the variance in duration of subsequences (Elzinga 2006, 2007). Unlike the somewhat-more-common Shannon entropy, this measure is sensitive to the ordering of states. The minimum value is zero and there is no fixed maximum. When averaged across all children under age five from low-income households, the distribution is bimodal. 42.5% of sample households have minimal turbulence of zero; among those with some turbulence the mean is 9.76 and the standard deviation is 4.95.

The fifth dependent variable is continuity of care. The NSECE survey includes a section devoted to the search for childcare. All questions in this section are in reference to a randomly-selected child in the household; that child may or may not be under age 5. This section includes a question that asks when the respondent most recently searched for care for the selected child. I created a variable that measures the duration, in months, between the date of interview and the date of most recent childcare search. Care that has been in place longer – that has not necessitated search for new forms of care – constitutes more continuous care.

I restrict analysis to the low-income households in which the randomly selected child was under age 5. Within these households, the average time since last search was 12.4 months and the standard deviation is 15.8 months. There is, as expected, a significant positive relationship between age of the youngest child in the household and the time since last search: households

with younger children have a shorter period; each additional year of age for the youngest child corresponds with a 1.5 month increase in this variable.

Lastly, the NSECE collects information on payment for all childcare arrangements. I mark households with children under age five as subsidy recipients if any of those children receive any care that is reportedly paid for directly or indirectly by subsidies, by a welfare agency, by a state or local agency, or by a community or religious organization. Respondents whose children use exclusively parental care are not asked these questions, so the denominator for analyses is smaller than the full sample. Still, even with this restricted sample of households in which at least one child receives some non-parental care, only 9% of households are marked as subsidy recipients. This measure almost certainly represents an under-report: especially with external support provided directly to providers, respondents may be unaware of the extent to which costs of care are underwritten. There is, however, no reason to expect this underreporting to vary systematically with work schedule, which makes for at least a reasonable proxy for subsidy receipt.

To analyze the associations between work schedules and these childcare outcomes, I make use of a number of regression methods. Because most of the dependent variables here are heavily right-skewed and/or have a large number of zero responses, basic OLS assumptions are untenable. In its place I use zero-inflated poisson (ZIP) regression models for the three measures of childcare use and childcare complexity and a negative binomial regression model for childcare continuity. Both ZIP and negative binomial regression allow for overdispersion of the dependent variable, but do so in somewhat different ways. ZIP regression consists of two models: a logistic regression predicting whether each given individual is likely to always provide a zero response and then, amongst those assumed to have some potential for non-zero response, a standard

poisson regression. Negative binomial regression is simpler, essentially adding a parameter to poisson regression that adjusts the variance independent of the mean. Because of the large number of zero responses, ZIP is the more appropriate model for the childcare use variables. For the complexity and continuity outcomes, I tested both types of models on each and chose the model that best fit the data (based on AIC). The exception here is subsidy use, which is a dummy variable most easily modeled with simple logistic regression.

Within each of these models I include a broad set of covariates; these covariates are included in both stages of the ZIP regressions. Inclusion of these variables helps to control for a number of relationships either documented or hypothesized in the literature on childcare choice and stability. These covariates are: respondent's race (disregarding sex of the respondent in two-partner households; values are "White," "Black," "Hispanic," or "Other"); age (continuous); educational attainment (values are "Less than High School," "High School Diploma/GED," "Some College," and "College Degree or More"); occupation (values are "None Recorded," "Managerial/Professional," "Technical/Support/Sales," "Administrative," "Service," and "Production"); school attendance (dummy variable indicating report of any school attendance in the schedule for the observed week); training attendance (dummy variable indicating report of any training attendance in the schedule for the observed week); natural logarithm of family income (derived from an imputed measure of total family income); observed variability in parental work schedule (dummy variable indicating whether parental work schedule switched between categories between Monday and Friday of the recorded week); number of children in the household (continuous); age of the youngest child in the household (continuous); a dummy variable indicating presence of children age five to 13 in the household; dummy variable indicating that children in the household have a relative within a 45-minute drive of home;

dummy variable indicating whether any English is spoken in the home; dummy variable indicating whether the household owns their home; and a dummy variable indicating whether the household owns their own car. In two-partner households, age, educational attainment, occupation, school attendance, and training attendance are entered for both partners.

I present two sorts of results in what follows. First, I provide results on the key predictors (parental schedule type) from each of the regression models I carried out. Second, I present marginal plots that demonstrate how each of the dependent variables is estimated to vary across parental schedule type, holding all other covariates at their mean values. These plots help to translate regression results into more tractable measures of the differences in care received depending on work schedule and across the single-mother/two-partner divide.

Results

Table 2 provides a description of the sample split by household type (single mother and two-partner). All results presented here are weighted using the provided sample weights (which adjust to make the sample nationally representative of all households with a child under age 13). Restricting to low-income households with children under age five, the sample represents 2.51 million single-mother households and 4.53 million two-partner households. The samples are, in some ways, quite similar. Each type of household includes, on average, two children. The youngest child is, on average, between two and two-and-a-half years old; roughly half of these households also include at least one child older than five years (but under age 13). Approximately 83% of these households have a relative within 45 minutes of home, and almost 60% could count on that relative to provide regular care for their child (either for free or for pay) if needed. Between 80% and 90% of these households speak at least some English at home.

On income, asset ownership, and race, however, the samples look quite different. The mean family income in single-mother households is over \$8,000 per year lower than in two-partner households. The welfare reciprocity rate is 15 percentage points higher in single-mother households, and such households are almost twice as likely as two-partner households to have an additional (non-partner) adult member present in the household. Two-partner households are substantially more likely to own both their home and a car. Respondents from two-partner households report being white and Hispanic more often and black less often than in single-mother households. The female partners in two-partner households are, on average, better educated than single mothers and somewhat less likely to work in a service occupation.

TABLE 2 HERE

I present regressions results for single-mother and two-partner households in Tables 3 and 4, respectively. In each case I report six sets of results: ZIP regression results for the three types of care and for childcare complexity; a negative binomial regression model for childcare continuity; and a logistic regression model for subsidy receipt. I present results, in log-odds format, for the main effects of the key predictor of interest: parental schedule type. The tables consist of two panels. The top panel contains the main results of interest: predictions of association between type of schedule and quantity of care, complexity, continuity, and subsidy use. The bottom panel – which is only relevant to the first four models – presents results from the first-stage ZIP models predicting likelihood of a zero response on the given dependent variable. In single-mother households I treat those with “standard” schedules as the reference category; in two-partner households the “single standard” schedule category serves as the reference.

TABLE 3 HERE

I predicted that non-workers (relative to standard workers) would make less use of all three types of care. The estimates provide clear support for this hypothesis: non-work is indeed associated with significantly less home-based care, center-based care, and relative care. In the lower panel of Table 3 we see that non-work is associated with significantly higher odds of reporting zero childcare complexity; relative to single mothers with a standard schedule, those in the non-work cluster have 8.1 times the odds of zero complexity ($e^{2.09} = 8.09$). I find no association, however, between non-work and childcare continuity or subsidy receipt.

I hypothesized that both “off-standard” and nonstandard work schedules would be associated with less home-based and center-based care, but more relative care. I find some evidence supporting these claims. Both types of schedules are associated with significantly fewer hours of home-based care. “Off-standard” schedules are marginally negatively associated with center-based care but, surprisingly, I find no evidence that children of single mothers working nonstandard schedules receive significantly less center-based care. The top-panel results on relative care are null, but in the bottom panel we see that both schedule types are significantly negatively associated with a zero response. Put another way, single mothers working a nonstandard or nontraditional schedule are significantly more likely to make use of *at least some* relative care than their counterparts working standard schedules. As we see below, this translates into a non-trivial gap in care used. As hypothesized, nonstandard schedules are associated with greater childcare complexity (no similar effect is found for nontraditional schedules). Both nontraditional and nonstandard schedules are associated with reduced continuity of childcare arrangements, but neither is significantly associated with subsidy use.

TABLE 4 HERE

As with single-mother households, I predicted that non-working two-partner households – relative to those with a single standard schedule – would make significantly less use of all forms of care, have less childcare complexity and lower odds of subsidy use, but potentially exhibit more continuity. I find limited support for these hypotheses. It appears that children in such households do receive significantly less center-based and relative care, but I find no significant results on home-based care, complexity, or continuity. Contrary to expectations, such households have *higher* odds of reporting subsidized care. Additional analyses, available upon request, suggest that this significant result cannot be accounted for by non-working parents taking part in school or training activities.

I find more support for the predictions on households with a dual standard work schedule. Children in these households are both significantly less likely to receive zero home-based care (bottom panel) and, among those plausibly receiving some home-based care, receive significantly more than their peers from single standard households (top panel). While there is no significant difference in center-based care use, they are significantly less likely to report a zero on relative care (bottom panel). There is evidence in both panels that such children have significantly more complex childcare arrangements and marginal evidence that their care is likely to be at least in part subsidized. They do not, however, appear to differ from their peers from households with a single standard schedule in terms of continuity of care.

Finally, I find only limited support for my hypotheses on two-partner households with nonstandard schedules. As predicted, children in such households receive significantly less home-based care, but there are no apparent effects on the other two types of care. They do also have marginally more complex childcare arrangements, but there is no difference in either continuity or subsidy use.

As an additional step, I produced a set of marginal plots associated with the outcomes in these two tables. These plots present the predicted amount of care used (in hours per week), the predicted complexity, the predicted continuity (months since previous search for care), and the predicted likelihood of subsidy receipt across both household and schedule type while holding all other covariates at their mean values. These plots serve to more clearly demonstrate the variation in care outcomes *within* household types and to lay out the differences *between* household types in ways that the previous tables did not allow.

FIGURE 1 HERE

In Figure 1 we get a sense of the absolute amounts of home-based, center-based, and relative care that children in these household schedule arrangements receive. A few patterns are immediately striking. First, children in single-mother households are receiving as much or more – in some cases much more – of all three of these forms of care than their counterparts in two-partner households. The sole exception, is home-based care, which is more common for children from “Dual Standard” households than for those from any other schedule type. Second, variation in care by schedule type is much smaller in two-partner households than in single-mother households. In single-mother households the difference between the schedule associated with the least and the most predicted care is six hours for center-based care and 16 for relative care; the same differences are two and five hours in two-partner households. Both points suggest a protective effect of two-partner households. Children from two-partner households receive less non-parental care and work scheduling has less dramatic effects. Third, within the single-mother sample we see quite different patterns between relative and center-based care (home-based care is rare across all schedule types; no meaningful patterns can be discerned). Relative care is increasingly common as schedules shift from non-work to standard work to off-standard work to

nonstandard work. Center-based care, by contrast, is most common for children of single mothers with standard schedules and less so among those with off-standard or nonstandard schedules. The decreased use of center-based care and the increased reliance on relatives by single-mothers working nonstandard shifts is troubling.

FIGURE 2 HERE

The results on childcare complexity in Figure 2 look, in many ways, similar to those on relative care: higher across the board in single-mother than two-partner households and, within single-mother households, higher moving left to right across the schedule types. Children in single-mother households with a nonstandard schedule have a complexity score 3.6 times greater than those in two-partner households with a single standard schedule. Children in dual-standard households have the most complex arrangements among those in two-partner situations, but even there the estimated complexity is lower than in single-mother households with the least complex arrangements (non-working single mothers).

FIGURES 3-4 HERE

Finally, in Figures 3 and 4 we see variations in childcare continuity and the likelihood of receiving subsidized care. The most notable result in Figure 4 is the low continuity predicted in single-mother households with a nonstandard schedule: their estimated time since last search was just under five months, compared to 14 months for single mothers with a standard schedule and 9.3 months for two-partner households with a nonstandard schedule. Again, this suggests that nonstandard shifts matter, but especially when the working individual does not benefit from the protective effects of a second partner. Figure 6 shows, first and foremost, the low predictions of subsidy receipt across the board. Among a population of households below 200% of the poverty rate, none of the groups is predicted to have higher than a 12% subsidy rate. It is striking that

non-workers are the most likely to report subsidized care in both types of household. This runs contrary to my expectation that work requirements would drive down subsidization rates in this group. It may be that non-workers are, however, best situated to handle the bureaucratic hurdles necessary for subsidy receipt and meet requirements by other means (searching for work, for example).

Discussion & Conclusion

The evidence marshaled here suggests that work scheduling continues to play a major role in determining childcare outcomes, especially for the children of single mothers. In single-mother households, the most striking results are for those who work nonstandard schedules. I find that these schedules – relative to standard schedules – are associated with more complex and less continuous care arrangements in which children spend significantly more time in relative care and less time in home-based care. There is also evidence that nontraditional, “off-standard” schedules share many attributes with nonstandard schedules. It is worth noting that these “off-standard” schedules would be subsumed under the “standard” category according to most traditional shift definitions. The analyses presented here, however, provide cause to believe that they lead to significantly different childcare arrangements and thus that such a combination is, at least in this case, unwarranted. The figures also make clear that the challenges facing single-mother households are typically much greater than those confronted by two-partner households.

For two-partner households there are two particularly revealing sets of findings. The first, regarding non-working partners, runs contrary to hypothesized relationships. With three exceptions, non-work (an arrangement in which neither partner works) does not result in childcare outcomes significantly different from an arrangement in which one partner works a standard shift and the other does not work (the “single standard” reference group). A plausible

explanation here is that two available parents are functionally no better than one. If the “single standard” arrangement already allows the non-working partner to do most childcare and not rely on outside providers, then little is gained by adding a second non-working partner. Childcare arrangements, such that they are, are no less complicated, no more stable, and no less likely to involve home-based care. The exceptions here are center-based care and relative care – both of which have significant negative associations in the top panel of Table 4 – and the surprisingly positive association with subsidy receipt. Examinations of Figures 1-3 suggest that the differences in care received between non-work and single-standard schedules are functionally trivial, but I remain unable to provide a compelling explanation for the significantly higher reports of subsidy use.

The second major set of findings for two-partner households relate to those households in which both partners work a standard schedule (“dual standard”). Here I find that, as anticipated, such schedules yield more complex childcare arrangements made up of more home-based, private center-based, and relative care. The lack of available parental care during the day translates into more care from more sources. Young children in these households receive more home-based and relative care than their peers from single-standard households and overall their childcare arrangements are significantly more complex.

Nonstandard work yielded some of the expected outcomes in two-partner households, but fewer than in single-mother households. This bears further consideration. In the vast majority of the “nonstandard” two-partner households, only one partner was working a nonstandard shift; the other was either working a standard shift or not working at all. These households have the luxury of a second partner who can handle care when the other partner is working in the evening or night. This is not to say that there are no effects of nonstandard work in two-partner households,

only that they are much more pronounced in single-mother households. To reach this finding, however, one must take into account both partners and the interactions between their schedules, as I have done here.

Policy Implications

The findings on childcare arrangements for single mothers – especially those working nonstandard or nontraditional shifts – are cause for concern. These women's children face more complex, less continuous arrangements made up of more relative, less home-based, and, in some cases, less center-based care. A number of policies or changes to practice may prove beneficial to such children.

First, promotion of and improvements to the childcare subsidy process may bear fruit. Such subsidies, though they can in some cases be used to pay relatives or home-based care providers, are generally most easily used with center-based providers. Subsidy uptake rates vary state-by-state, but are generally low, both because the programs are little-understood and often difficult to use (Chien 2015; Durfee and Meyers 2006). Promotion of these programs could help to increase public awareness, as could public outreach in ways that reduce the bureaucratic burden of garnering the subsidies. The lower likelihood of subsidy use among single mothers with nonstandard and off-standard schedules – see Figure 5 – speaks to their inaccessibility. By contrast, it is encouraging to find that dual-standard two partner households are marginally more able to access subsidized care. Understanding how such couples access these subsidies despite their working schedules could prove important to improving the process overall.

A second avenue to pursue is for the government to more directly stimulate childcare supply. Specifically, government incentives for the creation and expansion of center-based care beyond the standard working day could yield important returns, especially for the children of single

mothers. Expanded availability of early morning, late afternoon, and evening care could help to reduce dependence on relatives who currently help to bridge gaps between care and work hours. Night care could prove safer and more reliable than relative or home-based alternatives. It is also important that such centers be responsive and available to parents who are unable to guarantee a set schedule or a set number of hours per week. Such care, given the employment demands, would almost certainly be expensive. Ideally that should not make it unavailable to children who already find themselves disadvantaged in a number of respects.

Finally, third, one way to reduce the consequences of nonstandard work would be to reduce the number of parents working such schedules. Greater worker protections and schedule controls could help to alleviate ongoing increases in the prevalence of such schedules in single-mother households. If fewer single mothers found themselves with nonstandard and nontraditional work schedules, fewer children would face the sorts of childcare problems documented above.

Conclusions

I have provided evidence that work scheduling continues to affect a range of childcare outcomes. This is particularly true in single-mother households exposed to nonstandard and the emerging class of nontraditional “off-standard” work schedules. I have also documented the care challenges faced by two-partner households in which both partners work standard schedules. These families face different types of challenges and deal with them in distinct ways, but in all cases work scheduling shapes childcare arrangements. These findings are based on analysis of recent data, take into account co-scheduling in two-partner households, and expand the set of outcomes under analysis to include receipt of subsidized care and multiple measures of care stability. These findings point to the significance of labor market factors in determining childcare choices. Especially for the children of single mothers working nonstandard or nontraditional

schedules – many of whom already face a number of disadvantages – these results suggest a further avenue by which inequality is manifested.

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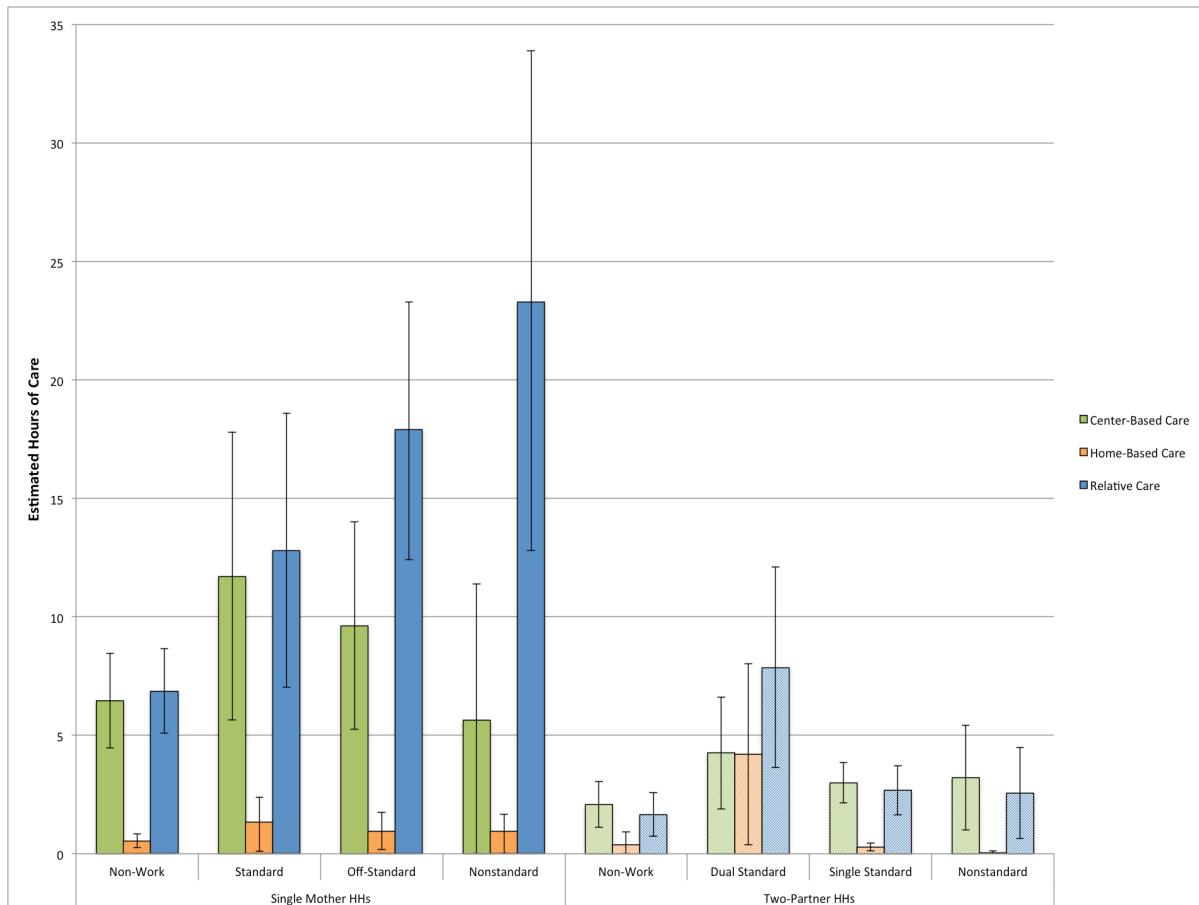


Figure 1. Estimated Childcare Use in Single-Mother and Two-Partner Households by Type of Care.

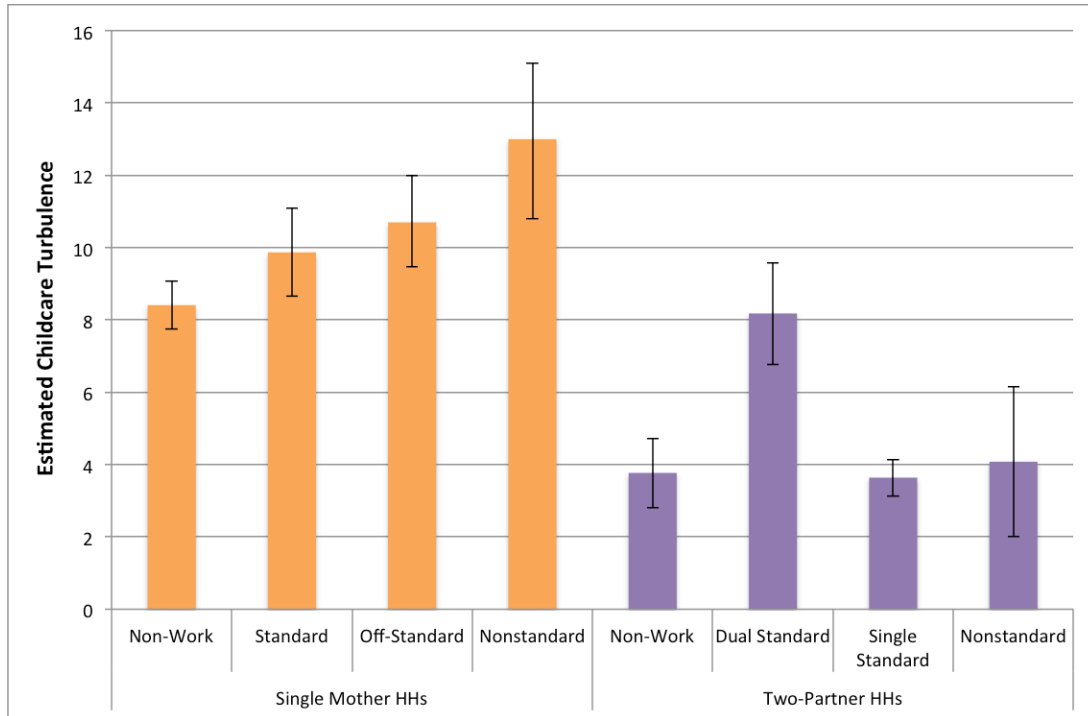


Figure 2. Estimated Childcare Complexity in Single-Mother and Two-Partner Households.

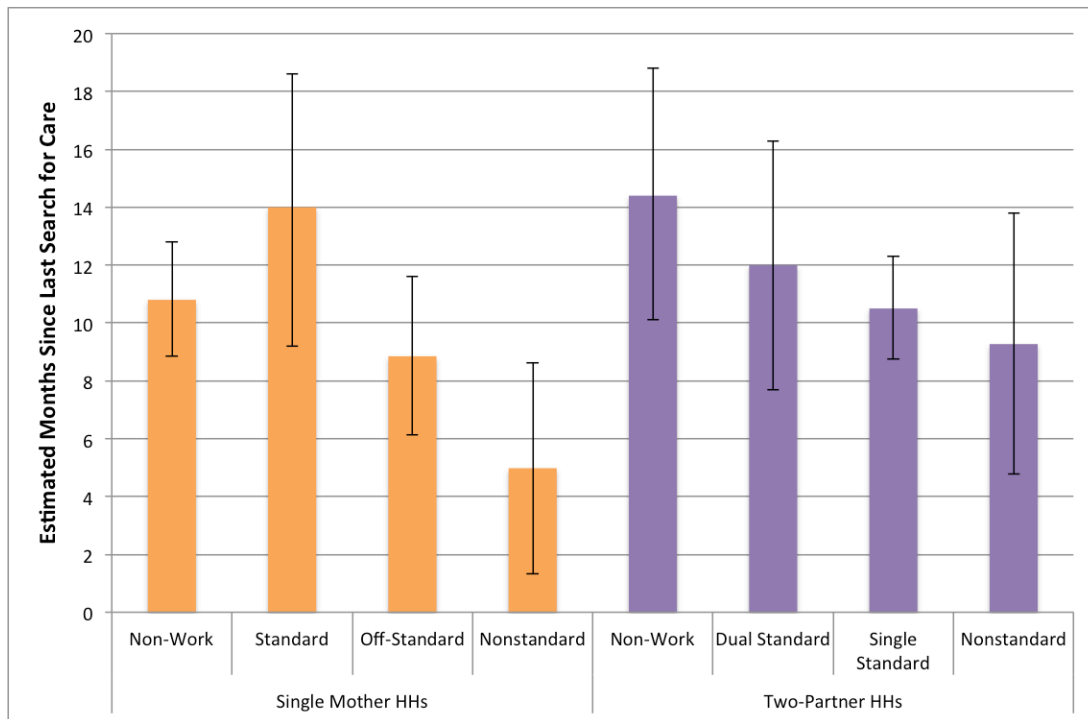


Figure 3. Estimated Childcare Continuity in Single-Mother and Two-Partner Households.

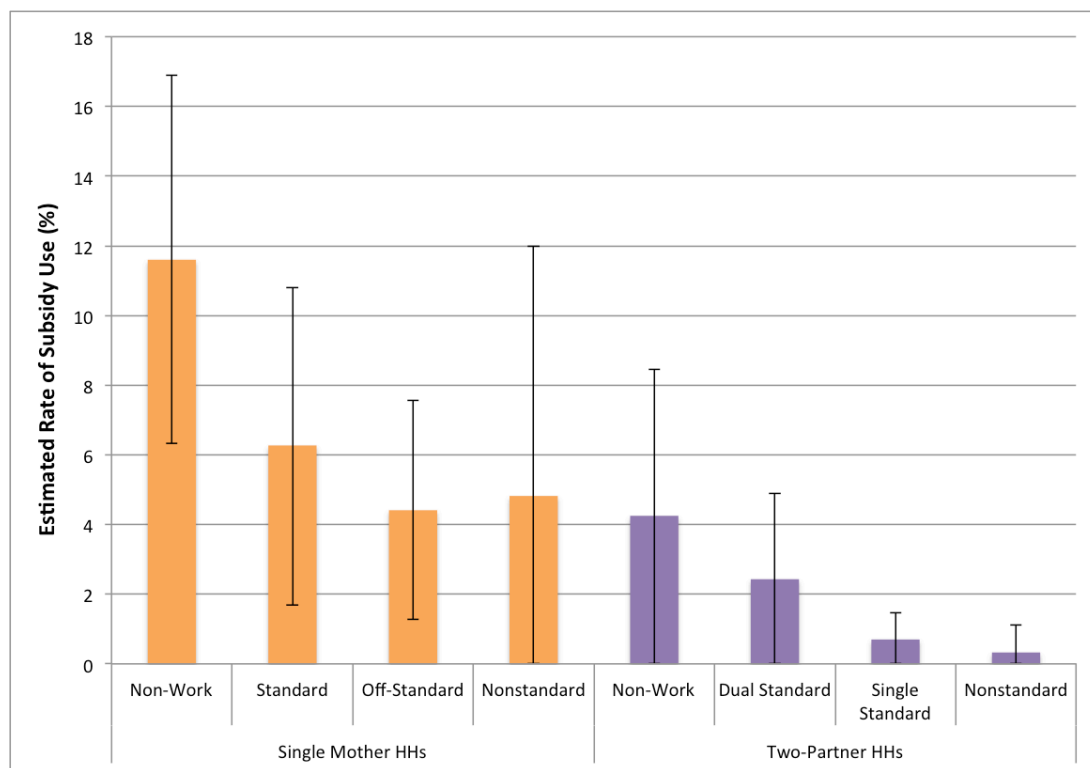


Figure 4. Estimated Likelihood of Childcare Subsidy Receipt in Single-Mother and Two-Partner Households.

Table 1. Distribution of Schedule Types

Single-Mother Households		Two-Partner Households	
Schedule Types		Schedule Types	
Non-Work	65.5	Non-Work	32.4
Standard	12.9	Dual Standard	14.0
Off-Standard	14.4	Single Standard	49.3
Short	5.7	Female Standard	7.3
Early	3.6	Male Standard	42.0
Long	5.1	Nonstandard Schedules	4.2
Nonstandard Schedules	7.2	Dual w/Female Shift	1.0
Evening	‡	Dual w/Male Shift	1.9
Night	‡	Male Shift	1.2

‡ Value suppressed due to small n

Table 2. Sample Description

	Single-Mother HHs		Two-Partner HHs	
	Mean	SD	Mean	SD
Number of Children	2.11	1.12	2.27	1.14
Age of the Youngest Child	2.42	1.42	2.07	1.43
Includes a Child Older than age 5 (%)	50.3		55.1	
Family Income (\$)	16,500	11,200	24,800	13,100
Additional Adult HH Member (%)	41.7		23.3	
Relatives Nearby (%)	83.7		83.1	
Nearby Relative Would Care (%)	59.4		62.6	
English Spoken at Home (%)	89.6		82.2	
Welfare receipt (%)	49.7		34.8	
Homeowner (%)	10.0		32.7	
Carowner (%)	64.0		88.6	
Respondent's Race				
White	34.0		50.5	
Black	34.7		11.9	
Hispanic	26.5		30.7	
Other	4.8		6.9	
Mother's Age	28.9	7.1	29.9	6.5
Immigrant Mother (%)	15.8		26.2	
Mother Attended School (%)	11.2		8.3	
Mother Attended Training (%)	2.5		1.4	
Mother's Education				
Less than HS	26.0		20.0	
HS diploma/GED	32.0		31.6	
Some college	26.9		25.1	
College +	15.0		23.4	
Mother's Occupation				
None Recorded	50.9		57.2	
Managerial/Professional	8.4		9.6	
Technicians/Support/Sales	5.1		5.1	
Administrative	8.7		6.4	
Service	23.3		17.0	
Production/Manufacturing	3.5		4.6	
Partner's Age			32.7	7.7
Immigrant Partner (%)			22.9	
Partner Attended School (%)			4.6	
Partner Attended Training (%)			3.2	
Partner's Education				
Less than HS			24.0	
HS diploma/GED			35.5	
Some college			19.3	
College +			21.1	
Partner's Occupation				
None Recorded			21.1	
Managerial/Professional			13.7	
Technicians/Support/Sales			13.5	
Administrative			4.3	
Service			12.1	
Production/Manufacturing			35.3	
Partner Married to Mother			73.8	

Table 3. Associations Between Working Schedule and Childcare Outcomes in Single-Mother Households

	Home-Based ¹		Center-Based ¹		Relative Care ¹		Complexity ¹		Stability ²		Subsidy Receipt ³	
	Estimate	Sig	Estimate	Sig	Estimate	Sig	Estimate	Sig	Estimate	Sig	Estimate	Sig
Non-Work Standard (ref)	-0.68	***	-0.443	**	-0.545	***	-0.044		-0.305		0.863	
Off-Standard	-0.279	**	-0.22	+	-0.173		0.086		-0.677	**	0.475	
Nonstandard	-0.857	**	-0.159		0.026		0.351	***	-1.35	**	-0.034	
Non-Work Standard (ref)	0.152		0.409		0.087		2.090	**				
Off-Standard	0.141		-0.002		-0.838	*	0.641					
Nonstandard	-0.055		0.75		-1.07	*	1.370					

significance levels: +<.1, *<.05, **<.01, ***<.001

1: ZIP model which includes schedule; respondent race; respondent age; respondent education; respondent occupation; number of children in the household; age of the youngest child in the household; dummy variable indicating presence of children older than age five in the household; natural log of family income; dummy variable indicating presence of another adult in the household; dummy variable indicating relatives live nearby; dummy variable indicating English spoken in the household; dummy variable indicating participation in school in the recorded week; dummy variable indicating participation in training activities in the recorded week; dummy variable for homeownership; dummy variable for car ownership; and a dummy variable indicating observed variability of the working schedule (entered as a predictor and interacted with schedule type). All variables are entered in both stages of ZIP modeling (except interaction between schedule and schedule variability, which is omitted in the first-stage modeling).

2: Negative binomial regression model with the same set of predictors as above.

3: Logistic regression model with the same set of predictors as above.

Table 4. Associations Between Working Schedule and Childcare Outcomes in Two-Partner Households

	Home-Based ¹		Center-Based ²		Relative Care ²		Complexity ²		Stability ³		Subsidy Receipt ⁴	
	Estimate	Sig	Estimate	Sig	Estimate	Sig	Estimate	Sig	Estimate	Sig	Estimate	Sig
Non-Work	0.052		-0.348	*	-0.98	***	-0.092		0.079		1.99	*
Dual Standard	0.931	***	0.141		0.37		0.266	**	0.203		1.59	+
Single Std (ref)												
Nonstandard	-1.04	*	-0.308		-0.566		0.350	+	-0.541		-1.47	
Non-Work	-0.255		0.152		-0.35		-0.078					
Dual Standard	-1.88	***	-0.174		-0.769	*	-1.790	***				
Single Std (ref)												
Nonstandard	0.725		-0.091		-0.367		0.327					

significance levels: +<.1, *<.05, **<.01, ***<.001

1: ZIP model which includes schedule; respondent race; respondent age; partner's age; respondent education; partner's education; respondent occupation; partner's occupation; number of children in the household; age of the youngest child in the household; dummy variable indicating presence of children older than age five in the household; natural log of family income; dummy variable indicating presence of another adult in the household; dummy variable indicating relatives live nearby; dummy variable indicating English spoken in the household; dummy variable for homeownership; dummy variable for car ownership; and a dummy variable indicating observed variability of the working schedule. All variables are entered in both stages of ZIP modeling.

2: ZIP model as above, but includes an interaction between schedule and observed schedule variability in the second-stage model as well as dummy variables in both the first- and second-stage models for female and male partner participation in school and training activities.

3: Negative binomial regression model with the same set of predictors as in (2).

4: Logistic regression model with the same set of predictors as in (2) except male partner indicator for training participation.