Work Scheduling for American Mothers, 1990 and 2012

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Abstract
American working conditions have deteriorated over the last 30 years; one commonly-noted change is the rise of nonstandard and unstable work schedules. Such schedules, especially when held by mothers, negatively affect family functioning and the well-being and development of children. The evidence that such schedules are actually increasing in prevalence is, however, limited. This paper describes and compares the working schedules—in terms of type, duration, and variability—of American mothers in 1990 and 2012. Analysis demonstrates that nonstandard work has become slightly more common for single mothers but not for their partnered peers. Mothers in both single-mother and two-partner households, however, experience considerably greater within-week schedule variability in 2012 than they did in 1990. Decomposition of variation over time indicates that these changes stem from shifts in the associations between individuals' characteristics and work schedules rather than the underlying distribution of characteristics across the population.

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Introduction

The conditions under which many Americans work have, by a number of standards, worsened over the last forty years (Collins and Mayer 2010; Doussard 2013; Kalleberg 2009, 2011; Lambert 2008; Lein et al. 2005; Shulman 2005). One of the frequently-invoked signs of this worsening is change in the hours that employees work. Evening and night "nonstandard" shifts and flexible, unstable schedules are understood to be increasingly common, especially for less-educated, lower-income, and non-white workers (Hamermesh 2002; Presser 2003). An increase in the prevalence of such schedules is worrisome because they have well-documented negative consequences for both workers and for workers' families, particularly their children (Davis, Crouter, and McHale 2006; Dunifon, Kalil, and Bajracharya 2005; Han 2004, 2005, 2006, 2008; Han, Miller, and Waldfogel 2010; Henly and Lambert 2005, 2014; Joshi and Bogen 2007; Phillips 2002; Presser 2003; Strazdins et al. 2006, 2004; Zeytinoglu et al. 2004).

Evidence that such schedules are becoming more common, however, is surprisingly thin. Support typically comes in one of three forms. First, a number of interview-based studies have documented the use—and apparent *increased* use—of such schedules (Lambert 2008; Lambert, Haley-Lock, and Henly 2012; Lein et al. 2005). These studies, however, rely on non-representative samples that both limit generalizability and do not allow for comparisons over time. Second, the prolonged growth of the service and retail sectors (Autor and Dorn 2013; Lee and Wolpin 2006)—rife with jobs that entail nonstandard or unstable schedules—has fueled predictions of more such schedules in the modern economy (Presser and Cox 1997). This speculative approach presumes that associations between occupations and nonstandard/unstable schedules are either fixed or strengthening; no evidence supports this presumption. Third, a number of researchers have used repeated cross-sectional surveys to characterize the prevalence

of nonstandard schedules (Hamermesh 2002; Presser 2003). Such analyses focus on the schedules of those who have selected into the labor force—or in some cases only a subset thereof—which hampers comparisons over time.

This paper answers two questions. Are mothers increasingly working nonstandard and unstable schedules and thereby exposing their children to the attendant consequences? If so, what factors account for these changes? Using the National Child Care Survey (NCCS) and the National Survey of Early Care and Education (NSECE), I describe the work schedules of American mothers in two periods: 1990 and 2012. I compare across these two periods to demonstrate the extent to which (1) the distribution of maternal working schedules has changed and (2) working schedules have grown more variable. In so doing, I bring to bear large-scale, nationally-representative data; I rely on detailed scheduling data for a full, seven-day week; and I analyze the schedules of both working and non-working parents and partners, thereby avoiding problems related to selection into employment. I provide a new typology of working schedules; this represents an alternative to traditional shift definitions that are increasingly divorced from individuals' actual working patterns (Henly and Lambert 2005; Lein et al. 2005). I find that fewer mothers are working standard schedules in 2012 than in 1990; that more mothers are working variable schedules; and that more single mothers are working nonstandard shifts.

To answer the second question posed above, I assess the changing correlates of these schedules. Changes in the prevalence of a given schedule over time can be accounted for by some combination of changes in the population distribution of certain characteristics (e.g., higher levels of educational attainment) and changes to the relationships between these characteristics and the given schedule (to continue the example, education may not predict schedule type as strongly as it once did). Occupation, education, race, and income are commonly linked to

nonstandard and unstable work. Using Blinder-Oaxaca decomposition techniques, I am able to show that changes in maternal work schedules between 1990 and 2012 are entirely accounted for by changes in the associations between population characteristics and work schedules rather than by changes in the underlying distributions of those characteristics. I use logistic regression models to pinpoint the specific coefficients that are shifting over time.

The next section reviews the literature on nonstandard and unstable work and discusses selection problems that inhibit assessment of temporal variation. The third section describes the data sources, the sequence analysis and clustering methods that are used to derive schedules, and the decomposition and logistic regression models employed. This article is accompanied by a Methodological Appendix for those seeking more detail. Results are presented in the fourth section prior to a discussion of their broader implications in the final section.

Background

Nonstandard and Unstable Work

Nonstandard work scheduling typically refers to working a majority of hours outside of the traditional "standard" day shift (often defined as 8 am to 6 pm). As of 2010, 28% of all workers were estimated to hold a nonstandard schedule (Enchautegui 2013). Estimates based on Current Population Survey (CPS) and American Time Use Survey (ATUS) data have demonstrated that nonstandard schedules are more common for men, less-educated workers, lower-paid workers, minorities, and, in at least some analyses, 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) (Presser 2003; Presser and Cox 1997).

Unstable schedules are those which vary from week-to-week or day-to-day; they are characterized by the limited amount of advance notice that employees are given (to the point where they may be altered mid-shift) (Henly, Shaefer, and Waxman 2006). Workers with unstable schedules exercise little or no control over which hours they work. Unstable scheduling has been the focus of considerably less research than nonstandard work scheduling. Analyses to date typically focus either on the locus of scheduling control (Gerstel and Clawson 2014; Lambert et al. 2012; McCrate 2012) or the consequences of unstable schedules (Carrillo et al. 2017; Dunifon et al. 2005; Henly and Lambert 2005, 2014; Zeytinoglu et al. 2004) rather than on the prevalence and correlates of such schedules. It is assumed that unstable schedules are a relatively new phenomenon—increasing in frequency as working conditions deteriorate—and that they are most often found in the retail and service sectors.

Workers with nonstandard and unstable schedules—especially working mothers—face myriad challenges. Nonstandard schedules have been associated with increased depression, decreased marital stability, and fewer shared meals with or extracurricular activities for children (Han 2005; Phillips 2002; Presser 2003). Such schedules lead parents to employ childcare arrangements that are more complex and less stimulating or developmentally productive (Han 2004; Hepburn 2017; Kimmel and Powell 2006). Maternal nonstandard work 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 et al. 2006; Dunifon et al. 2005; Han 2005, 2006, 2008; Han et al. 2010; Strazdins et al. 2006, 2004). Many of the effects identified for nonstandard work likely hold for those working unstable schedules. Multiple authors, for instance, have documented associations between maternal unstable schedules and increased stress and strain (Henly and Lambert 2014; Zeytinoglu et al. 2004).

Unstable work requires parents to have flexible patchworks of care in place and can lead to high reliance on informal care (Carrillo et al. 2017; Henly and Lambert 2005).

We lack an assessment of whether such schedules are becoming more common and, if so, why. Attempts to do so have been stymied by methodological choices that inhibit analyses of changes over time. One consistent factor in research on the prevalence of nonstandard and unstable work is the unit of analysis: workers. This sample is occasionally restricted (e.g., Hamermesh (2002) only analyzed those who worked 20 or more hours per week), but nearly all research on work schedules takes employment as a prerequisite. This focus on employees, however, presents a selection problem: changes in work scheduling are conflated with changes to selection into employment. Likewise, analyzing the characteristics associated with nonstandard and unstable work based on a sample of workers forces us to ignore how those characteristics may be simultaneously related to selection into employment.

One solution to this selection problem would be to track the prevalence of nonstandard and unstable work among all *working-age adults* at multiple points in time. If we are strictly interested in individuals' own exposure to these schedules, such a solution would be effective. Often, however, our concern rests with exposure more broadly, and in particular how families and children are affected by nonstandard and unstable work schedules. The literature cited above provides ample evidence that maternal work schedules in particular have significant and lasting effects on children's well-being and development. This then yields a second solution: track the prevalence of maternal nonstandard and unstable work among all *households with children* at multiple points in time. This approach—which is what is undertaken here—solves the selection problems identified above.

Measuring and Explaining Changes in Prevalence

How has exposure to nonstandard and unstable schedules changed over the last quarter century? Research on the decline of employment conditions leads to the expectation that it has likely increased for all workers, including the class of working parents. This view is not universal—Hamermesh (2002), for one, has argued that nonstandard work has become more *concentrated* but not necessarily more *prevalent*—but seems the most likely case.

> Hypotheses 1: Compared to 1990, more mothers in 2012 hold nonstandard and variable working schedules.

What accounts for these changes? As noted above, shifts in the prevalence of such schedules over time can be accounted for by a combination of two factors: "compositional" changes in the characteristics of the population or economy (more diversity, more education, more work in certain occupations, etc.) and "relational" changes to the associations between these characteristics and the likelihood of nonstandard/unstable work.[1] The previous literature highlights the significance of occupation, education, race, and income in determining the likelihood of nonstandard and, to a lesser extent, unstable work.[2] All of these factors have changed over the last 25 years.

The U.S. has witnessed the prolonged growth of the service and retail sectors over the last several decades (Lee and Wolpin 2006). Since the 1980s, the service sector has been the only

[1]Change could be attributed entirely to one or the other factor (i.e., entirely to demographic/economic changes or entirely to changes in the relationships between those characteristics and work scheduling). In practice, the result is likely to fall somewhere between these extremes.

[2]It is worth acknowledging variability in employee preferences. For any number of reasons, some mothers may elect to take work at nonstandard hours. Such work could plausibly allow these mothers to reduce reliance on non-parental care or could be sufficiently better-compensated to make it worthwhile. For couples in which joint leisure is relatively less valuable than availability of parental care, desynchronized work schedules (with one partner working evening or night) may be a satisfactory equilibrium. My goal is not to evaluate the benefits or drawbacks of such decisions. In investigating the changing associations between education, industry, race, income and maternal work scheduling, as I do below, I implicitly assume stability in parental preferences over time. I am aware of no evidence suggesting changes in such preferences over time.

area of employment growth for low-skilled workers (Autor and Dorn 2013). There is little reason to believe that work scheduling has become more family-friendly in these sectors during the time period under analysis. Deregulation and public policies aimed at those at the bottom of the labor market—particularly in the form of the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA) and its successors—have served to weaken the position of low-skilled employees vis-a-vis employers and allow the expansion of worker-unfriendly practices (Collins and Mayer 2010; Kalleberg 2009, 2011).

If more service and retail jobs are available—and if such jobs are as or more likely to entail a nonstandard or unstable schedule as they were in 1990—then this would help to explain an increase in nonstandard and/or variable schedules. Indeed, previous researchers have espoused this hypothesis. Presser and Cox identified retail and service occupations as major sites of nonstandard work for less-educated mothers in the early 1990s. They argued that these occupations were not only likely to become more common during the 1990s and 2000s (following Bureau of Labor Statistics projections), but were also likely to be landing places for women transitioning off of welfare in the years following passage of PRWORA (Presser and Cox 1997). The assumption is that unstable work was relatively rare previously but has become widespread particularly in these sectors in the last 30 years.

High school and college completion rates have steadily increased over the last 30 years. The adult population is better-educated, and the prime working age segment of the adult population—those most likely to have children in their households—is better-educated than the population at large (Ryan and Bauman 2016). Those with higher educational attainment have better employment outcomes than their less-educated peers: they hold higher-status jobs, receive higher incomes, and have lower unemployment rates and shorter periods of unemployment (Hout 2012).

Previous analyses indicate that they are also less likely to hold nonstandard schedules (Enchautegui 2013; Hamermesh 2002; Presser 2003). There is little reason to believe, however, that education plays a *greater* role now than it did in 1990 in determining employment characteristics. Hacker, for instance, argues that the protective effects of education in the labor market have diminished in recent years (Hacker 2006).

The racial composition of America has changed over the last 25 years. The non-Hispanic white population is declining and the population of minority groups is increasing (Lopez, Passel, and Rohal 2015; Sandefur et al. 2001). It is unclear whether changes in racial composition have been accompanied by changes in associations between race and employment characteristics. There is no compelling reason to believe that the treatment of minority employees (relative to their white peers and controlling for other characteristics) has substantially improved over time.

Finally, income inequality has been on the rise over the last half century. The rich receive an ever-larger share of all income and the poor get less (Heathcote, Perri, and Violante 2010; Piketty 2015; Piketty and Saez 2003). This growing divide between haves and have-nots has been reflected in working conditions. Work at nonstandard hours in particular has shifted over time to those at the bottom of the income distribution (Hamermesh 2002). Schedule variability, by contrast, may be more widespread. Indeed, a growing body of research examines the meaning, implications, and control of such flexibility across the income and/or class divide (Gerstel and Clawson 2014; Henly et al. 2006; Lambert et al. 2012; McCrate 2012). That research suggests that schedule variability may be an increasingly common trend for all, but that we should remain attuned to its lived consequences.

Some of these changes represent likely protective effects (e.g., more education) while others tend toward decreasing job security or quality (e.g., more work in the service and retail sectors).

Likewise, in some cases the compositional changes may lend themselves toward shifts in one direction while the relational changes are in the opposite direction. In the absence of a strong reason to favor one over the other, I suspect that compositional and relational changes will carry roughly equal weight in explaining changes in schedule prevalence.

> Hypothesis 2: Changes in the prevalence of nonstandard and unstable work—as a function of shifts in occupation, education, race, and income—will be the product of compositional and relational changes in roughly equal measure.

In addition, I put forward four hypotheses related to the specific factors addressed above:

> Hypothesis 2a: Retail and service sector employment is more common for working mothers in 2012 than it was in 1990 and is increasingly associated with both nonstandard and unstable schedules.
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> Hypothesis 2b: Mothers in 2012 will be better-educated than they were in 1990, but associations between education and nonstandard/unstable work schedules will not have changed.
>
> Hypothesis 2c: Mothers in 2012 will be a more diverse group than they were in 1990. Positive associations between minority status and nonstandard/unstable work will either be stable or increasing.
>
> Hypothesis 2d: Mothers will report little increase in family income between 1990 and 2012. Those with relatively lower incomes will be increasingly likely to work a nonstandard schedule, but will be at no increased risk of working a variable schedule.

Data and Methods

This paper uses data from two nationally-representative studies of the supply of and demand for childcare to analyze the working schedules of American mothers in households with children

under age 13 at two points in time: 1990 and 2012. The first, the National Child Care Survey (NCCS), was conducted in late 1989 and early 1990. It consisted of five studies: a survey of parents with children under age 13, a survey of the childcare providers used by those parents, a separate survey of individuals who provided childcare in their homes, and two sub-studies of select parents: those with low household incomes (less than $15,000) and those in the military. I make use of the parent study and the low-income sub-study here; combined, these data were gathered from 4,777 households. These studies collected extensive data on the childcare arrangements that families use, the employment schedules of parents, and family characteristics. These surveys were conducted via computer-assisted telephone interviewing, making use of a version of random digit dialing (Hofferth et al. 1992b, 1992a).

The second data source is the National Survey of Early Care and Education (NSECE), which was carried out in 2012. 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 and informal 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. The survey collected data on many of the same topics as the NCCS, often with identical or near-identical questions. Data were collected primarily via computer-assisted in-person interviews, though a minority were completed via computer-assisted telephone interviewing (Bowman et al. 2013).

I impose a number of sample restrictions on the data. First, I remove all interviews conducted with a respondent who was not either a biological or adoptive parent of a child in the household (n=114 in the NCCS and n=730 in the NSECE). Second, I remove all single-father households (n=71 in the NCCS and n=370 in the NSECE) and all same-sex two-partner households (n=23 in

the NCCS and n=80 in the NSECE) from the sample. Third, I remove a set of cases that are missing or have apparently erroneous maternal schedules (n=121 in the NCCS and n=80 in the NSECE). This leaves a remaining analytic sample of 14,485 cases: 916 single mothers and 3,352 partnered mothers from the NCCS and 2,777 single mothers and 7,590 partnered mothers from the NSECE.[3]

Describing Work Schedules

Surveys that gather scheduling data typically collect information either from a single specific day (as in the ATUS) or with reference to an abstract "usual" day (as in the May supplement to the CPS). Without repeated schedules covering multiple days we lack a reliable way of assessing variability. Hamermesh acknowledges this problem, noting that, "the ideal, a set of repeated cross-sections of a large numbers of time diaries showing exactly when people are at work for each of a number of days, is simply unavailable in the United States or elsewhere" (2002:603). The NCCS and NSECE do not suffer from this problem and, when combined, represent something approaching the ideal that Hamermesh lays out: each survey collected work schedule data for the respondent and their partner (if present in the household) for a full seven-day week.

To harmonize the NCCS and NSECE data I dropped all scheduling information from men and simplified the remaining schedules such that each person-week was broken into 15-minute blocks and each block assigned to either a "work" or "other" state. Each individual's schedule is stored as a 672-block vector 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).[4] I make use of sequence

[3]Note that NSECE disclosure guidelines restrict reports of weighted and unweighted frequencies and results. All numbers presented in this paper have been rounded to the nearest 10 and/or restricted to three significant/leading digits.

[4]It bears noting here that both surveys collected data from a single respondent, most often the mother of a child under the age of 13. Recall problems may pertain to such data, but they should be the same problems across the two surveys. It also bears highlighting one significant difference in how these data were collected. In both surveys

analysis and clustering methods to describe and characterize the maternal schedules. The most apparent alternative would be a simple categorization of schedules following traditional shift definitions (i.e., part- or full-time standard, evening, or night work). That option has at least two drawbacks. First, these traditional definitions are less settled than is commonly assumed; what exactly constitutes a standard or nonstandard shift varies from study to study. I have no strong grounds for choosing one of these definitions over the other. Second, there is compelling evidence—central, in fact, to much of the literature on unstable work—that these traditional definitions have become decreasingly good descriptors of the types of schedules that individuals actually work (Henly and Lambert 2005; Lein et al. 2005).

Sequence analysis and clustering, by contrast, allow for the derivation of schedules directly from the data without imposing any strong prior model of work scheduling. These methods offer up more subtle ways of characterizing schedules and are more appropriate as employees work shifts that are decreasingly aligned with traditional standards. Supplementary analyses (available upon request) demonstrate that sequence analysis and clustering yield typologies of work scheduling that perform better than those that result from traditional definitions by a number of metrics.

The steps involved are described in detail in Methodological Appendix A and briefly summarized here. I divide the week-long maternal schedules 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 Optimal Matching (OM) in which the cost of transitioning between states varies with time. DHD matching is well-suited to a time-varying

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respondents were asked to report work start and end times, but in the NSECE they were instructed to include time spent commuting to and from work. Because there is no direct way of accounting for commute time, I developed a method (described in Methodological Appendix A) to trim reported working hours in the NSECE on the basis of related covariates so as to make the two data sources commensurable.

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 fit statistics. I then re-configure the data into a week format; each 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 mother's week. 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.

The first-stage clustering process, when run over all maternal person-days, yields seven schedule types.[5] Figure 1 presents state distribution plots for each of these clusters. This type of plot gives the distribution of states ("work" and "other") in each 15-minute block; it can be thought of as a series of vertical bar plots run up against each other in chronological order. Take as an example the upper-right panel ("Standard"), which represents what we would think of as traditional standard work day. At 4:15 nearly all individuals in this cluster are in the non-working

[5]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 these seven clusters is .754, which suggests that a strong structure has been identified (Rousseeuw 1987; Studer 2013).

"other" state; around 8:00 they begin transitioning to the "work" state and the vast majority are working over the next eight to nine hours. They begin transitioning back to the "other" state around 17:00 (5:00 pm) and only a small percentage are still working at 21:15 (9:15 pm).

FIGURE 1 HERE

In the top-most cluster on the left, "Limited Work," individuals spend all or very nearly all of their time in non-work status. The two clusters below that follow the traditional nonstandard evening and night shifts; these two groups are combined in most of the analyses below. In addition to the Standard schedule described above, there are three variants thereof which are displayed on the right-hand side: standard schedules shifted earlier in the day ("Early"); shortened days with work falling entirely within standard hours ("Short"); and schedules of standard length which fall mostly in the afternoon and evening ("Afternoon"). In what follows, these three schedule types are referred to jointly as "off-standard" schedules.

These seven day types in turn form the basis for the categorization of person-weeks (ASW of the six-cluster solution is .786). Each week-level cluster is heavily but not exclusively populated by days of the given type. For instance, many days in the week-level Early category are of the Early type, but there are also Standard and Short type days scattered throughout, as well as Limited Work (especially on the weekends).

Table 1 provides a detailed description of these schedule types. The first two columns provide the modal start and end times for the seven day-level clusters.[6] The next three columns present the average number of weekday standard and nonstandard hours—with standard hours defined as 8 am to 6 pm—and weekend hours. Here we can see, for instance, that those with a Standard schedule typically work from 8:30 am to 5:00 pm, putting in an average of 7.9 weekday standard

[6]The modal schedule for the Limited Work schedule is to remain in the "other" state for the entire day, so there is no modal start or end time. Night schedules have two elements: 45 minutes of work at the end of the day as shifts begin and seven hours to start the next day for the remainder of the shift.

hours and almost no weekday nonstandard (0.2) or weekend (0.6) hours. Those working one of the nonstandard schedules, by contrast, work on average only 1.7 weekday standard hours but 4.6 weekday nonstandard and 2.5 weekend hours.

The subsequent three columns of Table 1 switch to the week level, displaying the average number of days that individuals in each schedule type (or combination) report no working hours, fewer than seven hours (recorded as a part-time day), or seven or more hours (recorded as a full-time day). Here we see, for instance, the large number of non-working days amongst those in the Limited Work category. Part-time work—analyzed in greater depth in Methodological Appendix B—is most common for those working a nonstandard or a Short schedule. Finally, the last column of Table 1 displays the percentage of individuals within that schedule type (or combination) that have more than one working schedule type (i.e., excluding Limited Work) in the observed week. For workers with a Standard schedule this is relatively rare: only 16.3% work more than one type of schedule. This variability is still uncommon for those working a nonstandard schedule, but considerably less so: almost a quarter of these workers had more than one schedule type in the given week.

TABLE 1 HERE

This last measure provides a simple indicator of within-week schedule variability. It is important to distinguish this concept of within-week schedule variability from that of schedule instability more broadly. Schedule instability can be thought of as consisting of four components: within-week variability, between-week variability, advance notice, and employee control. An unstable schedule must display either within- or between-week variability; this variability must be paired with either limited advance notice or low control on the part of the worker to constitute an unstable schedule. This combination lies at the heart of schedule instability as a concept. A

schedule that varies from day-to-day is far less pernicious when the worker has six weeks notice rather than only 48 hours. Likewise, a schedule that, for example, cycles between day and evening shifts is more manageable when the employee has control over when those different shifts fall. Within-week schedule variability is the only one of these four components of unstable scheduling that I am able to effectively measure across these two surveys. It is important that it not be misinterpreted as a direct proxy for schedule instability. I discuss the benefits and drawbacks of the measure in greater depth in Methodological Appendix B and also demonstrate and discuss differences by household type in other measures of schedule instability available in the NCCS and NSECE.

Analytic Plan

Addressing Hypothesis 1 is straightforward once schedules are categorized; t-tests can determine if nonstandard and variable schedules are more or less common in 2012 than they were in 1990.

To test Hypothesis 2, I run a set of Blinder-Oaxaca decompositions to assess which factors carry most weight in accounting for observed changes in nonstandard schedules and schedule variability. This approach allows me to decompose the changes over time into compositional and relational elements (Hlavac 2018; O'Donnell et al. 2008). It also builds on previous work in the sociology of the family decomposing changes over time in time use (e.g., Sandberg and Hofferth (2001)). Because the dependent variables in these cases are binary (i.e., holding a nonstandard schedule or not), I employ a non-linear extension of Blinder-Oaxaca models using logistic regression and the weighting method outlined by Yun (2004). I calculate two-fold decompositions; the reference coefficients are set, following Jann (2008), using a pooled regression model including group indicator as an additional regressor. Results are substantively

equivalent regardless of selected reference category (results available upon request). I compute decompositions based on normalized effects across categorical predictors (Yun 2005).

To test Hypotheses 2a-d, I carry out a series of logistic regressions testing for changes in associations between the main independent variables of interest (occupation, education, race, and income) and schedule type and variability. In these models I predict holding the given schedule type (e.g., a nonstandard schedule) relative to holding any other schedule type. I include interactions between each of the independent variables and the survey year (with the 1990 NCCS serving as the baseline). These interaction terms are the main outcome of interest because they indicate the significance of changes in associations over time.

Results

TABLE 2 HERE

Table 2 provides a description of the sample split by survey year (1990 and 2012) and household type (single mothers and those with a partner in the household). All results presented here are weighted with the provided sample weights so as to be nationally representative of households with children under age 13. In terms of the number of children and age of the youngest child, there are few notable differences between 1990 and 2012. Both single and partnered mothers are, on average, approximately three years older in 2012 than in 1990. While mothers living with a partner report significantly higher household income than their single-mother peers, they experience no change in total household income (standardized to 2012 dollars) between 1990 and 2012 (consistent with Hypothesis 2d). Single mothers do, however, report a significant increase ($p=.002$) in household income between 1990 and 2012.

There are fewer white and black mothers in 2012 than in 1990 and more that report being Hispanic or of another race.[7] As expected per Hypothesis 2b, mothers in 2012 are considerably more educated than their counterparts in 1990. Modal education for both single and partnered mothers shifts from a High School diploma to a college diploma. In line with Hypothesis 2a, Single mothers are almost twice as likely to be working retail or service jobs in 2012 as in 1990 ($p<.001$).[8] By contrast, the percentage of partnered women working such jobs barely changes at all.

Table 3 presents the distributions of mothers' schedules across the categories laid out above in Table 1, both by year and by household type. The table also indicates significant differences, both across years and, in the final two columns, across household types within years. In both years, the majority of mothers fall into the Limited Work category. Between 1990 and 2012 the percentage of mothers in this category has increased (significantly among all mothers and for those living with a partner). Over that period the percentage of mothers working a Standard schedule has, by contrast, fallen. Again, this change is significant across all mothers and those living with a partner but not amongst the smaller sample of single mothers.

The combined off-standard schedules show little variation over time, but this masks divergence within the combination: Early schedules are becoming less common (significantly

[7]In the NCCS, race was collected only for the respondent. In the NSECE, race was collected for the respondent and all children in the household, but not for adult household members other than the respondent. For comparability, I report here and throughout on just respondent's race (disregarding sex of respondent in two-partner households). All observed changes in race are statistically significant with the exception of the small decline in the reported number of black mothers in two-partner households.

[8]Occupation is a simplified, condensed version of the standard 1990 Census occupation categories. These classifications changed dramatically in the late 1990s, which make translation between older and newer systems difficult. I make use of the Integrated Public Use Microdata Series' well-validated recoding of current Census categorizations back to the 1990 standard (which was the basis for the categorization in the NCCS data). Anyone who was not working in the previous week is categorized as having no occupation recorded; in the NCCS, occupation and industry variables were not collected for these individuals. Individuals were allocated into the six other categories per standard occupation classifications with one exception: those working as cashiers were set as "Service" rather than "Technicians/Support/Sales." Those whose occupation could not be coded to one of these categories were coded as having an "Other" occupation.

across all three categories) while Short and Afternoon schedules grow more common (significantly in both cases across all three categories). Across all mothers, nonstandard schedules show no change in prevalence between 1990 and 2012 (stable at 3.5%). In this case, the pattern masks differences by household type: single mothers have seen a 1.6 percentage point increase in nonstandard schedules while those living with a partner have experienced a 0.4 percentage point decrease. The increase over time in nonstandard schedules for single mothers is non-significant, though the increase in Evening schedules specifically (from 2.4% to 4.3% for single mothers) is significant. Per results in the final column, single mothers have significantly higher rates of nonstandard schedules (and specifically Evening schedules) than their partnered peers in 2012.

The final four lines report on mothers' experience of schedule variability. "Variable Schedules" reflects the measure of within-week variability presented in Table 1. Here we see a significant increase over time in the percentage of mothers with more than one working schedule over the reported week (this is true for all mothers, single mothers, and partnered mothers). Separate and not directly comparable questions in the NCCS and NSECE allow measurement of other aspects of schedule instability across household type. From the NCCS, we see that in 1990 functionally identical percentages of single and partnered mothers reported having hours that varied from week to week (16.3% and 16.0%, respectively). By contrast, in 2012 we see that significantly more single mothers report having no usual schedule whatsoever (20.2% compared to 16.3% of partnered mothers) and having one week or less of advance notice of their schedule (30% compared to 22.4% of partnered women).

TABLE 3 HERE

Given the focus of this article, there are two patterns in Table 3 that merit attention. The first is the change in the prevalence of nonstandard work. In this case, given the lack of change across all mothers, I focus attention on the increase amongst single mothers. The second pattern is the significant increase for all mothers in within-week schedule variability. In what follows I analyze these changes in two ways: first via Blinder-Oaxaca decompositions and second using a set of logistic regressions. These analyses demonstrate, respectively, (1) whether changes are primarily attributable to compositional or relational factors and (2) which relations have changed in predicting the likelihood of the given schedule type or of schedule variability.

I carry out two Blinder-Oaxaca decompositions analyzing observed differences (as presented in Table 3) over time.[9] Model 1 analyzes change in the prevalence of nonstandard schedules amongst single mothers; Model 2 analyzes change in the prevalence of standard schedules across all mothers. In both cases the given outcome is modeled on the basis of mother's occupation; mother's education (a dummy variable indicating a college diploma or higher); respondent's race (a dummy variable indicating that the respondent is non-white); log of family income; and, in the case of Models 2, household type (a dummy variable indicating single mother). Figure 2 presents the main results from these three decompositions.

FIGURE 2 HERE

In the first decomposition (Model 1) we see that changes in composition—in the occupational distribution, in educational attainment, in the racial distribution, and in income—would, ceteris paribus, lead to an extremely small *decline* in the percentage of single mothers doing nonstandard work. The observed *increase* in the prevalence of such schedules that we see in Table 3 is entirely a function of changes in relationships between these characteristics and the

[9]Because of missing values in some of the covariates, the absolute differences in the schedule characteristics modeled in the decompositions does not perfectly match the differences reported in Table 3.

likelihood of nonstandard work for this population. Model 2, accounting for the increase in within-week variability across all mothers, follows a similar pattern. The change in population composition suggests a very slight *decrease* in variability, but the changing coefficients lead to a significant *increase* ($p<.001$) in the percentage of mothers with within-week schedule variability.

These decompositions highlight the significance of shifting relationships in explaining observed changes in prevalence. Results from regression analyses—presented in Table 4—demonstrate which relations have changed and how. The two models here follow the pattern outlined above and include the same set of predictors. The models are presented with the main effects (and significance indicators) in the first two columns: these terms provide the associations between the predictor and the given schedule outcome *in 1990*. Interaction terms (and significance indicators) are in the next two columns: these terms indicate the *changes between 1990 and 2012* in predictors of the given schedule outcome. These terms allow us to assess the evidence for Hypotheses 2a-d.

TABLE 4 HERE

In Model 1, starting with the main effects, we see that nonstandard schedules were significantly more common for single mothers in service, production, or manufacturing occupations (or those occupations that could not be coded) than for those in administrative occupations in 1990.[10] There are no significant differences by education, race, or income in the likelihood of single mothers working a nonstandard schedule in 1990. Moving to the interaction terms, we see no evidence supporting Hypothesis 2a's prediction of a *strengthening* association between service sector work and nonstandard schedules. In fact, in a model predicting single mothers' nonstandard work in 2012 on the basis of these variables (available upon request),

[10]Those not working were also, unsurprisingly, significantly less likely to hold a nonstandard schedule.

service sector occupations are only marginally positively related to holding a nonstandard schedule. The one interaction in which we do see a significant change is in education: single mothers with more education are significantly less likely over time to hold a nonstandard schedule. This finding is inconsistent with the expectation of null change in Hypothesis 2b. The non-significant effects on the interactions with race and income can be read as, respectively, consistent with Hypothesis 2c and inconsistent with Hypothesis 2d.

Model 2 predicts within-week schedule variability across all mothers. Here we see that technician/support/sales and service occupations are both significantly positively associated with schedule variability in 1990. The interaction terms with time, however, indicate that service occupations grow significantly *less* associated with schedule variability over time, a finding that is inconsistent with Hypothesis 2a. Education is not associated with schedule variability in 1990; the interaction term in this case signals a declining risk of a variable schedule for those with more education (again inconsistent with the expectation of null change in Hypothesis 2b). Income has no significant effect in predicting schedule variability in 1990, but non-white race is significantly negatively associated and single mother status is marginally positively associated with within-week variability. Of these three, only the interaction term with single mother status approaches significance (indicating a reduced association over time). The lack of significance on the interaction terms for race and income can be read as consistent with Hypotheses 2c and 2d.

Discussion and Conclusion

This paper achieves two ends. First, it provides a new and detailed description of maternal working schedules, in both single-mother and heterosexual two-partner households, in 1990 and 2012. Second, it analyzes changes in the prevalence of certain schedule types and characteristics over time. Several results presented above bear greater discussion.

First, to return to the core motivation of this paper, the evidence presented here (see Table 3) suggests that maternal nonstandard work has, contrary to expectations, *not* grown more common between 1990 and 2012. 3.5% of all mothers were working a nonstandard shift in 1990 and exactly the same percentage was doing so in 2012. An alternate reading—accounting for the changing denominator—is that 7.5% of mothers not in the Limited Work category were working a nonstandard shift in 1990 and 7.9% of such mothers were doing so in 2012. The change remains trivial. An increase is noticeable when looking just at single mothers (3.5% to 5.1%), but still not significant. All of this increase in nonstandard work amongst single mothers is accounted for by the significant increase in Evening work (from 2.4% to 4.3%); the prevalence of Night work appears to decline slightly. These findings should, of course, not be misread to suggest that nonstandard work is stable across the full population: it may be that parents, and particularly mothers, are actively selecting out of this work. That explanation would fit with the finding of difference in exposure to nonstandard work by household type. In 2012, single mothers—who plausibly have less leeway to select out of such schedules by leaving the labor market—were significantly more likely than their partnered peers to work a nonstandard shift (a trend driven, again, by the significantly higher rates of Evening work among single mothers).

By contrast, there is strong evidence in Table 3 that schedules have grown more unstable over this period. The percentage of mothers with variability in their working schedules over the course of the week increases by two-thirds between 1990 and 2012 (from 7.1% to 11.9%). This measure of within-week schedule variability is, as discussed above, only one indicator of overall schedule instability, but the sizable increase observed here is nonetheless noteworthy. Also of note are single mothers' significantly higher rates, relative to their partnered peers, of not having a usual schedule and having very little advance notice of their schedule in 2012. The NCCS lacks

survey items that allow for direct comparison over time of these items, but it is possible that other surveys may allow for further analysis of temporal change.

Second, the results presented in Table 4 and Figure 2 help to account for these changes. Analyses summarized in Figure 2 indicate that the increase in nonstandard work among single mothers and the increase in within-week schedule variability across all mothers are, in both cases, entirely attributable to relational factors: changes in the associations between population characteristics and the given scheduling outcome. Shifts to the underlying population characteristics—the compositional factors of occupation, education, race, and income—tend toward very small changes in the *opposite* direction of what was observed.

The logistic regression models in Table 4 serve to elucidate the results of the Blinder-Oaxaca decompositions and highlight which of these changing associations is driving the overall changes in prevalence. Across the models presented here one factor consistently stands out: education. The interaction terms indicate a significant decrease over time in the likelihood of more-educated mothers working a nonstandard shift or varying schedule. Other factors hypothesized to change—particularly the association between service sector employment and nonstandard/variable schedules—do not do so, or do so in unexpected ways. For instance, Model 2 indicates that service sector employment is significantly positively associated with holding a variable schedule in 1990, but the interaction term indicates a significant decline in this association over time.

Third, the working schedules upon which these analyses rest deserve greater consideration. The typology of working schedules presented in Table 1 represents a set of schedules that diverges in important ways from what we generally think of as the typical day, evening, and night shifts. Those three traditional shifts are still there, but I also highlight three off-standard

work schedules: an Early day that runs, on average, from 7 am to 4 pm, a Short day running from 8:15 am to 2:30 pm, and an Afternoon schedule running from 11:15 am to 6:45 pm. Following any traditional schedule definition, these would be subsumed under the "day" or "standard" shift since most hours do fall in the standard window. But for a mother attempting to arrange care for her child, arriving to work at 7 am—when certain forms of childcare are rarely available (Team and Project 2015)—is qualitatively different than arriving at 8:30 am. Leaving the office in the mid-afternoon may mean the ability to care for kids getting home from school, but it may also foreclose opportunities for career advancement or extra-curricular socialization. One set of questions that deserves further investigation relates to who works and who determines these shifts. Are mothers accepting jobs that demand these hours or are they the ones setting these schedules? How does the age and childcare/schooling of their children affect these schedules (and vice versa)? It would be particularly interesting to track the difference between mothers working Standard, Early, and Afternoon shifts. All three yield nearly same average number of weekly working hours (41.7, 44.3, and 37.4, respectively), but do they correspond to different career trajectories?

Indeed, the results presented above yield a number of additional questions and directions for further investigation. One of particular merit involves exploring work schedules within the household context. While my focus here has been on maternal schedules, it bears acknowledging that these schedules are never set or carried out in a vacuum. All of these women have children and have to manage and contend with their schedules. The women in two-partner households have boyfriends or husbands with their own schedules; many of the single mothers have additional adults living in their homes whose schedules may affect theirs. The interactions of these schedules—their synchronization, their co-dependencies—deserve greater attention. This

type of analysis has been carried out at the level of the partner dyad (Chenu and Robinson 2002; Hamermesh 2002; Kingston and Nock 1985, 1987; Lesnard 2008; Lesnard and de Saint Pol 2009; Nock and Kingston 1984, 1988; Presser 1987, 1988), but it bears considering how these inter-dependencies operate in less-traditional or more-complex household structures.

This study has its share of limitations. First, these data only allow me to analyze schedule instability indirectly. As discussed above—and in greater depth in Appendix B—my measure of within-week variability assesses observed day-to-day variation in schedule worked. Second, the schedules that I describe above are a function of the data; they derive from the schedules reported in the NCCS and NSECE and are thus unique to these data. I expect that additional data from similar sources would yield similar clusters, but the analysis does not, nor should it be interpreted as, producing a new set of shift definitions that are meant to be applied elsewhere.

Third, these data allow for comparison of maternal schedules in 1990 to those in 2012, but do not allow for identification of a strong trend line. It is possible, for instance, that maternal nonstandard work—and the associations between service sector employment and nonstandard work—increased significantly over the 1990s and early 2000s but weakened following the Great Recession. Given a range of economic and policy changes, it would be a mistake to draw simple trend lines between data points in these two surveys. Having one additional data point following passage of PRWORA and preceding the 2007 financial crisis would allow for some interesting analyses of that possibility and others. There is, unfortunately, no such data that I am aware of that meets the necessary criteria for comparability.

Nonetheless, two data points—and these two data points in particular—do make for an important comparison. A broad and growing set of literature in Sociology suggests that working conditions have declined over the last quarter century, including with regard to working

schedules (Collins and Mayer 2010; Doussard 2013; Kalleberg 2009, 2011; Lambert 2008; Lein et al. 2005; Shulman 2005). The analyses carried out here provide mixed support for this contention for one important subpopulation: mothers. The 2012 data, moreover, allow us a glimpse into the state of employment at the outset of what may well be a new economic period: a relatively weak economic recovery with limited policies or programs aimed at protecting workers' rights. In short, while this analysis does not allow for investigation of trends between 1990 and 2012, the comparison nonetheless offers a snapshot of the changed employment landscape for American mothers and the inclusion of post-2008 data is a boon for analysis of family functioning in the present day.

Conclusion

This paper explores how maternal work schedules have changed over the last quarter century. In analyzing the schedules of nearly all mothers—working and not, single mothers and those living with a partner of the opposite sex—I provide a complete picture of the types of maternal schedules to which children are exposed. I use sequence analysis and clustering methods to derive a scheduling typology inductively from two sets of uniquely detailed scheduling data; this typology improves upon traditional schedule definitions. I then employ Blinder-Oaxaca decompositions and logistic regressions to analyze changes over time in the prevalence of several notable schedule characteristics.

The central findings are mixed. There is no evidence that more mothers are working nonstandard schedules in 2012 than they were in 1990, though there is a growing gap in the prevalence of such schedules between single and partnered mothers. Schedule variability, on the other hand, has increased significantly for all mothers. Subsequent analyses suggest a growing protective effect of education for mothers. There is no evidence that nonstandard or variable

work is increasingly concentrated in the service sector, as is commonly assumed, and even some evidence that service occupations are significantly less associated with variable schedules in 2012 than they were in 1990.

Methodological Appendices

Appendix A: Schedule Data and Analysis

In this appendix I provide a detailed account of how schedule data were collected in the NCCS and NSECE. I then describe the process that I followed to develop the maternal schedule typology on the basis of these data. The level of detail provided is likely too great for the general reader but should prove helpful for those interested in replicating or extending this study. Most analysis is carried out in R. Sequence analysis is conducted using the TraMineR (Gabadinho et al. 2015), TraMineRextras (Ritschard et al. 2015), and WeightedCluster (Studer 2014) packages; weighted logistic regression is carried out via the survey package (Lumley 2016); and weighted, non-linear Blinder-Oaxaca decompositions are carried out via the Oaxaca package in Stata.

In the NCCS, the respondent was asked how many jobs they currently work. For each job, starting with the one in which they reported working the most hours in the previous week (Monday through Sunday), they were asked which days they worked in that previous week. The interviewer then asked what time they began and ended working on each of those days. The respondent was allowed to report two shifts per day per job, and reports on up to three jobs. Multiple shifts are rare. For instance, roughly 52.5% of respondents report the start time for a first shift on Monday, but only 0.31% report the start time of a second shift. Likewise, few respondents have multiple jobs. Of the 59.4% of respondents who report paid employment, 92.5% have only a single job. Respondents are then asked an identical set of questions about their spouse or partner, if present in the household.

The NSECE schedule data collection was somewhat more complicated. The respondent was asked if, in the last week, they did any work for pay; attended classes in a high school, college, or university; or attended any courses or training programs intended to help find a job, learn a

skill, or learn a job. For each day of the previous week they were then asked if they participated in each of the reported activities (if any); there was no limit on the number of work, school, or training shifts reported in each day. The respondent was allowed to report that a given day of the week was identical to a previous day—thus reducing respondent burden—but if they did so they were asked a follow-up question confirming that the chosen day was indeed identical to the previously-described day. This set of questions was then repeated for the respondent's partner (if present in the household), any other parent of a child under age 13 in the household, and any other household members who provided more than five hours of childcare in the previous week. Respondent fatigue is a concern because this section comes after a similar, potentially more complex, childcare calendar section of the survey. The survey instrument was programmed to check parental work schedules for duplicated periods and to check against previously-collected childcare schedules for any periods of one hour or more in which children were not reported to be in care and parents were at work, school, or training. In such instances the respondent was prompted for more detail. It does not appear that the NCCS instrument included such checks.

The first difference between these two approaches is in the content of schedules. The NCCS functionally divides time into two categories: work and non-work. The NSECE allows for more states: work, school, training, and unclaimed time. For the sake of comparability, I was forced to collapse the school, training, and unclaimed categories in the NSECE into non-work (henceforth labeled "other").

The second difference is in the number of individuals whose schedules are recorded. In the NCCS, schedules are gathered only for the respondent and the spouse/partner; schedules for additional household members may be collected in the NSECE (if there are additional parents in the household or if other household members provided care in the previous week). Because my

focus here is just on maternal schedules, I eliminate all schedules not associated with the focal mother.

Third, as discussed in the main text of the article, respondents to the NSECE were instructed to include time spent commuting to and from the given activity (work, school, or training) as part of the activity itself. There is no way to easily disentangle commuting time from working time, nor any way to confirm whether or not respondents to the surveys systematically followed the prompt to include commuting time. NCCS respondents were not instructed to include commute time in their responses nor does that survey collect data that would allow the analyst to add commuting time on to existing work reports.

Because the introduction of commuting time in the NSECE leads to a basic problem of comparability with the NCCS, I trimmed working schedules in the former by taking into account three related variables: how far the individual's place of employment is from home (where individual is either the respondent or, as appropriate, the respondent's partner); the urbanicity of the area where the household is located; and whether the household has a car. Working off of American Community Survey numbers, I developed a simple rule to determine how much time to trim from the start and end of working periods. Table A1 provides the numbers for households with a car; for those without a car I doubled all times. The resulting mean estimated commute among workers is 22.5 minutes, which is close to the 2009 national mean of 25.1 minutes traveled to work (McKenzie and Rapino 2011).

TABLE A1 HERE

Finally, fourth, data from these two studies are also stored differently. In the NCCS files these data are stored as collected: as start and end times by shift and job. In these NSECE they are stored as 15-minute blocks: each household member for whom a schedule was collected has a

vector of 15-minute blocks starting from 12:00-12:14 am Monday and ending with 11:45-11:59 pm Sunday (15-minute blocks over a 7-day week results in 672 entries). Each block can take on one of four values: "work," "school," "training," or "no work/school/training" (essentially an open block). The blocks can also take on a "don't know/refused" status, but this is exceedingly rare, occurring in only 0.04% of all blocks across all schedules collected. I recoded these as open blocks. This states-sequence format is ideal for sequence analysis; I reformatted the NCCS to match. Because shifts in the NCCS were not constrained to 15 minute intervals, I was forced to round starting and ending times to the nearest quarter hour.

I place three restrictions on the data. First, I limit single-parent households to those headed by a woman. Second, I only include only partnered mothers from heterosexual two-partner households. The exclusion is driven by the extremely small number of same-sex couple households available for analysis. For data quality reasons, I also remove cases where the mother is listed as having worked the entirety of at least one 24-hour day. I then modified both data sets such that each individual had seven day-level (96-block) sequences rather than one week-level (672-block) sequence. Once harmonized, I merged the two datasets. As noted above—and given these restrictions—schedule data were collected from 916 single-mother respondents and from 3,532 mothers in two-partner households in the NCCS. In the NSECE, schedule data were collected from 2,777 single-mother respondents and from 7,590 mothers in two-partner households.

Figure A1 is a sequence index plot that presents, as a set of horizontal bars, a simple visualization of the vectors of work and non-work for six selected person-days. In this case, each of the selected days is a Tuesday; time runs left-to-right from 12 am through 11:59 pm (23:59 military time). The bottom-most individual (individual 1) did no work on this particular Tuesday

and thus all 96 of their 15-minute blocks are set to "other." Individual 2, by contrast, worked from 7:45 am to 4 pm (a standard work day, albeit one that both started and ended slightly early). Individual 3 worked an extended standard day, arriving to work at 6 am and staying through to 5 pm. Individual 4 also worked during standard hours, but only three and a half hours total. Individual 5 worked slightly less (two and a half hours) and in the evening (6-8:30 pm). Finally, the top-most individual shows the classic signs of working the evening/night shift: he or she reports having started work at 12 am (the shift in fact started on Monday evening) and their shift ends at 6 am. They then report work starting back up at 6 pm and running through the end of the day (the shift continues in the Wednesday report).

FIGURE A1 HERE

To analyze these data I make use of a set of sequence and cluster analysis tools. I begin by running a variant of Optimal Matching (OM) over all person-day reports from single mothers. OM yields a measure of how dissimilar each sequence is from every other sequence; given n sequences it produces an n x n symmetrical matrix (called a dissimilarity matrix) wherein each (i,j) off-diagonal entry is the dissimilarity between sequence i and j. Functionally, it provides the "cost" of transforming—through insertions, deletions, and substitutions—any one observed sequence into another observed sequence. More similar sequences cost less to transform into one another whereas such transformation is more "expensive" between dissimilar sequences. The costs associated with each substitution are presented as a substitution-cost matrix which is generated using either theory, intuition, the observed transition rates between the various states, or some combination of those methods (Abbott 1995; Abbott and Tsay 2000; Aisenbrey and Fasang 2010; Elzinga and Studer 2015). 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. Rather than rely on a single substitution-cost matrix (as in standard OM), there is one for each contiguous pair of blocks. Functionally this means that the cost of substituting "non-work" for "work" at 9 am (when such a transition is relatively common and thus "cheap") will be different than doing so at 9 pm (when the transition is rare and thus "expensive"). DHD matching is well-suited to a time-varying process like employment. It is also worth noting that DHD matching relies solely on substitutions and does not allow insertions or deletions. Given that all sequences in these data are of equal length, this poses no serious problem. In addition to the papers cited above, those interested in the particulars of DHD matching and its use should refer to Lesnard and de Saint Pol (2009); Raab et al. (2014); Fasang and Raab (2014). To establish the multi-dimensional substitution matrix I rely solely on the transition rates between states at each point in time.

Because of the number of comparisons involved, OM can be a computationally intensive process. To streamline it, I aggregate such that each unique person-day appears only once in the data and weight these cases according to their frequency. The 103,684 total person-days from single mothers are reduced to 2,369 unique lines; each line represents, on average, 43.8 person-days (minimum of 1, maximum of 67,300). I carry out DHD matching on these unique lines. Because the process takes into account the frequency weights associated with each unique sequence, the multi-dimensional substitution cost matrix that results is identical regardless of whether it is produced with the full or the aggregated data set.

I use the resulting dissimilarity matrix and employ the non-hierarchical Partitioning Around Medoids (PAM) algorithm to derive clusters from the data. Studer (2013) makes a strong case for PAM, which seeks to maximize a global rather than local criterion, as an alternative to hierarchical clustering. I have, however, tested alternative clustering options: Ward's Minimum

Variance Method and the Weighted Pair Group Method with Arithmetic Mean (WPGMA, which is advocated by Lesnard (2008)). The former derives very similar clusters with slightly lower average silhouette widths; I in fact use the Ward clusters as the initial medoids in the PAM algorithm. WPGMA, by contrast, yields lower-quality and often quite sparse clusters. This process results in each person-day being allocated to a cluster; the reader should refer to Figure 1 and associated text for description of these day-level clusters. 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

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 1,530 unique person-week sequences. The end result is to categorize each individual's week. Figure A2 provides state distribution plots that correspond to the seven week-level clusters. As is evident, 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.

FIGURE A2 HERE

The week-level specification allows me to observe the extent of variability in schedule type across days. I record the total number of different work-type clusters that a given individual falls

into over the course of the observed week (i.e., the count of unique clusters omitting the non-work cluster). I mark mothers as experiencing within-week schedule variability if they experience more than one working schedule over the course of the seven-day sequence. This measure is discussed in greater detail in Methodological Appendix B.

Within each person-week I also calculate how many standard hours (8 am - 5:59 pm, Monday through Friday), nonstandard weekday hours (12 am - 7:59 am; 6 pm - 11:59 pm, Monday through Friday), and weekend hours (at any hour, Saturday and Sunday) each individual works. I also designate each day as either non-working (if no work was reported), part-time (if less than seven hours of work are reported), or full-time (if seven or more hours of work are reported). These measures are used in Table 3.

Finally, it bears noting that the NCCS and NSECE were collected over slightly different calendar periods. The NCCS was collected between October, 1989 and June, 1990; the NSECE was collected between January and June, 2012. In both cases the majority of cases were collected between January and April. I carried out a series of regressions to check whether month of interview was a predictor of week-level schedule cluster. I found no evidence of seasonality in work schedules. Analyses are available upon request.

Appendix B: Schedule Variability

Unstable schedules—those that vary from day-to-day or week-to-week or that may be changed in the course of a shift—have the potential to be more disruptive than nonstandard shifts. A predictable nonstandard shift can be planned for; an unpredictable working schedule may make organizing other arrangements (including childcare) especially problematic (Bohle et al. 2004; Gerstel and Clawson 2014; Henly et al. 2006; Zeytinoglu et al. 2004). In this paper I am unable to offer a measure of schedule instability that gets at all four components instability that have

been highlighted in the literature: worker control, advance notice, and within- and between-week variability. I am, in fact, able to measure only within-week schedule variability: are individuals working the same type of schedules each working day or do their working schedules vary? To do so, I count the number of unique work-type schedules (omitting non-working days) over the seven observed days. Individuals who take on more than one unique working-type cluster are marked as holding variable schedules. This definition raises two questions. First, how is this measure of within-week schedule variability related to other components of schedule instability? Second, is this measure driven by part-time employment?

To answer the first question, I explore the relation between within-week schedule variability several questions from the NCCS and NSECE. In both surveys, work schedules are complemented by questions on schedule variability. Unfortunately, these are not the same questions. In the NCCS, respondents are asked (of each job), "Do you usually work the same or fixed hours every week or do your hours vary from week to week, such as rotating from days to evenings or nights?" An equivalent question is asked of their partner's schedule (as appropriate). In the NSECE they are asked, "Did (you/she/he) work (your/his/her) usual schedule last week, is there no usual schedule, or was last week's schedule not the usual one?" These two questions can both be understood as measures of between-week variability. There is an additional question in the NSECE that asks the respondent how far in advance they (or the other individual whose schedule they are describing) usually know what days and hours they will need to work. Neither survey includes any questions on worker control over their schedule.

I cross-tabulate within-week schedule variability with mother-specific reports from these three questions. If my measure is indeed capturing something about schedule variability, I would expect that those mothers who I categorize as having variable schedules would be more likely to

work varying schedules (in the NCCS), that they have no usual schedule or that last week's was not usual (in the NSECE), and that they have less advance notice of scheduling (in the NSECE). From the NCCS I developed a variable that indicates whether the respondent reports maternal schedule variability in any job. Results are displayed as column percentages in Table A2.

TABLE A2 HERE

In the NCCS, mothers marked as having within-week schedule variability are far more likely to report between-week variability in hours (40.1% compared to 14.2%). In the NSECE only 24.4% of mothers who I categorize as having within-week stable schedules report either "No Usual" or an "Unusual" week, whereas 41.1% of those with variable schedules do so. Almost twice as many mothers displaying within-week schedule variability report having less than a week of advance notice of their schedule (17.2% compared to 9.4%).

These results generally support the idea that this measure of within-week schedule variability is related, in the expected ways, with other components of schedule instability. Those with within-week variability in their schedules do self-report *more* of the factors that characterize unstable or contingent work than their counterparts with observed stability in schedule. But it is also clear that it would be a mistake to treat within-week variability as a direct proxy for schedule instability. 14.2% of mothers displaying within-week stability in working schedules reported in the NCCS that their working schedules varied from week to week. That sort of between-week variation should be accounted for in measuring instability. At the same time, 59.9% of mothers with within-week variability *do not* report between-week variability. It may not be appropriate to include these significant sub-populations in any analyses of schedule instability.

The second question posed above was whether within-week variability is driven by part-time employment. If this is the case, then the increase in within-week schedule variability that we observe between 1990 and 2012 may simply be a function of the across-period growth in part-time employment. To check this possibility, I cross-tabulated weekly working hours (none, less than 35, or 35 hours or more) and within-week variability. The results are in Table A3, split by household type and year, presented as row percentages.

TABLE A3 HERE

Amongst single mothers working some hours in 1990, the difference in within-week variability between part-time and full-time workers was 1.1 percentage points (a non-significant difference according to a weighted chi-square test). By 2012 this gap had grown to 2.8 percentage points and, interestingly, it is full-time workers who demonstrate greater within-week schedule variability.

Partnered mothers working part-time do have significantly higher rates of within-week variability in 1990 (14.5% compared to 11.0%; p=.036 for a weighted chi-square test). This difference shifts in the 2012 data: here mothers working full-time have significantly higher observed variability (22.4% compared to 18.7%; p=.049). A simple weighted logistic regression model predicting maternal within-week schedule variability in two-partner households on the basis of (1) a dummy variable for survey year (1990 as the reference group), (2) a dummy variable for mother's part-time work (with full-time as the reference group), and (3) the interaction between these two provides some further illumination (results available upon request). Both survey year (being in the 2012 sample) and part-time work status significantly increase the odds of within-week variability. The interaction, however, is significantly negative,

suggesting a weakening of the association between maternal part-time work and schedule variability in such households.

Figures

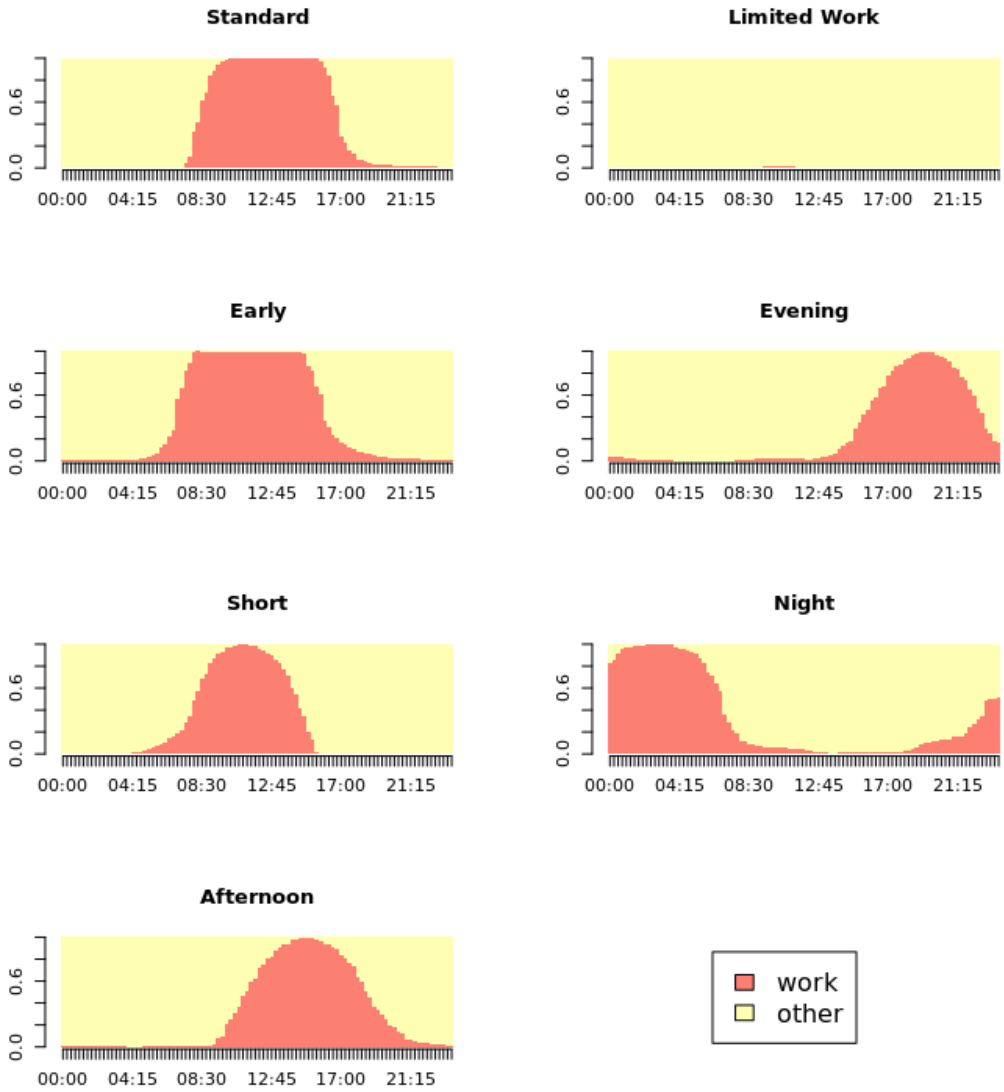

Figure 1. State distribution plots of person-day work schedules.

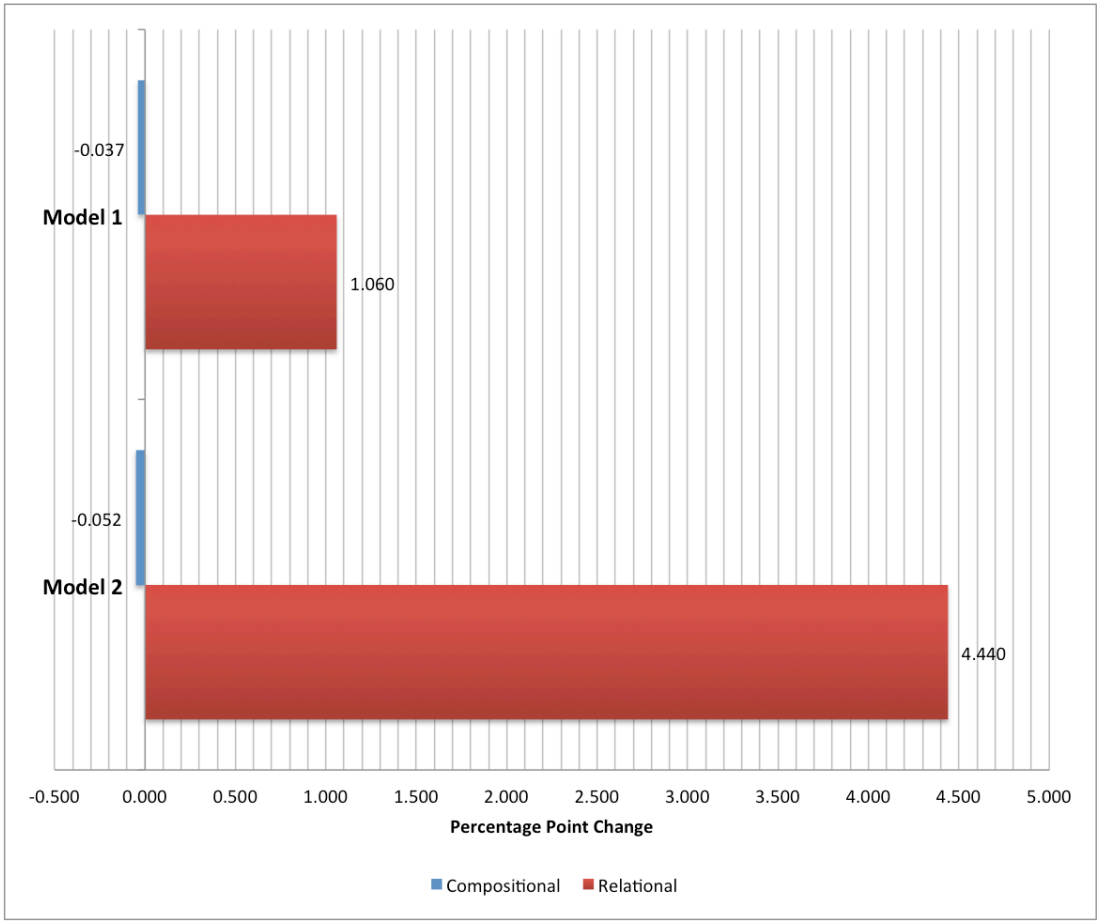

Figure 2. Results from Blinder-Oaxaca Decompositions.

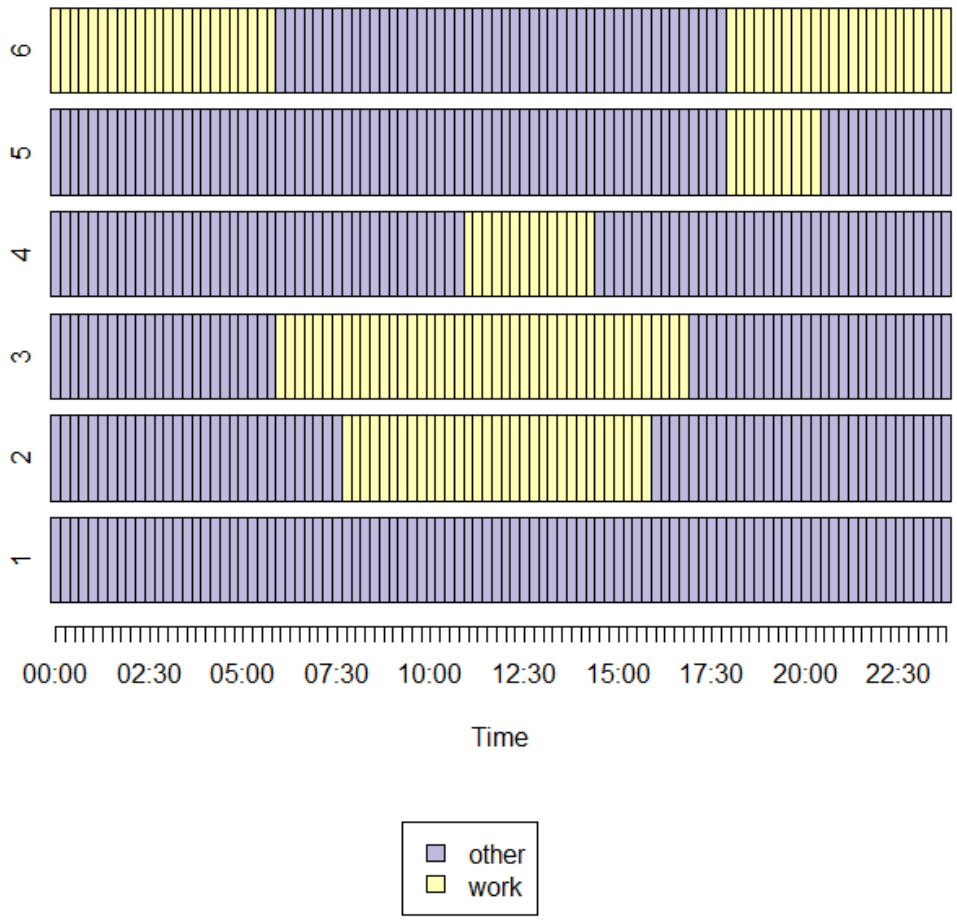

Figure A1. Sequence index plot of six selected Tuesdays.

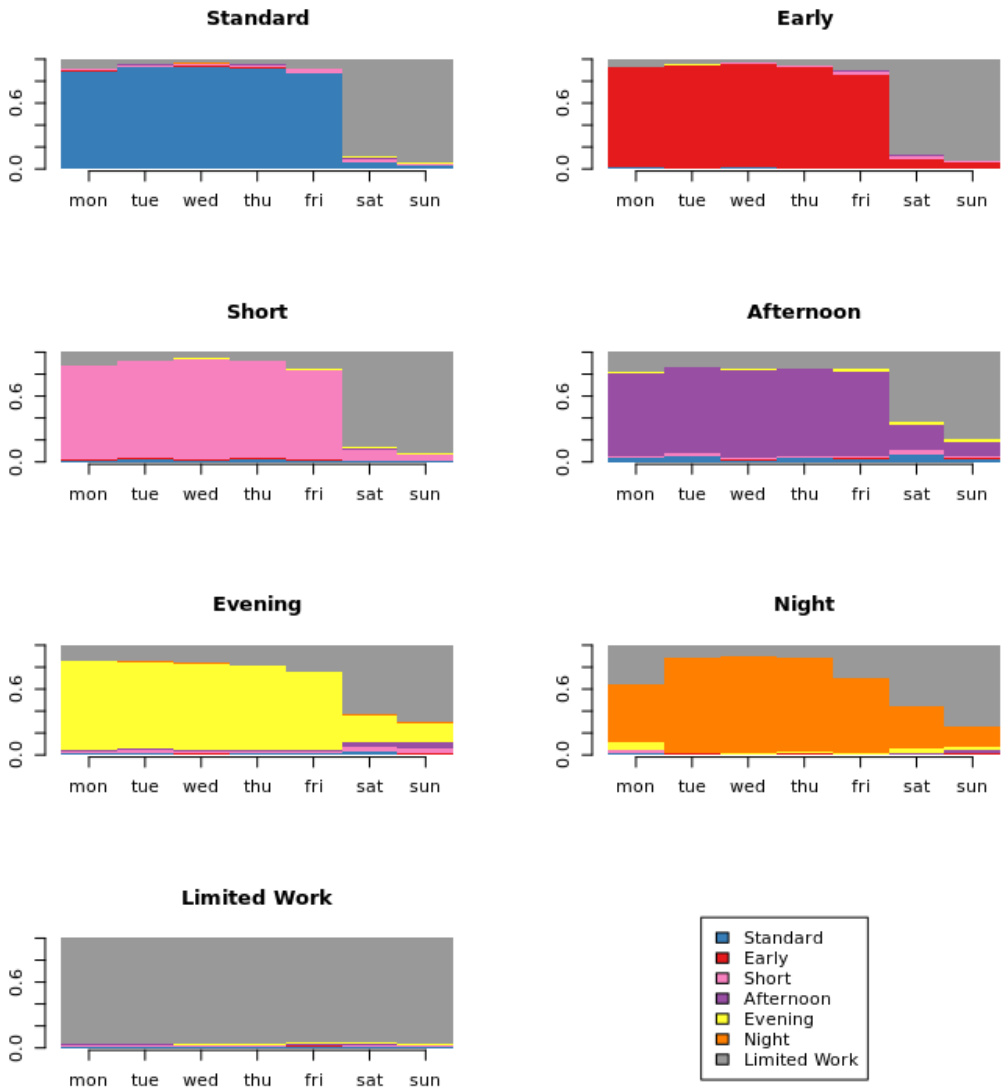

Figure A2. State distribution plot of person-week work schedules.

References

Abbott, Andrew. 1995. "Sequence Analysis: New Methods for Old Ideas." *Annual Review of Sociology* 21(1995):93–113.

Abbott, Andrew and Angela Tsay. 2000. "Sequence Analysis and Optimal Matching Methods in Sociology: Review and Prospect." *Sociological Methods & Research* 29(1):3–33.

Aisenbrey, Silke and Anette F. Fasang. 2010. "New Life for Old Ideas: The 'Second Wave' of Sequence Analysis Bringing the 'Course' Back Into the Life Course." *Sociological Methods & Research* 38(3):420–62.

Autor, David H. and David Dorn. 2013. "The Growth of Low-Skill Service Jobs and the Polarization of the US Labor Market." *American Economic Review* 103(5):1553–97.

Bohle, Philip, Michael Quinlan, David Kennedy, and Ann Williamson. 2004. "Working Hours, Work-Life Conflict and Health in Precarious and 'Permanent' Employment." *Revista de Saude Publica* 38:19–25.

Bowman, Marietta et al. 2013. *National Survey of Early Care and Education: Summary of Data Collection and Sampling Methodology*. Washington, DC: Office of Planning, Research; Evaluation, Administration for Children; Families, U.S. Department of Health; Human Services.

Carrillo, Dani, Kristen Harknett, Allison Logan, Sigrid Luhr, and Daniel Schneider. 2017. "Instability of Work and Care: How Work Schedules Shape Child-Care Arrangements for Parents Working in the Service Sector." *Social Service Review* 91(3):422–55. Retrieved (http://www.journals.uchicago.edu/doi/10.1086/693750).

Chenu, Alain and John P. Robinson. 2002. "Synchronicity in the Work Schedules of Working Couples." *Monthly Labor Review* 125:55–63.

Collins, Jane L. and Victoria Mayer. 2010. *Both Hands Tied: Welfare Reform and the Race to the Bottom in the Low-Wage Labor Market*. Chicago: University of Chicago Press.

Davis, Kelly D., Ann C. Crouter, and Susan M. McHale. 2006. "Implications of Shift work for Parent-Adolescent Relationships in Dual-Earner Families." *Family Relations* 55(4):450–60.

Doussard, Marc. 2013. *Degraded Work: The Struggle at the Bottom of the Labor Market*. Minneapolis: University of Minnesota Press.

Dunifon, Rachel, Ariel Kalil, and Ashish Bajracharya. 2005. "Maternal Working Conditions and Child Well-Being in Welfare-leaving Families." 1–36.

Elzinga, Cees H. and Matthias Studer. 2015. "Spell Sequences, State Proximities, and Distance Metrics." *Sociological Methods & Research* 44(1):3–47. Retrieved (http://smr.sagepub.com/content/44/1/3).

Enchautegui, María E. 2013. *Nonstandard Work Schedules and the Well-Being of Low-Income Families*. Washington, DC: Urban Institute.

Fasang, Anette Eva and Marcel Raab. 2014. "Beyond Transmission: Intergenerational Patterns of Family Formation Among Middle-Class American Families." *Demography* 51(5):1703–28.

Gabadinho, Alexis, Nicolas S. Muller, Gilbert Ritschard, and Matthias Studer. 2015. "TraMineR: a toolbox for exploring sequence data." Retrieved (http://traminer.unige.ch/).

Gerstel, Naomi and Dan Clawson. 2014. "Class Advantage and the Gender Divide: Flexibility on the Job and at Home." *American Journal of Sociology* 120(2):395–431.

Hacker, Jacob. 2006. *The Great Risk Shift: The New Economic Insecurity and the Decline of the American Dream*. New Haven: Yale University Press.

Hamermesh, Daniel S. 2002. "Timing, Togetherness and Time Windfalls." *Journal of Population Economics* 15(4):601–23.

Han, Wen-Jui. 2004. "Nonstandard Work Schedules and Child Care Decisions: Evidence from the NICHD Study of Early Child Care." *Early Childhood Research Quarterly* 19(2):231–56. Retrieved (http://linkinghub.elsevier.com/retrieve/pii/S0885200604000390).

Han, Wen-Jui. 2005. "Maternal Nonstandard Work Schedules and Child Cognitive Outcomes." *Child Development* 76(1):137–54. Retrieved (http://www.ncbi.nlm.nih.gov/pubmed/15693763).

Han, Wen-Jui. 2006. "Maternal work Schedules and Child Outcomes: Evidence from the National Survey of American Families." *Children and Youth Services Review* 28(9):1039–59. Retrieved (http://linkinghub.elsevier.com/retrieve/pii/S0190740905002112).

Han, Wen-Jui. 2008. "Shift Work and Child Behavioral Outcomes." *Work, Employment & Society* 22(1):67–87. Retrieved (http://wes.sagepub.com/cgi/doi/10.1177/0950017007087417).

Han, Wen-Jui, Daniel P. Miller, and Jane Waldfogel. 2010. "Parental Work Schedules and Adolescent Risky Behaviors." *Developmental Psychology* 46(5):1245–67.

Heathcote, Jonathan, Fabrizio Perri, and Giovanni L. Violante. 2010. "Unequal we stand: An empirical analysis of economic inequality in the United States, 1967-2006." *Review of Economic Dynamics* 13(1):15–51. Retrieved (http://dx.doi.org/10.1016/j.red.2009.10.010).

Henly, Julia R. and Susan J. Lambert. 2005. "Nonstandard Work and Child-Care Needs of Low-Income Parents." Pp. 469–88 in *Work, family, health, and well-being*, edited by S. M. Bianchi, L. M. Casper, and R. B. King. Mahwah, NJ: Lawrence Erlbaum Associates.

Henly, Julia R. and Susan J. Lambert. 2014. "Unpredictable Work Timing in Retail Jobs: Implications for Employee Work–Life Conflict." *Industrial & Labor Relations Review* 67(July):986–1016. Retrieved (http://ilr.sagepub.com/content/67/3/986.short).

Henly, Julia R., H. Luke Shaefer, and Elaine Waxman. 2006. "Nonstandard Work Schedules: Employer- and Employee-Driven Flexibility in Retail Jobs." *Social Service Review* 80(4):609–34.

Hepburn, Peter. 2017. "Costs of Work: Effects of Parental Work Scheduling on Childcare Arrangements."

Hlavac, Marek. 2018. *oaxaca: Blinder-Oaxaca Decomposition in R*.

Hofferth, Sandra L., April Brayfield, Shannon Deich, Pamela Holcomb, and Frederic Glantz. 1992a. *National Child Care Survey 1990: Low-Income Substudy*. Los Altos, CA: Sociometrics Corporation.

Hofferth, Sandra L., April Brayfield, Shannon Deich, Pamela Holcomb, and Frederic Glantz. 1992b. *National Child Care Survey 1990: Parent Study*. Los Altos, CA: Sociometrics Corporation.

Hout, Michael. 2012. "Social and Economic Returns to College Education in the United States." *Annual Review of Sociology* 38:379–400.

Jann, Ben. 2008. "The Blinder-Oaxaca Decomposition for Linear Regression Models." *The Stata Journal* 8(4):453–79. Retrieved (www.socio.ethz.ch).

Joshi, Pamela and Karen Bogen. 2007. "Nonstandard Schedules and Young Children's Behavioral Outcomes among Working Low-Income Families." *Journal of Marriage and Family* 69(February):139–56.

Kalleberg, Arne L. 2009. "Precarious Work, Insecure Workers: Employment Relations in Transition." *American Sociological Review* 74(1):1–22.

Kalleberg, Arne L. 2011. *Good Jobs, Bad Jobs: The Rise of Polarized and Precarious Employment Systems in the United States, 1970s to 2000s*. New York: Russell Sage Foundation.

Kimmel, Jean and Lisa M. Powell. 2006. "Nonstandard Work and Child Care." *Eastern Economic Journal* 32(3):397–419.

Kingston, Paul William and Steven L. Nock. 1985. "Consequences of the Family Work Day." *Journal of Marriage and Family* 47(5):619–29.

Kingston, Paul William and Steven L. Nock. 1987. "Time Together Among Dual-Earner Couples." *American Sociological Review* 52(3):391–400.

Lambert, Susan J. 2008. "Passing the Buck: Labor Flexibility Practices that Transfer Risk onto Hourly Workers." *Human Relations* 61(9):1203–27. Retrieved (http://hum.sagepub.com/cgi/doi/10.1177/0018726708094910).

Lambert, Susan J., Anna Haley-Lock, and Julia R. Henly. 2012. "Schedule Flexibility in Hourly Jobs: Unanticipated Consequences and Promising Directions." *Community, Work & Family* 15(3):293–315.

Lee, Donghoon and Kenneth I. Wolpin. 2006. "Intersectoral Labor Mobility and the Growth of the Service Sector." *Econometrica* 74(1):1–46.

Lein, Laura, Alan F. Benjamin, Monica McManus, and Kevin Roy. 2005. "Economic Roulette: When is a Job not a Job?" *Community, Work & Family* 8(4):359–78.

Lesnard, Laurent. 2008. "Off-Scheduling within Dual-Earner Couples: An Unequal and Negative Externality for Family Time." *American Journal of Sociology* 114(2):447–90.

Lesnard, Laurent. 2010. *Setting Cost in Optimal Matching to Uncover Contemporaneous Socio-Temporal Patterns*.

Lesnard, Laurent and Thibaut de Saint Pol. 2009. "Patterns of Workweek Schedules in France." *Social Indicators Research* 93(1):171–76.

Lopez, Mark Hugo, Jeffrey Passel, and Molly Rohal. 2015. *Modern Immigration Wave Brings 59 Million to U.S., Driving Population Growth and Change through 2065*. Washington, DC: Pew Research Center.

Lumley, Thomas. 2016. "Survey." Retrieved (http://r-survey.r-forge.r-project.org/survey/).

McCrate, Elaine. 2012. "Flexibility for Whom? Control over Work Schedule Variability in the US." *Feminist Economics* 18(1):39–72. Retrieved (http://www.tandfonline.com/doi/abs/10.1080/13545701.2012.660179).

McKenzie, Brian and Melanie Rapino. 2011. *Commuting in the United States: 2009*. Washington, DC: U.S. Census Bureau.

Nock, Steven L. and Paul William Kingston. 1984. "The Family Work Day." *Journal of Marriage and Family* 46(2):333–43.

Nock, Steven L. and Paul William Kingston. 1988. "Time with Children: The Impact of Couples' Work-Time Commitments." *Social Forces* 67(1):59–85.

O'Donnell, Owen, Eddie van Doorslaer, Adam Wagstaff, and Magnus Lindelow. 2008. "Explaining Differences Between Groups: Oaxaca Decomposition." Pp. 147–57 in *Analysing health equity using household survey data*. Washington, DC: The World Bank.

Phillips, Kenneth Ross. 2002. *Parent work and Child Well-Being in Low-Income Families*. Washington, DC: The Urban Institute.

Piketty, Thomas. 2015. "About Capital in the Tenty-First Century." *American Economic Review* 105(5):48–53.

Piketty, Thomas and Emmanuel Saez. 2003. "Quarterly journal of economics." *Quarterly Journal of Economics* 163(1):1–39.

Presser, Harriet B. 1987. "Work Shifts of Full-Time Dual-Earner Couples: Patterns and Contrasts By Sex of Spouse." *Demography* 24(1):99–112. Retrieved (http://search.ebscohost.com/login.aspx?direct=true{\&}AuthType=ip,uid{\&}db=sih{\&}AN=16799606{\&}site=ehost-live{\&}scope=site).

Presser, Harriet B. 1988. "Shift Work and Child Care among Young Dual-Earner American Parents." *Journal of Marriage and Family* 50(1):133–48.

Presser, Harriet B. 2003. *Working in a 24/7 Economy: Challenges for American Families*. New York: Russell Sage Foundation.

Presser, Harriet B. and Amy G. Cox. 1997. "The Work Schedules of Low-Educated American Women and Welfare Reform." *Monthly Labor Review* 120(4):25.

Raab, Marcel, Anette Eva Fasang, Aleksi Karhula, and Jani Erola. 2014. "Sibling Similarity in Family Formation." *Demography* 51(6):2127–54.

Ritschard, Gilbert, Matthias Studer, Alexis Gabadinho, Nicolas Muller, and Patricktr Rousset. 2015. "TraMineRextras." Retrieved (http://traminer.unige.ch/).

Rousseeuw, Peter J. 1987. "Silhouettes: A Graphical Aid to the Interpretation and Validation of Cluster Analysis." *Journal of Computational and Applied Mathematics* 20:53–65.

Ryan, Camille L. and Kurt Bauman. 2016. *Educational Attainment in the United States: 2015*. Washington, DC: U.S. Census Bureau. Retrieved (https://www.census.gov/content/dam/Census/library/publications/2016/demo/p20-578.pdf).

Sandberg, John F. and Sandra L. Hofferth. 2001. "Changes in Children's Time with Parents: United States, 1981–1997." *Demography* 38(3):423–36.

Sandefur, Gary D., Molly Martin, Jennifer Eggerling-Boeck, Susan E. Mannon, and Ann M. Meier. 2001. "An Overview of Racial and Ethnic Demographic Trends." Pp. 40–102 in *America becoming: Racial trends and their consequences, volume i*, edited by N. J. Smelser, W. J. Wilson, and F. Mitchell. Washington, DC: The National Academies Press.

Shulman, Beth. 2005. *The Betrayal of Work: How Low-Wage Jobs Fail 30 Million Americans*. New York: The New Press.

Strazdins, Lyndall, Mark S. Clements, Rosemary J. Korda, Dorothy H. Broom, and Rennie M. D'Souza. 2006. "Unsociable Work? Nonstandard Work Schedules, Family Relationships, and Children's Well-Being." *Journal of Marriage and Family* 68(2):394–410.

Strazdins, Lyndall, Rosemary J. Korda, Lynette L-Y. Lim, Dorothy H. Broom, and Rennie M. D'Souza. 2004. "Around-the-clock: Parent Work Schedules and Children's Well-Being in a 24-h Economy." *Social Science & Medicine* 59(7):1517–27. Retrieved (http://linkinghub.elsevier.com/retrieve/pii/S0277953604000279).

Studer, Matthias. 2013. "WeightedCluster Library Manual: A Practical Guide to Creating Typologies of Trajectories in the Social Sciences with R." 1–34.

Studer, Matthias. 2014. "WeightedCluster: Clustering of Weighted Data." Retrieved (https://cran.r-project.org/web/packages/WeightedCluster/index.html).

Team, National Survey of Early Care and Education Project. 2015. *Provision of Early Care and Education during Non-Standard Hours*. Washington, DC: Office of Planning, Research; Evaluation.

Yun, Myeong-Su. 2004. "Decomposing Differences in the First Moment." *Economics Letters* 82(2):275–80.

Yun, Myeong-Su. 2005. "A Simple Solution to the Identification Problem in Detailed Wage Decompositions." *Economic Inquiry* 43(4):766–72.

Zeytinoglu, Isik U., Waheeda Lillevik, Bianca Seaton, and Josefina Moruz. 2004. "Part-Time and Casual Work in Retail Trade." *Industrial Relations* 59(3):516–44.

Table 1. Description of Maternal Working Schedules

	Day Level					Week Level			
Work Schedule	**Modal Start Time**	**Modal End Time**	**Avg Weekday Standard Hrs Worked**	**Avg Weekday Nonstd Hrs Worked**	**Avg Weekend Hrs Worked**	**Avg Non-Working Days**	**Avg Part-Time Working Days**	**Avg Full-Time Working Days**	**Within-Week Variability (% of person-weeks)**
Non-Work	n/a	n/a	0.3	0.1	0.4	6.4	0.4	0.2	4.0
Standard	8:30	17:00	7.9	0.2	0.6	2.1	0.3	4.7	16.3
Off-Standard Schedules			6.4	0.7	0.9	2.1	1.5	3.5	15.0
Early	7:00	16:00	7.6	0.9	0.9	2.0	0.1	4.9	12.5
Short	8:15	14:30	5.4	0.4	0.7	2.2	2.6	2.2	13.4
Afternoon	11:15	18:45	5.6	1.0	2.2	2.0	1.8	3.2	37.3
Nonstandard Schedules			1.7	4.6	2.5	1.9	2.0	3.0	24.6
Evening	16:00	22:30	2.1	3.8	2.5	2.1	2.1	2.8	25.3
Night	0:00 - 7:00	23:15-24:00	0.7	6.7	2.7	1.5	1.8	3.7	22.6

Standard hours are defined as 8 am through 6 pm, Monday through Friday. Non-Working days are those in which no work is reported; part-time days are those in which less than seven hours work is reported.

Table 2. Sample Description

	1990				2012			
	Single Mothers		Partnered Mothers		Single Mothers		Partnered Mothers	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Number Kids	1.66	0.86	1.79	0.84	1.74	0.96	1.83	0.91
Age of the Youngest Kid	5.09	3.62	4.55	3.66	5.61	3.66	5.17	3.73
Age	30.7	7.14	33.2	6.42	33.1	8.24	36.2	7.95
Family Income	24,000	23,800	70,200	47,100	27,600	28,900	69,200	51,000
Respondent's Race (%)								
White	50.7		81.4		41.3		67.1	
Black	37.3		7.9		29.5		7.1	
Hispanic	10.6		9.7		23.9		17.6	
Other	1.4		1.1		5.3		8.1	
Mother's Education (%)								
Less than HS	21.1		9.2		18.1		10.0	
HS diploma/GED	46.6		39.7		26.8		19.4	
Some college	22.3		24.6		27.5		19.2	
College +	10.0		26.5		27.6		51.4	
Mother's Occupation (%)								
None recorded	44.2		41.2		39.5		40.9	
Managerial/Professional	6.5		16.5		16.6		24.9	
Technicians/Support/Sales	3.6		5.7		5.8		6.9	
Administrative	15.8		17.1		11.4		9.0	
Service	11.5		11.1		21.5		11.5	
Production/Manufacturing	7.3		4.7		4.0		3.3	
Other	11.0		3.5		1.3		3.5	
Unweighted Sample Size	910		3530		2,780		7,590	
Weighted Sample Size	5,390,000		19,800,000		5,860,000		20,500,000	
Year-Specific Percentage	21.4%		78.6%		22.3%		77.7%	

Table 3. Prevalence of Maternal Working Schedules

	Overall			Single Mothers			Partnered Mothers			Comparison by HH Type	
Work Schedule	**1990**	**2012**	**sig**	**1990**	**2012**	**sig**	**1990**	**2012**	**sig**	**1990**	**2012**
Non-Work	53.3	55.7	*	52.2	53.7		53.6	56.3	*		
Standard	19.5	17.3	*	20.7	18.4		19.2	17.0	*		
Off-Standard Schedules	23.7	23.5		23.6	22.9		23.7	23.7			
Early	13.0	7.7	***	14.3	6.3	***	12.6	8.1	***		*
Short	9.1	13.4	***	7.5	13.2	***	9.5	13.4	***	+	
Afternoon	1.6	2.4	*	1.8	3.3	*	1.6	2.1	+		*
Nonstandard Schedules	3.5	3.5		3.5	5.1		3.5	3.1			**
Evening	2.4	2.7		2.4	4.3	*	2.4	2.3			**
Night	1.1	0.8		1.1	0.8		1.1	0.8			
Variable Schedules	7.1	11.9	***	8.4	12.3	**	6.8	11.8	***		
Varying Hours	16.1			16.3			16.0				
No Usual Schedule		17.2			20.2			16.3			*
1 Week or Less Notice		24.2			30.0			22.4			***

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

Table 4. Logistic Regression Models Predicting Work Schedule Characteristics

	Model 1: Nonstandard Schedules (Single Mothers)				**Model 2: Variable Schedules (All Mothers)**			
	Main Effect		Interaction w/ Time		Main Effect		Interaction w/ Time	
	Coef	Sig	Coef	Sig	Coef	Sig	Coef	Sig
2012			5.58				-0.402	
Mother's Occupation								
Administrative (ref)	n/a		n/a					
None recorded	-16.50	***	-0.90		-17.50	***	-0.48	*
Magerial/Professiol	0.88		0.19		0.02		0.18	
Technicians/Support/Sales	-16.80	***	17.20	***	0.82	***	-0.19	
Service	2.10	**	-0.78		1.00	***	-0.56	*
Production/Manufacturing	2.31	**	-1.06		-0.02		0.01	
Other	2.00	**	-1.23		0.44		-0.33	
Mother has College+	0.42		-1.91	*	0.26		-0.53	*
Non-White Respondent	0.22		0.06		-0.65	***	0.33	
Log Income	0.36		-0.45		-0.09		0.13	
Single Mother					0.44	*	-0.40	+
# Obs	3,570				14,300			
Weighted	10,600,000				48,400,000			
Pseudo R2	0.208				0.199			
AIC	980				6,820			

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

Table A1. Summary of Time Trimmed from Working Schedules by Distance to Work and Urbanicity

	High-Density Urban	Moderate-Density Urban	Rural
0 Miles	0 mins	0 mins	0 mins
<3 Miles	15 mins	15 mins	15 mins
3-8 Miles	30 mins	30 mins	30 mins
>8 Miles	45 mins	45 mins	30 mins

Table A2. Observed Work Schedule Variability and NCCS/NSECE Scheduling Questions

	Within-Week Schedule Variability	
	No (%)	Yes (%)
Varying Schedule (NCCS)		
No	85.8	59.9
Yes	14.2	40.1
Usual Schedule (NSECE)		
None	14.8	26.5
Unusual	9.6	14.6
Usual	75.5	58.9
Advance Notice (NSECE)		
<1 Week	9.4	17.2
1-2 Weeks	23.3	27.6
3 Weeks+	67.3	55.3

Table A3. Observed Work Schedule Variability and Hours Worked in the Recorded Week

		Within-Week Schedule Variability	
		No	Yes
Single Mother Households	**Maternal Working Hours (1990)**		
	None (%)	100	0
	<35 (%)	83.7	16.3
	>=35 (%)	84.8	15.2
	Maternal Working Hours (2012)		
	None (%)	100	0
	<35 (%)	80.2	19.8
	>=35 (%)	77.4	22.6
Two-Partner Households	**Maternal Working Hours (1990)**		
	None (%)	100	0
	<35 (%)	85.5	14.5
	>=35 (%)	89	11
	Maternal Working Hours (2012)		
	None (%)	100	0
	<35 (%)	81.3	18.7
	>=35 (%)	77.6	22.4