Who Cares if Parents have Unpredictable Work Schedules?: The Association between Just-in-Time Work Schedules and Child Care Arrangements

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Abstract

Working parents must arrange some type of care for their young children when they are away at work. For parents with unstable and unpredictable work schedules, the logistics of arranging care can be complex. In this paper, we use new data for a sample of 3,653 parents who balance work in the retail and food service sector with parenting young children 0 to 9 years of age. Our results demonstrate that unstable and unpredictable work schedules have consequences for children's care arrangements. We find that parents' exposure to on-call work and last-minute shift changes are associated with more numerous care arrangements, with a reliance on informal care arrangements, with the use of siblings to provide care, and with young children being left alone without adult supervision. Given the well-established relationship between quality of care in the early years and child development, just-in-time scheduling practices are likely to have consequences for child development and safety and potentially contribute to the intergenerational transmission of disadvantage.

Who Cares if Parents have Unpredictable Work Schedules?: The Association between Just-in-Time Work Schedules and Child Care Arrangements

The quality and stability of child care arrangements have important implications for child development and wellbeing (Shonkoff and Phillips 2000). Stable and consistent child care arrangements such as those offered in high-quality school- or center-based care settings have been found to have a host of benefits for children's cognitive and socioemotional development (Loeb et al. 2004; NICHD Early Child Care Research Network 2002; Shonkoff and Phillips 2000). However, access to this type of stable and high-quality care is sharply stratified by socio-economic status. For children in low-income families, child care arrangements are often informal, complex, and low quality (Galinsky et al. 1994; Henly and Lyons 2000; Hofferth and Collins 2000). As such, childcare arrangements may play an important role in the transmission of status and the reproduction of inequality across generations.

Many low-income parents face barriers to arranging stable, high-quality child care because of costs (Henly and Lyons 2000; Sandstrom and Chaudry 2012), or because their work schedules fall outside of the 9 to 5 Monday through Friday hours, and are misaligned with the times that formal, high-quality child care is typically available (Chaudry et al. 2011; Henly and Lyons 2000). Many low-income parents also face another significant barrier to stable, high-quality child care arrangements: they experience routine uncertainty about the times that they will be required to work. In the service sector, which we take as our focus, the majority of workers contend with routine uncertainty in their schedules because of just-in-time scheduling practices that offer workers' little notice of when they will be expected to work (Henly et al. 2015; Author 2019). The instability and unpredictability of work schedules, endemic to the service sector, are an important

dimension of precarious work (Kalleberg 2018; Kalleberg 2013). This variability and uncertainty is the product of a set of employer practices including asking workers to work "on call" shifts in which they must be prepared to come to work if asked, but not paid otherwise, as well as making last-minute changes to work schedules such as earlier or later starting or stopping times (Author 2019). Parents contending with just-in-time work schedules are likely to have to arrange just-in-time child care to match. This may raise children's risk of exposure to unstable and low-quality care.

However, our knowledge of the association between such just-in-time scheduling practices and child care arrangements is limited because few data sets capture detailed information on both work scheduling and care arrangements. While studies such as the NLSY97 and the National Survey of Early Care and Education measure some childcare arrangements and some aspects of work scheduling, they do not capture the work scheduling practices – such as on-call work and last-minute changes in shift timing – that are likely to be most disruptive to child care arrangements and that are the focus of a new wave of state and local laws designed to regulate work scheduling practices (Wolfe, Jones, and Cooper 2018).

To fill this gap, this paper takes advantage of new data from the Shift Project to examine how uncertain work schedules influence child care complexity and type. We focus on the large retail and food service sector, which comprises 10 percent of jobs in the American economy and employs the parent of 1 in 10 American children (Author's Calculations from the American Community Survey). This focus is strategic because just-in-time scheduling practices are prevalent in this sector and low wages mean that working parents have few resources with which to cope with schedule uncertainty. Further, although just-in-time scheduling is prevalent in retail and food service jobs, it is not universal. This allows for comparisons between hourly service sector workers

who face the added challenge of just-in-time scheduling when arranging for child care for their young children and their counterparts who have more predictable work schedules.

Overall, parents with young children working in the service sector rely heavily on informal care, often have to patch together complex care arrangements, sometimes lean on siblings to provide care, and at times leave their children alone without adult supervision. But, parents with the most uncertain work schedules – those subject to "just-in-time" scheduling practices – use more numerous care arrangements, use more informal care, and are significantly more likely to rely on siblings for care and to leave children alone without adult supervision. Our research finds that just-in-time work scheduling practices have consequences for the children of working parents who experience these schedules.

Prior Research: Parental Work Schedules and Child Care Arrangements

The stability and quality of child care arrangements is known to be important for young children's development (Loeb et al. 2004; Shonkoff and Phillips 2000), and work schedules play a central role in enabling or precluding particular types of care arrangements.

Research shows that within the low-wage labor market, jobs schedules can be erratic, with some employers using just-in-time scheduling practices and setting schedules at the last minute (Henly et al. 2006; Scott and Abelson 2016). These practices are designed to match the labor supply to consumer demand (Lambert 2008; Williams, Blair-Loy, and Berdahl 2013). If, for example, there are few customers frequenting a store on a given night, a retail employee working the floor may be sent home without their expected pay. If, on the other hand, a store is unexpectedly busy, workers may be called in at the last minute or told to stay beyond the end of their scheduled shift. Store supervisors in the retail and fast food industries are often evaluated on how closely they match labor supply to demand (Williams et al. 2013), creating added incentives to engage in

these scheduling practices. These combined influences mean that just-in-time schedules are common practice in the retail and food service sectors (Henly and Lambert 2014; Author 2019).

Young dependent children's time is closely intertwined with their parents' time, and unpredictability in a parents' work schedule has spillover effects for their young children's care schedule and conditions. Below, we review theory and research on how the timing of work may affect the number of care arrangements a child experiences, reliance on informal care arrangements, reliance on siblings for care, and leaving children without supervision.

Number of Care Arrangements. Stable and consistent child care arrangements are an important component of supporting healthy child development. Stable care arrangements allow children to form more stable attachments with caregivers (Shonkoff and Phillips 2000) and are positively related to social competence (NICHD Early Child Care Research Network 2005), behavior outcomes (Huston, Chang, and Gennetian 2002), cognitive outcomes (Loeb et al. 2004), language development (Tran and Weinraub 2006), school adjustment (Howes 1988), and overall child wellbeing (de Schipper et al. 2003).

Yet, roughly one-fifth of children under the age of 5 in the United States are regularly in more than two child care arrangements (Laughlin 2013). Among children with employed mothers, more than one-fourth are regularly in multiple arrangements (Laughlin 2013). Multiple arrangements have negative effects on children's social adjustment (de Schipper et al. 2004), can interrupt the formation of routines (Morrissey 2009), and impede the formation of secure attachments with caregivers, all of which can contribute to increases in child stress and health problems (de Schipper et al. 2004; Morrissey 2009). Multiple care arrangements are particularly detrimental for very young children (Cryer et al. 2005; Morrissey 2009).

Much of the research on the topic of work schedules and child care focuses on nonstandard work (Presser 1988; Prickett 2016). In her work on the 24/7 economy, Presser (2003) finds that parents working rotating or variable shifts were more likely to rely on a complex patchwork of care arrangements. This finding is echoed in a number of other studies using a variety of data sources. Drawing on data from the 1987 National Survey of Families and Households, Folk and Yi (1994) find that mothers with varying work schedules are more likely to use multiple care arrangements for their pre-school aged children. A similar relationship was found using data from the Survey of Income and Program Participation: irregular work schedules are associated with relying on a patchwork of multiple child-care arrangements (Laughlin 2013). In qualitative research, Scott, London, and Hurst (2005) describe the "unstable patchwork" of care arrangements used by 38 mothers moving from welfare to work, which involved odds hours that often changed from day to day. In even more recent work, Hepburn (2018) uses data from the 2012 National Survey of Early Care and Education and finds that parents' nonstandard work schedules are associated with child care complexity among single-mother households.

The uncertainty introduced by just-in-time scheduling practices may also contribute to a more complex patchwork of care arrangements. Researchers have long speculated that these practices might have an important effect on family life (Henly, Shaefer, and Waxman 2006; Hofferth 1995). However, few empirical studies have specifically examined how just-in-time scheduling practices affect child care arrangements. Rare direct evidence of the connection between just-in-time scheduling practices and unstable and complex care arrangements comes from a rich qualitative study of 54 low-wage, working mothers employed in retail in Chicago from the Study of Work–Child Care Fit (Henly and Lambert 2005). This study describes the challenges that the working parents in the study faced in piecing together care at the last minute or just in case

they were called in to work. Another qualitative study by Carrillo et al. (2017) similarly reports that parents working in jobs with unstable and unpredictable work schedules, and especially on-call shifts, were far more likely to "scramble" to arrange care than those with stable, even if nonstandard, shifts. We have good reason to expect that these same spillover effect of just-in-time schedules to unstable and complex care arrangements would apply more broadly, but to date no quantitative research has been available to empirically test this relationship at a national level.

Informal Child Care Arrangements. Research finds that formal center-based child care provide more stability than other types of care and that children benefit cognitively and socioemotionally from the stability and quality of formal care arrangements (Shonkoff and Phillips 2000). Formal, center-based care settings are more likely to follow developmentally appropriate care guidelines, whereas informal care settings may be more variable in their quality and of lower quality on average (Galinsky et al. 1994; Henly and Lyons 2000). Studies consistently find that caregivers with training in early childhood education provide higher quality care (Burchinal et al. 2002). However, formal care is often limited in low-income neighborhoods and inaccessible for low-income parents (Chaudry 2004; Henly and Lyons 2000; Queralt and Witte 1998). As a result, low-income working parents frequently use grandparents, other relatives, friends, or other informal care providers (Henly and Lyons 2000; Hofferth and Collins 2000). These informal child care providers play a critical role in helping parents align their work schedules with their children's needs (Brady 2016).

Although informal providers may provide greater flexibility, they can also be inconsistent and unreliable. Informal care is contingent on the networks available, and may not be accessible to all parents (Henly and Lyons 2000). Informal care by relatives and others is usually unregulated

and unlicensed, and can be of poorer quality compared to more formal center-based care (Galinsky et al. 1994; Henly and Lyons 2000). Unregulated care settings can have inadequate health and safety provisions, prolonged exposure to television, and fewer opportunities for children's cognitive and social development (Adams, Tout, Zaslow 2007; Brown-Lyons et al. 2001). Relative care has also been linked to behavioral problems in children (Bacharach and Baumeister 2003). In Henly and Lyons' 2000 study of 57 low-income mothers in Los Angeles, some mothers expressed concern about the quality of their informal care arrangements.

Many researchers have pointed out that low-income families are more likely to have nonstandard work schedules that conflict with child care centers' hours of operation (Henly and Lyons 2000; Henly and Lambert 2005; Hofferth 1995; Lowe et al. 2005; Lowe and Weisner 2006; Scott and Abelson 2016). These schedules can constrain child care options and increase the use of informal care (Henly and Lyons 2000). Folk and Beller (1993) found that nearly 50% of parents working in sales use informal care, compared to only 10% of those in other occupations. In a longitudinal study using data collected through the National Institute of Child Health and Human Development Early Child Care Research Network, Han (2004) found that mothers whose schedules changed from standard to nonstandard were more likely to rely on paternal or relative care, while mothers whose schedules became more standard were more likely to rely on center-based care. Informal (grandparent) care is especially common in families with lower incomes (Kuhlthau and Mason 1996), when mothers are employed (Fergusson, Maughan, and Golding 2008; Vandell et al. 2003), and when mothers work nonstandard hours (Presser 1989; Vandell et al. 2003).

To date, studies of informal care tend to focus on nonstandard work. Yet just-in-time work schedules may also increase parents' reliance on informal care arrangements because formal,

center-based care typically requires some advance notice of when care is needed, may be unable to provide last-minute care, and may charge penalties for cancelling care at the last minute.

Sibling care. Informal child care providers vary widely in their quality and their influence on healthy child development. Young children who are placed in the care of siblings may experience low quality care if older siblings lack the maturity, experience, and judgement to provide safe and stimulating care for an infant or young child. Though rare compared to other forms of informal care, recent census estimates suggest that 3% of children under the age of 5 in the United States are regularly cared for by their siblings (Laughlin 2013). Researchers have raised concerns about the consequences of sibling care for both the younger child who is being cared for and the older sibling caregiver.

Concerns about sibling care often emerge in the literature on adultification (Burton 2007), which describes how low-income children are thrust into adult roles. Childhood adultification "involves contextual, social, and developmental processes in which youth are prematurely, and often inappropriately, exposed to adult knowledge and assume extensive adult roles and responsibilities within their family networks" (Burton 2007 p. 329). Burton (2007) is careful to differentiate the adultified children from the "hurried" children in middle-class households (seen in Lareau's 2003 work). Instead, adultified children perform tasks within households – including parenting of one's siblings – to fill a specific family need. Adultification is therefore usually borne out of necessity in families with limited access to formal child care arrangements (Burton 2007). Researchers argue that the responsibility of taking care of younger siblings can negatively affect older children, especially in school (Chase et al. 1998; Cooper, Denner, and Lopez 1999; Gennetian et al. 2002; Hafford 2010). Dodson and Dickert (2004) argue that girls' labor in low-

income households comes at a "great cost," as they forgo educational opportunities to take on adult responsibilities (Dodson and Dickert 2004 p.326).

Another strain of research documents safety issues for the young child associated with sibling care. In their work, Morrongiello and colleagues (2010) argue that sibling care is associated with an increase in risk-taking and accidents. Similarly, Hafford (2010) cautions that, "Sibling caretakers often develop their own methods to coerce cooperation and to manage the behavior of children in their care, and may resort to harsher disciplinary modes than adult caregivers" (p. 393).

Sibling care tends to be more common in households where parents – and especially mothers – are employed (Casper and Smith 2004; Crouter et al. 2001; Gennetian et al. 2002) and in low-income households (Blair 1992; Dodson and Dickert 2004). Research also suggests that sibling care may be more common during the summer months, when one in ten children 6-12 are home alone or with a sibling under the age of 13 (Williams 2006).

Schedule type may affect the use of sibling care. According to census reports, sibling care is more common when parents work non-day shifts compared to day shifts (Laughlin 2013). While we are not aware of any prior research that examines the question directly, there are good reasons to suspect that the uncertainty introduced by just-in-time work schedules may push parents to rely on children to care for younger siblings. For a parent who is called in at the last-minute or asked to be on-call for work, children also likely to be a free and accessible source of child care for young siblings. Older children may also provide a convenient fall back option or last resort when other care providers are not available on short notice.

Young Children without Care. In the absence of other child care options, some children are left unsupervised while their parents are at work. Eleven percent of children between the ages of 5-14 are left in unsupervised self-care, for an average of 6.5 hours each week (Laughlin 2013). While

self-care is more common among older children (Cain and Hofferth 1994), it is routinely used as a form of care for younger children as well (Laughlin 2013). About 5% of elementary school children between the ages of 5 and 11 are in self-care for some time during a typical week, including 2% of children between the ages of 5 and 6 (Laughlin 2013). Other estimates similarly suggest that 5% of 6-9-year-olds use self-care as their primary child care arrangement while their parents are at work (Capizzano, Tout, and Adams 2000). Roughly 10% of parents report having no regular childcare arrangement for their children under 5 aside from school and self-care (Laughlin 2013).

As with children left in the care of their siblings, leaving children in self-care raises a number of immediate and long-term concerns, ranging from risk of injury to poor social and intellectual development (Heymann 2006; Kerrebrock and Lewitt 1999; Moilanen et al. 2016). Unintentional injuries are the leading cause of death among children (Morrongiello, Klemencic, and Corbett 2008) and for children under 6, the greatest risk of injury is at home (Rivara 1995). When child injuries occur, lack of supervision is often cited as a primary contributing factor (Garbarino 1988; Saluja et al. 2004). Beyond the immediate risk of injury, researchers have found that self-care offers fewer developmental benefits than more structured after-school care (Boyd-Swan 2019; Granger 2009; Mahoney and Parente 2009; Park and Zhan 2017; Roche et al. 2007). In a study of 150 third graders, Vandell and Corasaniti (1998) found that children in high-quality after-school programs showed more academic improvement than children in self-care. On the other hand, Pettit et al. (1997) have found that first grade children who used self-care for more than four hours per week showed lower levels of social competence and academic achievement than children who rarely used self-care. Other studies have found that unsupervised self-care is associated with conduct problems including lying, stealing, and bullying (Atherton et al. 2016).

While some parents allow their children to spend time unsupervised by choice, especially as their children grow and mature, the use of self-care is also related to parents' labor force participation, suggesting that it is closely tied to parents' availability (Cain and Hofferth 1994; Casper and Smith 2004; Presser 1998). Fourteen percent of children with employed mothers between the ages of 5 and 11 are regularly in self-care compared to 7% of children whose mothers are not employed (Laughlin 2013). While having a working mother doubles the use of self-care, the effect of work schedules on self-care are still not well understood. A small number of studies have examined the role of nonstandard work hours on self-care. In one study, researchers found that the use of self-care as a primary child care arrangement is less common among children whose mothers work nontraditional hours (outside of the standard 6 a.m. to 6 p.m. hours) (Capizzano et al. 2000). Another study similarly found that children with parents who work a day shift were more likely to be in self-care than those with parents working a nonday shift (Laughlin 2013). It is possible that parents working nontraditional hours (such as night shifts) on a consistent basis may be able to find stable caregivers for their children while they are at work or tag-team with a partner (Capizzano et al. 2000). Just-in-time scheduling practices, on the other hand, may introduce instability that is harder for parents to plan for, resulting in the increased reliance on children's self-care. To our knowledge, however, no studies have specifically examined whether just-in-time scheduling practices increase the use of self-care among children.

Prior research provides strong evidence that complex child care, informal child care, child care provided by siblings, and self-care have negative consequences for the wellbeing and healthy development of young children. Some prior research documents a connection between working at nonstandard times and having to rely on these types of care arrangements. Yet, we know very little about how routine schedule uncertainty that comes about though just-in-time scheduling practices

affects child care arrangements, because until recently no national data has been available. Therefore, there are serious gaps in our knowledge about how on-call work and last-minute schedule changes destabilize care arrangements and exacerbate reliance on informal care including that provided by a young child's sibling and by self-care.

Hypotheses. To fill this gap in the literature, our paper examines a set of hypotheses about how just-in-time work scheduling affects the number and type of child care arrangements used by working parents employed in the service sector.

We expect that working parents subject to just-in-time scheduling practices will need to rely on a larger set of child care arrangements for their young children to cover all schedule contingencies. The schedule uncertainty introduced both by on-call schedules and by last-minute scheduling changes can be expected to increase reliance on informal sources of child care including spouses, grandparents, and babysitters. We also predict that just-in-time work schedules will be associated with greater reliance on young children's siblings to provide care as well as young children going unsupervised. Because formal care arrangements tend to be more rigid in the requirements for notice and more limited in their hours of service, we do not expect just-in-time schedules to increase reliance on formal daycare or school-based care arrangements.

Data and Methods

Between 2016 and 2018, the Shift Project collected survey data from approximately 60,000 workers employed in the retail and food service sectors across the United States. The sample is composed of workers employed at 116 of the largest retail or food service employers in the United States and includes workers aged 18 years and older. This paper restricts the Shift sample to 3,653

working parents caring for dependent children between 0 and 9 years of age. All of these working parents were employed in the retail or food service sector in jobs that are paid by the hour.

The Shift Project recruited this sample of retail and food service workers using Facebook targeted advertisements that led respondents to an online Qualtrics survey. Facebook serves as both the sampling frame, providing targeting information to identify workers employed at the 116 firms, and the recruitment mechanism, delivering target survey recruitment advertisements. The key benefit of this approach is to enable the construction of a large sample of parents of young children that contains detailed questions on just-in-time scheduling practices and child care arrangements.

Moreover, the method of construction, recruiting workers at large firms, aligns the sample with the population of workers who are subject to a new set of labor laws that seek to regulate just-in-time work scheduling practices. These, laws, passed in San Francisco, Seattle, New York City, and Oregon regulate or restrict the use of on-call work shifts and last-minute schedule changes. Relevant here, these laws only cover workers employed at large chain retail and food service establishments (Wolfe, Jones, and Cooper 2018).

While nearly 80% of Americans age 18-50 are active on Facebook (Greenwood, Perrin, and Duggan 2016; Pew 2018), there is likely selection into actually taking the survey. Indeed, in the full Shift sample of service sector workers, the Facebook ad appeared 5,024,362 times (including multiple times for some users), resulting in 337,098 clicks through to the survey and 60,409 individuals contributing survey data. In all, 1.2% of all ad displays yielded survey data. To address the research questions at hand, we narrow this resulting sample to the 3,653 parents in the sample caring for dependent children between the ages of 0 and 9.

This response rate is significantly lower than that achieved by leading non-governmental survey firms, such as Pew. However, it is important not to overstate the difference – Pew currently reports a 6% response rate to their telephone surveys (Kennedy and Hartig 2019). One way to gauge potential bias in the Shift data is to compare univariate statistics and associations between the Shift data and gold standard probability samples. Such analyses, have found that the data from the Shift Project are more similar to data from the Current Population and National Longitudinal Survey of Youth than these two gold standard probability samples are to one another (Author 2018). Additional Shift data checks are reported in Author (2019).

Dependent variables. We analyze eight dependent variables that capture the number of child care arrangements and the types of care providers. Each of these dependent variables was derived from a survey question that asked respondents to report on: "In a typical week, how often do you usually use each type of child care for your youngest child?" Possible response categories were: (1) My spouse or partner, or my child's other parent, (2) Child's grandparent or other relative, (3) Older sibling, (4) Child cares for self, (5) Babysitter, or (6) Daycare center, school-based program, or Head Start. For each of these six types of care arrangements, respondents reported whether they used the arrangement 5-7 days per week, 2-4 days per week, 1 day per week, or never in a typical week.

We measure the number of care arrangements by tallying parent reports of types of care arrangements. For this tally, we do not count resident parents who provide care, but we do count non-resident parents in the tally of care providers when the parent selected the category "My spouse or partner, or my child's other parent" and separately indicated that they were not living with a spouse or partner. Our measure of number of types of care is likely to underestimate care complexity, because some categories such as "grandparent or other relative care" may include

more than one different care provider but only contribute 0 or 1 to the tally of types of care. This potential underestimation is a data limitation, and the average number of care arrangements should be interpreted with caution.

For each of the six care types, we create 0/1 dichotomous measures for spouse care, grandparent or relative care, babysitter care, sibling care, child cares for self, or formal daycare/school-based care. We also create a seventh measure – "Sibling less than 10 or self-care" – which is coded 1 if the 0 to 9 year old child cares for himself or herself, or is cared for by a sibling younger than 10 years of age.

We also measure the amount of care of each type in a typical week as the average number of days of care provided by spouses, grandparents or other relatives, babysitters, siblings, children caring for themselves, sibling less than 10 years of age or self-care, or formal daycare or school-based care. We code response categories of "never" used type of care as 0, "1 day" as 1, "2-4 days" as 3, and 5-7 days as 6.

Key independent variables. The primary independent variables are two measures of just-in-time work scheduling: working on-call shifts and experiencing last-minute work scheduling changes. We refer to these two types of uncertainty collectively as "just-in-time scheduling."

Our measure of on-call work schedules is based on responses to a question that asks, "In the past month or so, have you ever been asked to be "on-call" for work at [EMPLOYER NAME]? By "on-call", we mean you have to be available to work, and you find out if you are needed to work just a few hours before your shift." Parents who responded "yes" are coded 1 and those who responded "no" are coded 0.

Our measure of last-minute work scheduling changes is based on affirmative responses to a question that asks about last-minute changes to work shifts. Respondents were asked, "In the

past month or so, did your employer ever change the timing or the length of your scheduled shift at [EMPLOYER NAME]? For example, your employer asked you to come in early or late, or asked you to leave early or to stay later than the hours you were originally scheduled for." Parents who reported experiencing last-minute changes in the past month are coded 1 and parents who did not experience such changes are coded 0. We note that in a separate follow-up question (only available for respondents interviewed in Fall of 2017 and Spring of 2018), 75% of respondents said this change occurred with less than 24 hours' notice.

Control variables. Our models include a set of control variables to account for the potential confounding influence of variables that may be correlated both with on-call work and last-minute schedule changes and also with child care outcomes.

One set of control variables measure job quality and other job characteristics. We control for hourly wages, usual weekly work hours, the amount of advance notice of work schedules, whether the parent works a variable schedule or a regular daytime, evening, or night shift, whether the employer or the worker control the start and end times of work, job tenure, and whether the parent identifies as a manager.

A second set of control variables measure parent and child characteristics including parents' age; whether parent lives with a spouse or partner; parents' race or ethnic self-identification, educational attainment, and school enrollment; whether parent has more than one child, and the age of the youngest (focal) and the oldest child. We also control for household resources including household income and perceived ability to cope with a $400 expense shock. Finally, we include a control for month of interview to account for seasonal variation in work schedules and child care needs.

Methods. We estimate the relationship between just-in-time scheduling practices and child care arrangements using OLS regression to model the number of care types and linear probability models to model the probability of using a particular type of care. To better isolate the relationship between just-in-time schedule exposure and child care outcomes, each of these models controls for worker, household, and job characteristics. We present regression coefficients in Table 2. We then estimate predicted values of number of types of care and predicted probabilities of using each type of child care for parents with and without exposure to on-call scheduling and last-minute scheduling changes.

The sample design as well as the extensive control variables account for some types of selection that could bias the estimated relationships between just-in-time work schedules and child care arrangements. We further address selection using a propensity score weighting approach known as inverse probability of treatment weights. In the first stage we regress an indicator of just-in-time scheduling exposure (defined as either working on-call or experiencing last-minute schedule changes) on a detailed set of child, parent, and job characteristics, then estimate predicted probabilities of just-in-time exposure given observed values of covariates. We then construct weights that are the inverse probability of "treatment" where treatment is exposure to just-in-time schedules. Those who are in the treated group receive a weight value that is the inverse of the probability of treatment (being exposed to just-in-time schedules). Their counterparts who are not in the treated group are assigned a weight value that is the inverse of the probability of not being treated (not being exposed to just-in-time schedules). When these weights are applied, the observed selection mechanisms are parceled out and the residual relationship between just-in-time schedules and child care arrangements is purged of the influence of selection on observables.

Finally, we examine the relationship between on-call shifts or last-minute schedule changes and the number of days of each of type of child care working parents use in a typical week. Our measures of number of days per week of each care type take on values of 0, 1, 3, or 6 days. We use OLS regression for ease of interpretation, but get results that are consistent in their sign and significance when we estimate multinomial or ordered logistic regressions models. These alternative specifications are available in Appendix tables.

For all our analyses, we use listwise deletion for item non-response. Item non-responses affected fewer than 5% of observations for a given variable. In separate work, we have constructed and applied survey weights to adjust sample composition to align with the attributes of service sector workers in the American Community Survey. We have found that our results are not sensitive to application of survey weights. Although the survey weights shift the demographic composition of our survey sample, they have no effect on the results estimated in our regression models. Therefore, we present unweighted results.

Results

Table 1 presents descriptive statistics on our sample of 3,653 working parents with children 0 to 9 years of age. The average working parent used 1.4 types of child care for their youngest child in a typical week (standard deviation of 1). As mentioned previously, this average number of care types is likely an underestimate, given that each type of care (e.g., grandparents or relatives) can only contribute 1 to the tally of care types even if that category may encompass multiple care providers (e.g., two or more grandparents or relative care providers).

[TABLE 1 HERE]

Spouses, grandparents, and relatives were the most commonly reported care providers. Almost three-quarters of parents reported that their spouse or partner was one source of child care

for their young child. Most of these spouses or partners lived with the working parent and child. Almost 60 percent of working parents relied on grandparents or other relatives for care.

Sizeable minorities of working parents reported using formal center-based care, babysitters, and children's older siblings for care. Almost one-quarter of working parents used some formal daycare or school-based care in a typical week. Nearly 20 percent reported using a babysitter in a typical week. Overall, 18 percent of working parents relied on care from one of their other children. About two-thirds of working parents reported having more than one child, and, among these working parents with two or more children, about 25 percent relied on one of their other children to provide care for their youngest child.

Finally, 3 percent of parents reported that their 0 to 9 year old child was left alone without a care provider, and 6 percent reported either that the child was left alone or in the care of sibling younger than 10 years of age. These types of care arrangements were the least common, but pose special concerns related to lack of supervision and child safety.

As shown, a substantial portion of working parents in the service sector are exposed to on-call work and to last-minute schedule changes. Almost 28 percent of parents were asked to work on-call in the prior month, and almost 70 percent reported a last-minute schedule change in the past month. We note that although a sizeable minority of parents experience on-call work and the majority experience last-minute schedule changes, there are also sizable portions of working parents who do not experience these types of schedule uncertainty. This variation is a key feature that enables our examination of the relationship between schedule uncertainty and child care arrangements. At the same time, our sample is unique in that we are comparing an otherwise fairly homogeneous sample of working parents. All parents have children 0 to 9 years of age and all are working for 1 of 124 large retail or food service sector employers. Therefore, many potential

confounding influences that have to do with child age or with other job conditions are more or less held constant by definition.

In addition to the broad exposure to on-call and just-in-time scheduling, 37 percent of parents in the sample receive less than a weeks' notice of their work schedule, 57 percent work a variable work schedule, and a large majority (81 percent) had little or no control over their work schedule. The average worker worked about 34 hours per week and earned about $11 or $12 per hour.

The average working parent in the sample had two or more children, and her youngest child was less than 4 years old. Among parents with two or more children, the average age of the oldest child was almost 11 years.

More than 80 percent of parents were between 18 and 39 years of age. About 75 percent of parents were either married or living with a partner and about 25 percent were not living with a spouse or partner. Most working parents in the sample were white, non-Hispanic (73 percent), and the rest were Hispanic (13 percent), African American (6 percent), or another race/ethnic group (8 percent). In the sample, 11 percent of parents were combining school and work, and 43 percent had no more than a high school education.

Just-in-Time Scheduling and Child Care Arrangements. Table 2 presents results from regressions of just-in-time scheduling practices on number of type of child care arrangements. All models include a full set of controls for other job characteristics, and for a set of child and parent characteristics. The model estimates for number of care arrangements shown in the first column are from an OLS regression model. The coefficients for the remaining columns in Table 2 are from linear probability models and thus represent the change in the probability of using the care

arrangement associated with a one-unit change in the predictor variable. Table 2 also displays results from F-tests of the joint significance of on-call shifts and last-minute shift changes as predictors of child care arrangements. Significant F-tests are indicated by a cross symbol (†). Figure 1 displays the predicted value or predicted probabilities of each of the child care arrangement dependent variables for parents who do not work on-call or experience last-minute shift changes compared with parents who do work on-call and experience last-minute changes.

[TABLE 2 HERE]

Both on-call scheduling and last-minute changes to work schedules are positively associated with the number of types of care arrangements. Parents who work on-call use 0.11 more types of care arrangements in a usual week compared with those who do not work on-call. Parents who experience last minute shift changes use 0.10 more types of care arrangements in a typical week. These model results suggest that parents who work on-call and experience last-minute changes use about 0.21 more types of child care in a given week, 1.46 types compared with 1.25 types, or about one-fifth of a standard deviation difference (see Figure 1). The estimated relationships between on-call shifts or last-minute schedule changes and the number of child care arrangements are net of the influence of many other job characteristics and net of child and parent characteristics.

[FIGURE 1 HERE]

When work schedules are unpredictable, parents may have to rely more heavily on informal care arrangements from family, friends, or babysitters. We find some support for this prediction but that the particular types of informal child care vary between on-call shifts and last-minute shifts. Parents who experience last-minute shift changes are more likely to report using spousal

and grandparent or relative care, and parents who work on-call are more likely to report using babysitter and sibling care.

When we test the joint significance of on-call shifts and last-minute shift changes, we find that just-in-time schedules are associated with more babysitter care (17% versus 23%, Figure 1), and more sibling care (16% versus 21%, Figure 1), but are not associated with spousal or grandparental care.

On-call shifts and last-minute shift changes are positively associated with children being unsupervised but neither of these scheduling conditions are statistically significant predictors of children being unsupervised. However, when we test the joint significance of on-call shifts and last-minute shift changes together, we find that just-in-time scheduling significantly increases the likelihood that children 0 to 9 years old will be left alone without adult supervision. Just-in-time schedules are associated with children 0 to 9 years old being left alone (2% versus 4%, Figure 1) and also with children 0 to 9 years old being left in the care of a sibling who is younger than 10 years of age (5% versus 8%, Figure 1). In percentage terms, just-in-time scheduling have a major impact on children being left unsupervised, increasing children left alone by more than 100% and increasing children left alone or in the care of a sibling younger than age 10 by 50%. Most of this increase was driven by children being left alone.

As predicted, on-call shifts and last-minute shift changes are not associated with increased use of formal daycare or school-based care. These formal care arrangements are likely to be less flexible in terms of last-minute scheduling, and therefore less likely to fill needs that arise from on-call and changing shifts.

The Table 2 and Figure 1 results provide evidence that exposure to just-in-time schedules has consequences for young children's care arrangements after controlling for a wide range of

potential confounders. To test the robustness of these relationships, we further address selectivity into just-in-time schedules by constructing and applying propensity score weights that purge estimates of selection on observables. Parents who experience just-in-time schedules are assigned a weight that is the inverse of the predicted probability that a parent with their observed characteristics would experience just-in-time schedules. Parents who *do not* experience just-in-time schedules are assigned a weight that is the inverse of the predicted probability that a parent with their observed characteristics would *not* experience just-in-time schedules. When the weights are applied, the observed differences between the "treated" (exposed to just-in-time schedules) and "untreated" (not exposed to just-in-time schedules) are netted out.

The propensity score weighted results are presented in Table 3. As shown, weighting to purge selection on observables makes little difference in the estimated relationships between just-in-time schedules and child care arrangements compared with the results presented in Table 2. Most of the coefficients are similar in magnitude and significance. The joint tests of the statistical significance of on-call and last-minute schedule changes find that these are significant predictors of numbers of types of care, babysitter care, sibling care, and children being left unsupervised. In contrast with the Table 2 results, after applying inverse probability of treatment weights, children being cared for by themselves or a sibling younger than 10 falls just shy of statistical significance ($p=.052$).

[TABLE 3 HERE]

Next, we consider whether on-call shifts and last-minute schedule changes are associated with the amount of care of each type in a typical week. Table 4 presents results from regressions in which the number of days of care type per week is regressed on on-call shifts and last-minute schedule changes.

[TABLE 4 HERE]

Table 4 shows that last-minute schedule changes are associated with about 0.3 more days of grandparent or relative care per week. Extrapolating this result suggests that last-minute schedule changes are associated with 15 more days of care provided by grandparents, among the 68 percent of workers subject to these last-minute changes. On-call shifts are associated with 0.14 more days of babysitter care per week (or 7 days per year) and 0.20 more days of sibling care per week (or 10 days per year) among the 28 percent of parents who work these on-call shifts.

Although we do not have a measure of cost of care, we expect that the extra days of babysitter care come at an expense to working parents. The extra days of grandparent or relative care impose some opportunity cost for the care providers and may also mean that working parents are indebted to kin care providers and incur reciprocal obligations.

Table 4 shows that on-call shifts and last-minute schedule changes are collectively associated with an increase in the number of days a child spends unsupervised in a typical week. Summing the coefficients for on-call and last-minute changes suggests that just-in-time schedules are associated with an increase of 0.10 days in which a child less than 10 years of age is left unsupervised.

Discussion

In recent decades, young children have come to spend an increasing portion of their early years being cared for by someone other than a parent. A large body of research establishes that the quality and continuity in child care arrangements has a substantial influence on healthy child development. Over the same period of time, women's labor force participation has not only increased, but the

jobs that less-educated Americans work have become more and more precarious (Kalleberg 2009). This precarity is manifest in low wages, nonstandard work schedules, but also unstable and unpredictable work schedules characterized by just-in-time scheduling practices like on-call shifts and last-minute schedule changes (Author 2019).

Against this backdrop, our paper examines how routine uncertainty in parents' work schedules influences the number and types of care arrangements for children 0 to 9 years of age. We extend prior research, which has examined how maternal employment and nonstandard work hours outside of Monday to Friday 9 to 5 schedule affect children's care arrangements by focusing on just-in-time scheduling practices that introduce routine uncertainty into the lives of parents and their children.

Our study focuses on parents working in the service sector while also raising young children, 0 to 9 years of age. The service sector is a setting where routine uncertainty in work schedules is prevalent. In our sample, almost 30 percent of parents report being asked to work "on-call," and almost 70 percent report last-minute changes to their work schedule. This routine uncertainty about when they would be needed for work has repercussions for children's child care arrangements. Routine uncertainty is largely incompatible with formal, center-based care, and increases the likelihood of needing a complex patchwork of care arrangements.

Our study documents, for a national sample of low-wage working parents, that on-call work and last-minute shift changes are associated with more numerous care arrangements, reliance on informal care arrangements, and relying on children to provide care for their siblings. Children whose parents work on-call or have last minute shift changes have significantly more different kinds of care arrangements. More specifically, last minute shift changes drive the use of grandparent and relative care while on-call shifts increase babysitter care, and sibling care. Their

combination leads to increases in the use of babysitter and sibling care, as well as self-care and care by a sibling under 10 years of age. These results are also substantively meaningful, increasing the incidence and exposure to these kinds of informal and multiple care arrangements.

We note a few limitations and cautions when interpreting our results. First, we are likely to have underestimated the complexity of child care arrangements for the young children in our sample, because the number of types of arrangements was not collected with precision in the Shift survey. In particular, the Shift survey asked about several different types of care (non-resident other parent, relative care, sibling care, babysitter, school or center-based care) but did not collect the number of care arrangements *within* each type (e.g., we do not know whether a parent used more than one relative for care, or more than one babysitter for care). Second, before 2018, the Shift survey did not measure the number of different settings in which care was provided, and we cannot distinguish young children cared for in their familiar home environment from children cared for outside the home.

In addition to these measurement limitations, we also acknowledge some methodological limitations inherent to our sample and research design. Our sample is not a probability sample, and our analysis is cross-sectional. Separate research has validated the results from the Shift sample by benchmarking against the Current Population Survey and the National Longitudinal Survey of Youth (Author 2018). To address selectivity into just-in-time schedules, we include a wide range of parent and job characteristics as covariates. We also find that our results are robust to the application of inverse probability of treatment weights. From this robustness check, we conclude that our results are not sensitive to selection on observed characteristics. Still, we cannot rule out the possibility that unobserved omitted variables may bias the results.

Our study is novel in providing a lens into the work scheduling conditions and care arrangements of a vulnerable and policy-relevant population: working parents who are combining low-wage work in the service sector with parenting young children. We capitalize on a new source of data collected in 2017 and 2018 on 3,653 such working parents. Our sample of parents employed at large retail and food service firms represents a particularly policy-relevant population – employees of large "big box" and chain firms that are the subject of recent city and state-level efforts to regulate work scheduling. While such laws are often motivated by a concern for how working parents exposed to just-in-time scheduling can secure quality child care, previously data on the association has been notably lacking. The associations that we document between just-in-time work schedules and child care arrangements have long been suspected and have been documented in localized qualitative studies, but to our knowledge this is the first time that the connection between routine uncertainty in work schedules and young children's care arrangements has been established for a national sample.

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Table 1. Descriptives for Working Parents with Children Aged 0 to 9 Years

	Mean or %	Std Dev
Child care arrangements		
Number of care arrangements	1.4	(1.0)
Spousal care	74.6	
Grandparent/relative care	59.6	
Babysitter care	19.2	
Sibling care	17.8	
Child cares for self	3.2	
Sibling younger than 10 care or self care	6.2	
Day care	24.4	
Just-in-time work schedule conditions		
Worked on-call last month	27.8	
Last minute schedule change in last month	68.3	
Other work schedule features		
Less than 1 week advanced notice	36.8	
Variable work schedule	56.6	
Little or no control over work schedule	81.3	
Child characteristics		
One child only (%)	36.3	
Two or more children (%)	63.7	
Youngest child's age (years)	3.8	(2.8)
Oldest sibling's age (years)	10.9	(5.2)
Mother characteristics		
Age 18-19 years	2.1	
Age 20-29 years	39.7	
Age 30-39 years	41.1	
Age 40 or more years	17.1	
Married	43.0	
Living with partner	31.2	
Not living with partner	25.9	
White, non Hispanic	72.9	
Hispanic	12.9	
Black, non Hispanic	5.9	
Asian Pacific Islander	2.4	
American Indian, Alaskan Native	2.7	
Other race, non-Hispanic	3.2	
Enrolled in school	9.7	
High school degree or less education	42.8	
Some college education	49.2	
Has a college degree	8.0	(continued)

Table 1. Descriptives for Working Parents with Children Aged 0 to 9 Years

	Mean or %	Std Dev
Job characteristics		
Job tenure		
Less than 1 year	19.7	
1-2 years	28.7	
3-5 years	24.3	
6+ years	27.3	
Number of usual weekly hours		
Less than 20 hours per week	13.9	
20 to less than 30 hours per week	22.4	
30 to less than 40 hours per week	50.8	
More than 40 hours per week	12.9	
Resources		
Hourly wage	$ 11.78	
Annual household income		
Less than $15,000	20.2	
$15,000 to less than $25,000	24.1	
$25,000 to less than $35,000	17.3	
$35,000 to less than $50,000	17.2	
$50,000 to less than $75,000	12.5	
$75,000 or more	8.6	
Could not cope with $400 expense shock		
Certainly	18.9	
Probably	26.3	
Probably not	23.7	
Certainly not	31.1	
n	3,653	

Table 2. Child Care Arrangements Regressed on Just in Time Work Schedules for Working Parents with a Child Aged 0 to 9 Years

	Number of care arrangements	Spousal care	Grandparent or relative care	Babysitter care	Sibling care	Child cares for self	Sibling less than 10 or self care	Formal day care or school care
Worked On-Call	0.11 **	-0.01	-0.02	0.04 *	0.04 **	0.01	0.02	0.03
	(3.07) †	(0.50)	(1.18)	(2.52) †	(2.90) †	(1.46) †	(1.86) †	(1.54)
Shift Change	0.10 **	0.03	0.06 ***	0.02	0.02	0.01	0.01	-0.01
	(3.06)	(1.91)	(3.42)	(1.46)	(1.26)	(1.85)	(1.00)	(0.79)
Variable schedule	0.15 ***	0.04 **	0.08 ***	0.02	0.01	0.00	0.00	0.01
	(4.70)	(3.04)	(5.03)	(1.75)	(0.46)	(0.45)	(0.29)	(0.97)
< 1 week notice	-0.03	-0.03	-0.01	0.01	-0.01	0.00	0.00	-0.01
	(0.89)	(1.86)	(0.29)	(0.67)	(0.63)	(0.43)	(0.05)	(0.88)
Lack schedule control	-0.05	-0.01	-0.02	0.02	-0.03	-0.01	-0.01	0.00
	(0.98)	(0.41)	(0.61)	(0.72)	(1.63)	(0.58)	(1.13)	(0.13)
Youngest child age	0.01	-0.01 **	-0.01 **	-0.01 ***	0.02 ***	0.01 ***	0.00 **	0.00
	(1.31)	(3.03)	(2.93)	(4.00)	(8.76)	(4.48)	(2.69)	(0.26)
Has 2+ children	0.00	0.01	-0.09 ***	-0.01	0.14 ***	0.00	-0.02	-0.05 **
	(0.06)	(0.64)	(4.81)	(0.66)	(10.30)	(0.48)	(1.89)	(3.08)
Female	0.07	-0.06 ***	0.02	0.02	0.05 ***	0.00	0.00	0.03
	(1.85)	(3.61)	(1.19)	(1.43)	(3.30)	(0.52)	(0.18)	(1.82)
Not living w/ partner	-0.81 ***	0.37 ***	-0.11 ***	-0.10 ***	-0.03 *	0.00	-0.02 *	-0.11 ***
	(21.27)	(22.93)	(5.60)	(5.98)	(2.26)	(0.20)	(2.16)	(6.24)
Intercept	1.29 ***	0.52 ***	0.68 ***	0.19 **	0.01	-0.05	0.03	-0.02
	(7.52)	(7.04)	(7.63)	(2.62)	(0.12)	(1.41)	(0.57)	(0.23)
N	3632	3668	3667	3650	3651	3644	3642	3653

T-statistics in parentheses; * p<0.05, ** p<0.01, *** p<0.001; † indicates that the F-test of joint significance of on-call and last-minute scheduling changes significant at p<.05.

Models also control for mother's age, race/ethnicity, education, school enrollment, household income, resources to cope with a $400 expense shock, job tenure, usual weekly hours, hourly wage, manager, interview month. Coefficients on these additional covariates not shown.

Table 3. Child Care Arrangements regressed on Just in Time Work Schedules for Working Parents with a Child Aged 0 to 9 Years accounting for selection using Inverse Probability of Treatment Weights

	Number of care arrangements	Spousal care	Grandparent or relative care	Babysitter care	Sibling care	Child cares for self	Sibling less than 10 or self care	Formal day care or school care
Worked On-Call	0.12 **	-0.01	-0.02	0.04 *	0.04 *	0.01	0.02	0.03
	(3.02)	(0.33)	(0.98)	(2.48)	(2.56)	(1.40)	(1.62)	(1.81)
Shift Change	0.09 **	0.02	0.05 **	0.02	0.02	0.01	0.01	-0.0061
	(2.69)	(1.32)	(2.86)	(1.22)	(1.23)	(1.78)	(0.96)	(0.38)
F-test	18.50	0.45	1.75	7.90	8.67	5.95	3.79	1.37
	p<.001 †	p=.501	p=.186	p=.005 †	p=.003 †	p=.015 †	p=.052	p=.242
n	3632	3668	3667	3650	3651	3644	3642	3653

T-statistics in parentheses; * p<0.05, ** p<0.01, *** p<0.001; † indicates that the F-test of joint significance of on-call and last-minute scheduling changes significant at p<.05.

Models also control for variable schedule, schedule notice, schedule control; parent has more than one child, youngest child age, parental age, race/ethnicity, education, school enrollment, household income, resources to cope with a $400 expense shock, job tenure, usual weekly hours, hourly wage, manager, and interview month. Coefficients on these additional covariates not shown.

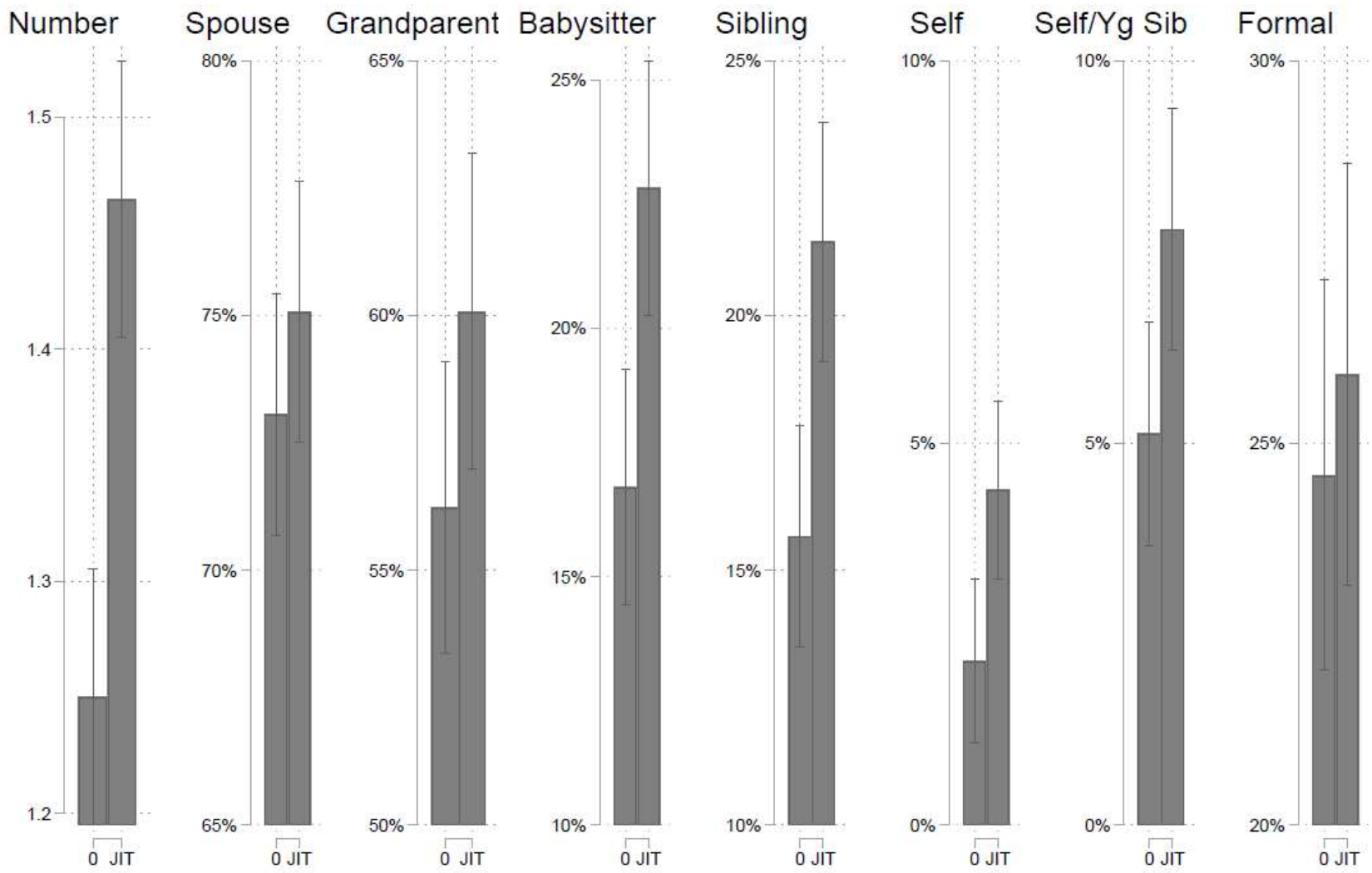
Table 4. Days of Child Care Type regressed on Just in Time Work Schedules for Working Parents with a Child Aged 0 to 9 Years

	Days of Spousal care/week	Days of Grandparent or relative care/week	Days of Babysitter care/week	Days of Sibling care/week	Days Child cares for self/week	Days of Sibling less than 10 or self care/week	Days of Formal day care or school care/week
Worked On-Call	-0.062	-0.040	0.138 *	0.200 ***	0.054	0.095 *	0.094
	(0.70)	(0.46)	(2.27)	(3.61)	(1.75)	(2.47)	(1.11)
Shift Change	0.161	0.294 ***	0.051	-0.006	0.047	0.016	-0.058
	(1.90)	(3.56)	(0.89)	(0.10)	(1.59)	(0.44)	(0.72)
F-test	0.77	5.3	6.09	7.68	6.62	5.23	0.11
	p = 0.382	p=0.021 †	p=0.014 †	p=.006 †	p=.010 †	p=.022 †	p=.0738
n	3668	3667	3650	3651	3644	3642	3653

T-statistics in parentheses; * p<0.05, ** p<0.01, *** p<0.001; † indicates that the F-test of joint significance of on-call and last-minute scheduling changes significant at p<.05.

Models also control for variable schedule, schedule notice, schedule control; parent has more than one child, youngest child age, parental age, race/ethnicity, education, school enrollment, household income, resources to cope with a $400 expense shock, job tenure, usual weekly hours, hourly wage, manager, and interview month. Coefficients on these additional covariates not shown.

Figure 1. Child Care Arrangements by On-Call Shifts or Last-Minute Schedule Changes (JIT)



Notes: "Number" is number of types of care; "Self" is child is unsupervised; "Self/Yg Sib" is child is left alone or with a sibling younger than 10 years of age; "Formal" is child care provided by a daycare center or school-based care provider. The left bar in each pair represents those who do not work on-call and do not experience last-minute shift changes and the right bar in each pair represents those who work on-call and experience last-minute changes.