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ABSTRACT

Previous research on maternal employment has disproportionately focused on married, college-educated mothers and examined either current employment status or postpartum return to employment. Following the life course perspective, we instead conceptualize maternal careers as long-term life course patterns. Using data from the NLSY79 and optimal matching, we document four common employment patterns of American mothers over the first 18 years of maternity. About two-thirds follow steady patterns, either full-time employment (38 percent) or steady nonemployment (24 percent). The rest experience "mixed" patterns: long-term part-time employment (20 percent), or a multiyear period of nonemployment following maternity, then a return to employment (18 percent). Consistent employment following maternity, either full-time or part-time, is characteristic of women with more economic advantages. Women who experience consistent nonemployment disproportionately lack a high school degree, while women with return to employment following a long break tend to be younger with lower wages prior to maternity. Race is one of the few predictors of whether a mother is consistently employed full time versus part time: consistent part-time labor is distinctive to white women. Our results support studying maternal employment across the economic spectrum, considering motherhood as a long-term characteristic, and employing research approaches that reveal the qualitative distinctness of particular employment patterns.

JEL Classification Codes: D13, J13, J22

Key Words: motherhood, employment, optimal matching, life course

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The rise of female labor force participation has been heralded as the most important trend of the twentieth-century U.S. labor market (Goldin 2006). Yet American mothers spend, on average, 16 hours less per week in paid employment than fathers, the employment rate of mothers with children under age 18 remains only 70 percent, and roughly half of mothers of minor children are employed full time (Pew Research Center 2013). Labor market behavior, including total work experience, current and past part-time employment status, and employment interruptions, strongly mediates the motherhood wage penalty — the lower wages received by mothers compared to their childless peers (Budig and England 2001; Gangl and Ziefle 2009; Waldfogel 1997). Given the financial consequences of not only how *much* mothers work but the *pattern* of work, it is natural to ask what factors produce sustained, full-time employment versus other maternal employment trajectories.

Yet studies of maternal employment and its determinants have typically conceptualized employment much more simplistically than has research using employment patterns as explanatory variables. Most prior studies of women's or maternal employment take a static or short-term view, modeling either current employment conditions (Blau and Kahn 2007; Boushey 2008; Percheski 2008) or employment outcomes within several years immediately postpartum (Desai and Waite 1991a; Glass and Riley 1998; Halpin 2010; Hynes and Clarkberg 2005; Joesch 1994; Klerman and Leibowitz 1994, 1999; Leibowitz, Klerman, and Waite 1992; Wenk and Garrett 1992). As a result, we know little about the long-term labor market trajectories women experience as they raise their children. Is part-time employment a temporary status, as mothers transition between nonemployment and full-time work? Or is it more often a long-term strategy, employed by a distinct subset of mothers? Is the overall low rate of employment for mothers driven primarily by a subset of mothers who are long-term out of the labor market, or do most

mothers follow a similar pattern of a short withdrawal from the labor market just after the birth of their children, followed by a return? How diverse are American mothers' long-term employment patterns?

By taking a holistic, sequential approach to the study of maternal employment patterns, we aim to answer these questions, which short-term or static perspectives cannot address. Rather than using cross-sectional models to examine current labor force status, or hazard models to describe single transitions in employment, we examine sequences of mothers' employment statuses through the first 18 years following the birth of their first child. We use sequence analysis followed by cluster analysis to identify common patterns of long-term maternal employment outcomes.

We use a nationally representative sample of American women, highlighting how family experiences, attitudes, economic circumstances, and race shape employment patterns and recognizing that work-family conflict may take different forms at different points of the economic distribution (Damaske 2011). In this way, we expand on prior research on maternal employment that has focused on the experiences of highly educated women and women in professional occupations (Blair-Loy 1999; Herr and Wolfram 2012; Hersch 2013; Percheski 2008; Stone 2007), a group that is both a small share of American mothers and, if anything, least likely to experience a substantial postpartum break in employment (Hynes and Clarkberg 2005; Laughlin 2011).

CONCEPTUALIZING MATERNAL EMPLOYMENT OUTCOMES

Conventional Approaches: Static or Immediate Postpartum

Maternal employment has been widely studied. To study trends across time, it is common to model mothers' current employment status or hours (Blau and Kahn 2007; Percheski 2008). For other research questions, current status may not be appropriate, since it does not place women's current employment in the context of their longer labor market patterns (Damaske 2011). As early as 1980, Chenoweth and Maret (1980) argued that studying current labor force status "presents a severely limited picture of women's work" (p. 224). Mothers who are currently not employed are a mix of new mothers on a short break from full-time employment, women who are involuntarily unemployed, and mothers who have withdrawn long-term from the labor market to care for children. Mixing together these heterogeneous groups is an important limitation because each type of nonemployment is likely to be affected by distinct factors. For some mothers, nonemployment is determined by factors shared by men and childless women, such as low levels of human capital. For others, nonemployment is specific to motherhood, such as due to preferences for parental child care. For still others, nonemployment is specific to a particular moment of motherhood, such as being at home to breastfeed. Studying the determinants of maternal employment with point-in-time measures, stripped of the context in surrounding periods, does not facilitate distinguishing among these groups.

Other studies examine the return to employment postpartum, focusing on at most the employment of mothers of preschool-aged children (Desai and Waite 1991b; Glass and Riley 1998; Halpin 2010; Hynes and Clarkberg 2005; Joesch 1994; Klerman and Leibowitz 1994, 1999; Leibowitz and Klerman 1995; Leibowitz, Klerman, and Waite 1992; Wenk and Garrett 1992). This approach is especially useful when the goal is to examine the experiences of new

mothers or to evaluate policies designed to support the combination of employment and care of infants. However, there is a long-standing call for research that examines maternal employment in longer-term perspective, especially given evidence of considerable instability in mothers' employment statuses following maternity (Hynes and Clarkberg 2005; VandenHeuvel 1997). Focusing on the immediate postpartum period overlooks the experiences of mothers of older children and variation in employment outcomes over time.

Our Approach: Situating Maternal Employment in Time

We use a life course approach to conceptualize maternal employment (Elder 1994). Rather than point-in-time employment status or individual labor market transitions, we use sequence analysis to describe the long-term trajectories in which these transitions are embedded, following each mother's employment over the 18 years after the birth of her first child. This life-course, trajectory-based approach has been heralded as an appropriate way to understand careers in their intact, processual form (Abbott and Hrycak 1990; Aisenbrey and Fasang 2010; Blair-Loy 1999; Han and Moen 1999). Aassve, Billari, and Piccarreta (2007) write, "The benefit of sequence analysis is that it enables us to study a complex set of life-course trajectories as they actually take place, providing ideal-types of trajectories that can be interpreted and analysed in a meaningful way" (p. 371).

Sequences are particularly useful for categorical analyses, as they do not impose any ordering on the patterns identified. Unlike analyses that focus on the conditional mean or probability of a particular event, sequence analysis is also useful for identifying less-standard trajectories (Aisenbrey and Fasang 2010). The rise of women's labor force participation has not led to uniform increases in mothers' work experience. Instead, considerable heterogeneity exists

in how mothers combine employment and child-rearing across the life course. Sequence analysis is uniquely suited to identifying this diversity of common work patterns.

The small body of previous research that has examined adult women's long-term employment sequences (past age 30 or so) has privileged age as a determinant of the life course (Gauthier et al. 2009; Han and Moen 1999). As a result, the employment patterns identified are heavily influenced by women's timing of school completion and fertility, rather than differentiating among maternal employment patterns. These analyses are well suited to describing how the timing of transitions in other key domains — education and fertility — shapes the timing of employment sequences, but not to exploring variation in maternal employment.

With entry into motherhood, women, on average, substantially reallocate their time use, spending more time in domestic labor and less in paid labor (Sanchez and Thomson 1997). Thus, we peg time not to age but to the first transition to motherhood. Two new, first-time mothers, one age 22 and one age 35, are likely to be more similar in the shape of their employment patterns over the next decade than two 25-year-old women, one of whom gave birth to her only child at age 20 and one of whom will give birth to her only child at age 30.

The Distinctiveness of Part-Time Work

Identifying mothers who are employed full-time near-continuously and mothers who are largely out of the labor market is typically not challenging. It is more difficult to make sense of the large and heterogeneous group of mothers who lie between these two extremes and are referred to as exhibiting "mixed," "adaptive," or "pulled back" employment patterns (Chenoweth and Maret 1980; Damaske 2011; Hakim 2002). We shed light on this large but challenging-to-define group in part by distinguishing part-time employment from full-time employment.

While the motherhood penalty literature has acknowledged that part-time and full-time work have different wage consequences (Waldfogel 1997), the study of maternal employment has been slow to incorporate this distinction. Instead, the vast majority of studies do not distinguish between full-time and part-time employment, even if they examine consistency in employment across several years (Desai and Waite 1991b; Hynes and Clarkberg 2005; Leibowitz and Klerman 1995; Leibowitz, Klerman, and Waite 1992; Rexroat 1992; VandenHeuvel 1997).

Yet ample evidence demonstrates that part-time work is qualitatively distinct from both full-time employment and nonemployment. Mothers may exit the labor force only after attempts to negotiate a reduction in hours fail (Stone 2007), and part-time work may allow mothers to achieve desired flexibility, while still contributing financially to their households and retaining desired social and psychological benefits of work (Damaske 2011). Furthermore, the predictors of mothers' entrances and exits from the labor market differ by whether work is part-time or full-time (Drobnič 2000). Thus, we treat nonemployment, part-time employment, and full-time employment as three distinct employment statuses for women, with no assumption that women's preferences align with a monotonic ordering of work hours or that factors associated with full-time employment also predict part-time employment.

In sum, we argue that recent cohorts of mothers are not only working more, but are combining employment and motherhood in varied ways. Prior research, which has focused on employment status at a moment in time, or examined the narrow window of time surrounding a birth, or simply counted mothers as working more or less, is insufficient to understand the employment patterns of contemporary American mothers. We examine mothers' long-term employment patterns as they unfold, with attention to the potentially heterogeneous group of mothers who fall between continuous full-time employment and continuous nonemployment. We

hypothesize that long-term part-time workers, while they may resemble long-term full-time workers in near-continuous employment and accumulate total employment hours similar to women who briefly interrupt employment before returning to full-time labor, may demographically differ from both of these groups.

Social Determinants of Work-Family Experiences

After identifying common maternal employment patterns, we explore the characteristics of mothers who experience each type of pattern. Rich description of maternal employment patterns is important because prior research on maternal employment has disproportionately focused on the experiences of economically well-off women who have at least a bachelor's degree, and often even more select subsamples, including graduates of specific universities or members of particular professional occupations (Blair-Loy 1999, 2003; Hersch 2013; Percheski 2008; Stone 2007). Other research focuses exclusively on white mothers (Drobnič 2000; Eggebeen 1988; Rexroat 1992; Stone 2007) or married mothers (Blau and Kahn 2007; Leibowitz and Klerman 1995; Shafer 2011; Stone 2007). Highly educated mothers are poised to occupy prestigious positions in the labor market and reap large financial rewards from employment, and they have more resources to navigate work-family conflict. Thus, their labor market exit may be seen as both particularly important for gender inequality and illustrative of the challenges of work-family balance (Blair-Loy 1999; Percheski 2008). In addition, married, highly-educated women attract scholarly attention because they are perceived as one of the few groups of mothers who have the option to exit employment to raise children (for example, Stone [2007, p. 9]).

But the focus on married, highly educated, professional or managerial mothers is at odds with evidence that women across the class distribution, both married and single, struggle to resolve work-family conflict (Damaske 2011; Seefeldt 2008). Compared to less-educated

women, college-educated mothers experience *less* employment interruption at motherhood (Laughlin 2011), and mothers characterized by consistent nonemployment in the years immediately surrounding births are disproportionately young, unmarried, and less educated (Hynes and Clarkberg 2005). Although an extensive literature, dominated by economists, has studied how eligibility for cash assistance affects poor mothers' labor supply (for a review, see Moffitt [2002]) , this research focuses on the marginal effects of policy changes, rather than the lived employment experiences of poor women. Focus on mothers either eligible for cash assistance or in professional occupations also leaves out the vast swath of mothers who fall between these extremes of the economic spectrum. More recent research has called attention to these limitations and advocated greater attention to heterogeneity by race and class in maternal employment experiences (Damaske 2011; Landivar 2013).

By exploring employment patterns of a nationally representative sample of mothers, we describe more fully the experiences of American mothers as they make choices about how to combine employment and parenthood and experience constraints in their abilities to do so. Since effective work-family policies are unlikely to be one-size-fits-all (Bianchi 2011; Damaske 2011; Landivar 2013), understanding variability in mothers' employment experiences is a first step to policies that will meet the needs of a diverse range of American families.

Below we consider four groups of determinants of maternal employment patterns.

1) Work experience and human capital. Neoclassical economic theory suggests that women's own wage-earning potential deters labor market exit (Leibowitz and Klerman 1995; Mincer 1962). Education, job tenure, prior employment, and wage have all been found to facilitate women's or mothers' employment, although not all studies find support for each factor (Blau and Kahn 2007; Cha 2010; Desai and Waite 1991a; Glass 1988; Glass and Riley 1998;

Klerman and Leibowitz 1994; Leibowitz and Klerman 1995; Leibowitz, Klerman, and Waite 1992; Shafer 2011; Taniguchi and Rosenfeld 2002; Wenk and Garrett 1992). Education roughly proxies general human capital, while tenure indicates firm-specific capital, and hourly wage directly measures the cost of withdrawal from the labor market at that time. Education and tenure may also affect employment decisions by shaping the nonfinancial rewards associated with work, such as job fit and satisfaction, which are associated with employment decisions (Damaske 2011; Glass 1988; Glass and Riley 1998). We expect that these measures of mothers' wage-earning potential will be associated with more consistent labor market participation.

2) Attitudes and aspirations. Preference theory argues that heterogeneity in women's attitudes and values shapes heterogeneity in their employment outcomes (Hakim 2002). Consistent with this perspective, mothers with more traditional gender role attitudes are more likely to be nonemployed (Glass and Riley 1998; Hynes and Clarkberg 2005). Women's reported desire to be employed at age 35 may also affect employment, although the evidence for this association is weaker (Desai and Waite 1991a; Yoon and Waite 1994). We expect that, net of economic circumstances, women with more traditional gender role attitudes and preferences for more children and unpaid labor will experience less consistent maternal employment.

3) Family experiences. We expect that maternal employment will be informed by other life course markers: the woman's age at first maternity and her marital status. Later fertility is generally associated with less employment disruption (Hynes and Clarkberg 2005; Wenk and Garrett 1992). In addition to a woman's own traits, her marital status and the characteristics of her husband may also shape maternal employment. From an economic perspective, marriage and husbands' earnings should be associated with lower levels of maternal employment, as husbands' earnings provide an alternative income source (Leibowitz and Klerman 1995; Mincer

1962). Above and beyond economic circumstances, the perception that married women do not "need" to work may make it more likely that maternal employment is interpreted by the woman, her husband, or others as not in the best interests of the family — an important way that women justify their employment decisions (Damaske 2011; Stone 2007). This may be especially true when husbands work demanding jobs that women may feel take priority to their own (Cha 2010; Shafer 2011; Stone 2007).

However, evidence of the association between marital status and employment (Boushey 2008; Drobnič 2000; Eggebeen 1988; Glass 1988; Leibowitz, Klerman, and Waite 1992; Taniguchi and Rosenfeld 2002; Wenk and Garrett 1992) and between husbands' (and other family members') income and wives' employment (Blau and Kahn 2007; Eggebeen 1988; Glass 1988; Glass and Riley 1998; Klerman and Leibowitz 1994; Leibowitz and Klerman 1995; Leibowitz, Klerman, and Waite 1992; Shafer 2011; Taniguchi and Rosenfeld 2002; Wenk and Garrett 1992) is mixed.

We expect that married mothers will be underrepresented in sequences characterized by persistent full-time employment. Among women currently not employed, children slow the return to full-time labor for married women compared to unmarried women, but speed the return to part-time labor (Drobnič 2000). Thus, we expect that distinguishing between part-time and full-time employment may be particularly important for understanding how marriage shapes mothers' employment. We further expect that husbands' earnings and long work hours will be associated with less consistent employment for wives.

4) Race. Given that Hispanic mothers have lower employment rates than either African American or white mothers (U.S. Bureau of Labor Statistics 2014), we expect that Hispanic mothers will be overrepresented in employment patterns characterized by long spells out of the

labor force. Although aggregate rates of employment for African American and white mothers are similar (U.S. Bureau of Labor Statistics 2014), as are rates of reentry following birth (Yoon and Waite 1994), we expect that African American mothers will experience more polarized employment hours than white mothers. Among women who have recently worked, African American mothers are less likely to exit the labor market or reduce hours after becoming mothers (Landivar 2013), return to work more quickly (Wenk and Garrett 1992), and are more likely to have consistent employment in the decade following maternity (VandenHeuvel 1997). On the other hand, the rate of employment exit is *higher* for young African American women (and Hispanics) than their white peers (Taniguchi and Rosenfeld 2002), and unmarried white mothers have higher labor force participation than unmarried African American mothers (Klerman and Leibowitz 1994). We expect that African American women will be overrepresented among mothers with consistent full-time employment, yet also, given their more economically disadvantaged positions, disproportionately likely to experience sequences of persistent nonemployment. Our analyses can evaluate whether similar average employment rates for white and African American mothers mask variation by race in employment sequences.

DATA AND METHODS

We use data from the 1979–2012 waves of the National Longitudinal Survey of Youth 1979 (NLSY79), which surveys a nationally representative sample of 12,686 men and women 14–22 years old during the first wave in 1979. These individuals were interviewed annually through 1994 and subsequently biennially, with a retention rate above 70 percent (National Longitudinal Surveys 2013). Our results do not describe the experiences of today's *new* mothers, but they describe the experiences of women who are currently at midlife — in their early 50s.

These mothers are still of prime working age, and their long-term employment patterns will have substantial financial consequences over the next several decades as they age into retirement.

To construct 18-year maternal employment sequences, described in more detail below, we restrict the sample to mothers with a first birth between 1980 and 1994. This restriction excludes one-third of NLSY79 mothers and potential mothers:[1] 23 percent had their first births prior to 1980, the earliest year in which we can measure prebirth traits; 7 percent had not experienced a first birth by 1994, so that fewer than 18 years of postmaternity data are available for them; and 3 percent remained childless but exited the study before ending their reproductive years. In addition, 11 percent of women with eligible first births left the study before the eighteenth birthday of their firstborn. After exclusions, our analytic sample includes 2,458 women.[2]

By following mothers for a shorter length of time, we could increase the representativeness of the sample, including some women who had births after 1994 and some who had births prior to 1994 but were not followed for 18 years subsequently. Therefore, as a robustness check, we repeated the analysis using sequences based on only the first 14 years postmaternity. Using this shorter time window increases our sample size by 10 percent (2,713 respondents). We find an identical set of common employment patterns, very similar relative frequencies of these patterns, and very similar multivariate results. To account for the possibility of selective attrition, we also identified common employment patterns using the NLSY79 weights for respondents who are in *all* survey waves (that therefore account for attrition) and found similar results. The results for these additional analyses are shown in the appendix.

[1] Women who belonged to the discontinued subsamples, were observed childless until the end of their reproductive years, or died before their first children turned 18 are excluded.

[2] One respondent was dropped due to missing data for her child's birth month.

Identifying Common Employment Patterns

We use optimal matching to describe mothers' long-term employment patterns. We describe optimal matching in more detail below; in broad terms, it relies on creating a measure of dissimilarity between any two mothers' employment patterns. We follow three steps. First, we define a month-by-month employment sequence for each mother. Second, we create a dissimilarity matrix that defines how different any two sequences in the data set are from each other. Third, we use the dissimilarity matrix to create clusters of sequences that follow similar patterns. These clusters, representing common maternal employment patterns, become the dependent variables in subsequent analyses.

Step 1: Month-by-month employment sequences. Employment sequences are constructed using data from the NLSY79 weekly employment arrays. Each maternal employment sequence begins at first maternity, which is reported with month and year. We assume the child was born at the end of the month and start the maternal employment sequence the following month. For example, if a woman reports a first birth in March, we call April her first month of parenthood and mark the week containing April 1 as the start of her maternal employment history. We use the NLSY79 continuous week crosswalk to convert between the week numbers in the NLSY79 employment arrays and calendar year and month. Each maternal employment sequence spans 18 years (216 months).

The NLSY79 weekly employment arrays report respondents' labor force status and total work hours in each week since January 1, 1978. In each week, we classify a respondent as employed full time (at least 35 hours), employed part time (less than 35 hours), or not employed. We consider mothers on active-duty military to be full-time employed. We identified weeks of maternity leave from within-job work gaps that covered the birth month or started within four months after the birth. We record the modal weekly status in a month as the monthly status. In

less than 1 percent of observations, multiple statuses appear with equal frequency, so we randomly assign one of the most frequent statuses as the monthly status.

Missing monthly employment information is not very common. Only 429 respondents (17 percent) had any months of missing employment status, with a mean within this group of 13 missing months out of 216. In the next section, we describe how we incorporate missing employment data in the sequence analysis.

Step 2: Constructing a dissimilarity matrix. To analyze sequences we use optimal matching, which defines two sequences as more similar when the "cost" of transforming one sequence to the other is lower. We measure the dissimilarity between two sequences with the Hamming distance, which counts the number of substitutions required to transform one sequence to another, allowing that substitutions between different states may carry different weights (Lesnard 2010).[3]

The substitution cost matrix defines the cost of each type of substitution between employment statuses. In general, there are three types of cost-setting schemes: 1) equal costs for all substitutions, 2) theory-derived costs, and 3) costs weighted inversely by the frequency of transitions between states. Despite great concern about cost-setting (Aisenbrey and Fasang 2010; Wu 2000), our results are similar across the three cost-setting schemes (see the appendix).

We use theory-derived costs in the main models. We do not use the uniform cost matrix, because we want to permit that some statuses are more similar than others: for example, full-time employment is more like part-time employment than nonemployment. The transition-rate-based approach is appealing because it offers a data-driven cost matrix. At the same time, this approach

[3] Optimal matching may also transform sequences using insertions and deletions, which add or subtract points from the sequence. However, this allows two sequences to be considered similar if they contain the same subsequence of statuses, even if they occur at different times (Lesnard 2010). Because we believe the timing of employment status changes relative to the birth has meaning, we prohibit insertions and deletions.

assumes that rare transitions indicate dissimilar statuses. This assumption may be appropriate for scholars studying *careers*: if it is uncommon to move from Job A to Job B, we might assume that the overlap between the two jobs in skill or experience requirements is not very high. However, this logic does not as obviously apply to employment statuses, especially since more common statuses tend to have higher transition rates for purely mechanical reasons.

Table 1 displays the substitution cost matrix we adopt. The scale of costs is arbitrary, all that matters is the relative costs. The matrix is symmetric, meaning that replacing status 1 with status 2 costs the same as the other way around. We assign the maximum cost, four, to substitutions between full-time employment and nonemployment. We consider part-time employment to be a middle ground equally far from full-time employment and nonemployment, assigning a cost of two for substitution from part-time employment to either of the more extreme states.

We distinguish between maternity leave and employment following Klerman and Leibowitz's (1994) argument that failing to do so will overstate paid work time of new mothers. Although being on maternity leaves maintains the affiliation with the employer, in terms of time use it is more similar to being nonemployed. Therefore, we assign the substitution between maternity leave and nonemployment to be less costly (one) than that between maternity leave and part-time (two) or full-time (three) employment.

We treat missing data as a status (Aisenbrey and Fasang 2010). When a respondent is completely missing monthly employment status, the actual status could be any of the valid statuses, so we assign a cost of two for substituting missing to any other state. For some observations, we know that the individual was employed in that month, but we do not know whether work was full-time or part-time. We specify the transition from employed with unknown

hours to full-time or part-time employment to be relatively inexpensive (one), while acknowledging a greater distinction between employed with missing hours and nonemployment (three). Consistent with our view that maternity leave lies closer to nonemployment than employment, we assign a substitution cost of 2.5 between maternity leave and employed with unknown hours. Again, our results are robust to alternative cost matrices defined by either uniform costs or costs based on transition rates.

Step 3: Identifying clusters. Once we have established a matrix of dissimilarities between sequences, we use cluster analysis to identify groups of mothers with similar employment sequences. We apply the k-medoids clustering algorithm with survey weights. Given k clusters, the algorithm searches for k representative sequences from the sample, called medoids, and minimizes the weighted sum of distances from all observations in a cluster to the medoid of that cluster.

Common objections to cluster analysis are that results may differ across clustering algorithms and that the choice of number of clusters can be arbitrary. We follow the guidelines suggested by Aisenbrey and Fasang (2010): we explore a range of methods of clustering (average linkage and Ward's method, in addition to k-medoids) and number of clusters (2 to 15), we consider the construct validity of the clusters produced, and we examine how each clustering solution performs on a set of partition quality measures. Based on these criteria, we select four clusters. We also find that the k-medoids algorithm performs better than Ward's method or average linkage. More details on the range of clustering solutions considered and their performance are shown in the appendix.

Modeling Employment Patterns

We use an unweighted multinomial logit model to assess how work experience and human capital, preferences and aspirations, family experiences, and race are associated with women's postmaternity employment patterns. Item-missing data on covariates are multiply imputed.

Work experience and human capital

We measure education with five categories: less than a high school degree, exactly a high school degree, some college, a four-year college degree, or postgraduate. To measure prematernity labor force attachment, we created two dummy variables, one for whether she had *ever* been employed by one year prebirth (this also acts as a flag for whether prematernity work traits are measured) and one for whether a woman was employed at one year prior to birth.[4] Job tenure (in weeks) and hourly wage are both measured in the last job held at least one year prior to the birth and logged in the multinomial logit model. Although prebirth wage and tenure do not capture the range of wage-earning possibilities for women over the next 18 years, they are the most recent signals a mother has of her likely financial reward from work when she is considering return to employment following the birth of a first child.

Attitudes and aspirations

We measure women's preferences with prechildbirth attitudes toward their own work and family lives and their more general attitudes toward women's roles. We include a binary variable for whether the respondent reported in 1979 that she would like to be working at age 35 and a linear measure for the ideal number of children she reports, top-coded at four. As a proxy for role

4 The determinants of postmaternity employment may differ for women who did and did not work pre-maternity. However, we found similar results for the subgroup of mothers ever employed prior to the birth as for the full sample (see the appendix).

model effects, we include a categorical measure of the respondent's mother's education and a binary variable for whether the respondent's mother was employed full time in 1979.

In 1979, the NLSY79 also asked respondents eight questions about their attitudes toward women's roles and the organization of family life, with respondents replying using a 1 to 4 strongly disagree/strongly agree scale. After using principal components analysis to identify statements that cohere together, we created an index of women's attitudes by summing respondents' responses to the following five statements ($\alpha = 0.78$): a woman's place is in the home, not in the office or shop; a wife who carries out her full family responsibilities doesn't have time for outside employment; the employment of wives leads to more juvenile delinquency; it is much better for everyone concerned if the man is the achiever outside the home and the woman takes care of the home and family; and women are much happier if they stay at home and take care of their children. A higher score on the index indicates more traditional views.

Family experiences

We measure age at the first birth with a linear term. We measure marital status and spousal characteristics, like women's own traits, one year prior to the birth. Marital status is captured in three categories: never married, married, or previously married. For women who are married, we measure husbands' annual earnings (logged in the multivariate model) and categorize husbands' usual weekly work hours as less than full-time (less than 35 hours), full-time (35–50 hours), or overwork (more than 50 hours).

Race

We examine variation in employment patterns between Hispanic, non-Hispanic African American, and non-Hispanic women of other races (which we refer to as "white" for simplicity).

All financial variables are converted to 2014 dollars to adjust for inflation and top-coded at the ninety-ninth percentile to prevent unduly influential outliers.

RESULTS

Maternal Employment Patterns

Figure 1 shows the fraction of respondents in each employment status in each month from one year prebirth to the eighteenth year postpartum. Changes in employment are dramatic around the time of birth. In the year before birth, the share of full-time employed women plunges from 60 percent to 20 percent. The return to full-time employment is slow: it rises to almost 40 percent by the child's first birthday but does not return to the prebirth level until the child's eighteenth birthday. Immediately following the first birth, maternity leave is common (almost 20 percent), but very few mothers remain on maternity leave by a year following the birth. Part-time employment rates also drop in the months surrounding the first birth but are subsequently much more stable, from 17 percent at the child's first birthday to 19 percent at the eighteenth. However, Figure 1 provides only aggregate patterns, without describing common employment patterns experienced by individual mothers.

To examine long-term patterns, we turn to the results of our optimal matching analysis. Figure 2 shows the four medoids, or centers of clusters, that we identified. The medoid of a cluster is the sequence whose (weighted) sum of distances from all other sequences in the cluster is the smallest. The top row of Table 2 describes how common each of the clusters is. The medoids of three of the four clusters represent stable employment statuses. Thirty-eight percent of mothers are grouped into the Continuous Full-Time cluster, characterized by one month of maternity leave, followed by full-time employment in all subsequent months. One-fifth of the

sample is in the Continuous Part-Time cluster, characterized by two months of maternity leave, then consistent part-time employment. The medoid sequence of the Continuous Nonemployment group is nonemployment in every month, and this group captures 24 percent of the sample. Together, the stable employment patterns comprise about four-fifths of the mothers in the sample. Of course, this does not mean that most women in these clusters experience no employment status changes, rather that their employment pattern most closely resembles one of these stable patterns.

The final cluster is Returners, characterized by a long spell of nonemployment, a transition to part-time employment about six years following the first birth, and then a transition to full-time employment about two years later. Returners comprise the remaining 18 percent of the sample.[5] Notably, the employment pattern typical of this cluster includes return to employment after the commonly studied window of several years around the birth. Thus, analyses that focus only on the first several years after transitions to motherhood and capture employment with a simple binary will miss distinctions among the four groups: rapid returns to part-time and full-time work will be confounded, as will return to full-time employment several years following maternity and no return.

Figure 3 shows the full set of employment sequences, grouped by cluster. Although each cluster is heterogeneous, the clusters identify real employment pattern variation across mothers. As shown in Table 2, the clusters differ substantially in labor market experience accumulated over the first 18 years of motherhood. Mothers in the Continuous Full-Time group accumulate an average of over 1,900 employment hours per year, demonstrating this group's strong attachment

[5] Our clusters have some similarities with those found in prior research, but these studies either are organized by age rather than maternity (Gauthier et al. 2009) or examine only a few years surrounding the birth of a child (Halpin 2010; Hynes and Clarkberg 2005).

to the labor market throughout maternity. At the other extreme, mothers in the Continuous Nonemployment group accumulate an average of fewer than 400 employment hours annually. The Continuous Part-Time and Returners groups fall in between (1,044 and 1,262 employment hours annually, respectively). Thus, our cluster distinctions have face validity in capturing meaningful variation in maternal employment patterns. Mothers in the "mixed" or "adaptive" groups of Continuous Part-time and Returners accumulate similar employment hours through quite different pathways, and the consistently employed mothers in the Continuous Full-Time and Continuous Part-Time groups amass quite different levels of labor market experience.[6]

Social Determinants of Work-Family Experiences

Next, we examine variation across employment trajectories in the economic characteristics, family experiences, and attitudes of the mothers who experience them, as well as variation by race. Table 2 displays these characteristics by cluster and for the total sample. ANOVA tests revealed statistically significant between-group differences in average characteristics for all variables except job tenure, preference for employment at age 35, and mother's full-time employment. Table 3 shows results of a multinomial logit model that predicts cluster membership based on the same characteristics. We draw on the raw differences in Table 2 to facilitate the interpretation of multivariate results in Table 3.

In Table 3, the first three columns describe how changes in the independent variables are associated with changes in the predicted odds of falling into a given cluster, versus the Continuous Full-Time cluster (the omitted category); positive coefficients indicate that increases in a given characteristic are associated with increases in the odds that a mother falls into the

[6] Damaske (2011) identifies a set of mothers whose employment patterns are characterized as "interrupted," churning from job to job and in and out of employment. We do not find a similar cluster, perhaps because we do not examine between-employer moves.

designated cluster versus the Continuous Full-Time group. Other comparisons can be obtained by differencing coefficients across columns, and the fourth through sixth columns indicate which of these comparisons between other clusters are statistically significant. When exponentiated, the coefficients give the multiplicative change in the odds of one cluster versus another.

Work experience and human capital

More education is associated with lower odds of being in the Continuous Nonemployment group, but minimal variation across the other groups. Mothers in the Continuous Nonemployment cluster are distinctive in their high likelihood of lacking a high school degree: 14 percent compared to only 6 percent in the sample overall.

Employment during motherhood also correlates with recent prematernity labor force experience, as expected. Working a year prior to the birth is associated with higher odds of being in the Continuous Full-Time group and lower odds of being in the Continuous Nonemployment group compared to the Returners and Continuous Part-Time groups. In all groups, most women were employed a year prior to maternity, ranging from 90 percent of women in the Continuous Full-Time group to 70 percent in the Continuous Nonemployment group.

Wage is negatively associated with membership in the Returners compared to all other clusters. Descriptively, Returners earn an average hourly wage of $12.70 one year prior to maternity, compared to $14.90 in the sample overall. Average job tenure is similar across clusters, ranging from 20.6 (Returners) to 24.1 (Continuous Part-Time) weeks. In the multivariate results, job tenure is associated with higher odds of being in the Continuous Full-Time group compared to the Continuous Nonemployment group, but no other differences are statistically significant.

Attitudes and aspirations

Women's preferences, for either number of children or employment at age 35, do not strongly distinguish among the clusters. However, more traditional gender role attitudes are associated with increased odds of membership in the Continuous Nonemployment cluster compared to either the Continuous Full-Time or Returners clusters. Mothers in the Continuous Nonemployment cluster average 10.9 on the gender traditionalism scale (range: 5–20), compared to 10.1–10.4 in the other clusters. Thus, gender role attitudes distinguish the mothers who work least from other mothers, but do not distinguish among the other groups.

The Continuous Full-Time group is distinctive in that they are the most likely to have mothers who also worked full time (48 percent, compared to 41 percent for all other clusters). This characteristic of own mother's employment *only* differentiates mothers in the Continuous Full-Time group from all other mothers — there are no statistically significant differences among other clusters. Furthermore, this difference is not due to differences in maternal education. If anything, mothers in the Continuous Part-Time group have mothers with the most education: only 23 percent of mothers in this group had mothers who lacked a high school degree (compared to 36 percent in the overall sample), and 11 percent had mothers with at least a college degree (compared to 8 percent in the overall sample).

Family experiences

Younger age at maternity is associated with heightened odds of membership in the Returners cluster compared to all other clusters. Mothers in the Returners group average 23.5 years of age at the first birth, compared to 24.9 in the sample overall.

Being married is associated with higher odds of membership in the Continuous Full-Time group. However, differences by marital status must be interpreted along with variation by spousal earnings, which have the opposite association. Spousal work hours do not distinguish

among clusters. Descriptively, marriage rates are higher for women in the Continuous Full-Time and Continuous Part-Time groups than for the Returners or Continuous Nonemployment groups. However, among those who are married, husbands' annual earnings average almost $55,000 for mothers in the Continuous Nonemployment group, compared to about $47,000 in the sample overall and only $41,000 in the Continuous Full-Time group. These results highlight the heterogeneity of mothers employed less than full time: both single mothers and married mothers with high-earning husbands are overrepresented, although prior research has disproportionately focused on only the latter subpopulation.

Race

Net of other characteristics, being white as opposed to African American or Hispanic is associated with heightened odds of membership in the Continuous Part-Time cluster compared to any other cluster. Ninety-two percent of mothers in the Continuous Part-Time cluster are white, compared to only 80 percent of the sample overall. Compared to being white, being African American is associated with heightened odds of membership in the Continuous Full-Time cluster compared to any other cluster.[7] Net of other characteristics, being Hispanic as opposed to white is associated with higher odds of membership in the Continuous Full-Time or Continuous Nonemployment clusters compared to the two adaptive clusters.

In sum, net of other differences, African American mothers are more likely to experience Continuous Full-Time employment than their white peers. On the other hand, white mothers are overrepresented in the Continuous Part-Time group, highlighting the differences between the determinants of part-time and full-time employment. Compared to white mothers, Hispanic mothers are overrepresented at both poles of the employment distribution, Continuous Full-Time

[7] Compared to being Hispanic, being African American is associated with lower odds of membership in the Continuous Nonemployment cluster compared to the Continuous Full-Time or Returners clusters.

and Continuous Nonemployment. The results for Hispanic mothers highlight that focusing on average experiences may mask the polarization of employment patterns.

CONCLUSION

In this paper, we study maternal employment with a broader lens of both children's ages and the population of women considered. We avoid the focus on white, married, educated women that has characterized much previous research on maternal employment and instead consider the experiences of a nationally representative sample of American mothers. Rather than considering point-in-time measures of employment status or employment experiences in the years immediately surrounding the birth of a child, we follow mothers over the first 18 years of maternity to examine common employment patterns. In this way, we bring a life course perspective to the study of maternal employment, recognizing that mothers' decisions about paid labor are not isolated in time, but may be part of long-term strategies.

Using optimal matching, we identify four common maternal employment patterns: permanent disaffiliation from the labor market (Continuous Nonemployment), consistent participation in part-time employment (Continuous Part-Time), consistent involvement in full-time employment (Continuous Full-Time), and a multiyear spell of nonemployment, followed by part-time employment, followed by full-time employment shortly thereafter (Returners). These results show the considerable variability in contemporary American women's balancing of paid employment and motherhood and reveal how much variation is lost by previous research that either studies only the first few years following a birth, missing distinctions between the Returners and Continuous Nonemployment groups, or considers only the distinction between

employment and nonemployment, missing the distinction between the Continuous Full-Time and Continuous Part-Time groups.

The results also demonstrate that describing mothers only by their cumulative labor market experience obscures substantial differences in labor market experiences that are in turn associated with different traits of mothers and their families. Although members of the Continuous Part-Time and Returners clusters accumulate similar labor market experience in the first 18 years of maternity, these groups have substantially different characteristics. On the other hand, research that examines only employment consistency, not whether work is full time or part time, also loses substantial information. Part-time work is not simply a weigh station on the way to a return to full-time employment, but a long-term employment experience for some mothers. As a result, women in the Continuous Part-Time group accumulate far less experience during maternity than their Continuous Full-Time counterparts, and less than mothers in the Returners group, although the latter spend significant periods out of the labor market.

Our multivariate analyses draw out the key distinguishing features of each group. Mothers in the Continuous Nonemployment group include a disproportionate number of the least educated women and women not employed a year prior to the birth, but *also* of women with more traditional gender role attitudes and women with high-earning husbands. Thus, this group may combine economically secure women who withdraw from the labor market in part to accommodate their preferences and women who face substantial challenges in the labor market due to low education and experience. Returners also face economic disadvantages: they have the lowest wages prior to the birth and are the youngest at maternity. For these women, a medium-term spell out of the labor market may be relatively inexpensive, as their foregone wages are less and they are earlier in their careers.

The Continuous Part-Time and Continuous Full-Time groups, on the other hand, are relatively more advantaged: they hold higher levels of education and are very similar to each other in human capital, gender role attitudes, and family experiences; these factors may distinguish mothers with consistent employment from those who are out of the labor force for at least several years after the birth of their first child, but do not distinguish between mothers who pursue full time versus part-time trajectories. Instead, race is the key divider: mothers pursuing long-term part time work are disproportionately white. While direct measures of attitudes and preferences do not distinguish between the members of these groups, having a mother who was employed full time is associated with increased odds of being consistently full-time employed oneself, compared to consistently employed part-time. This suggests that the decision to remain consistently employed may be primarily driven by human capital, while the decision about whether to work full-time or not may be driven by more subjective factors, such as role models and norms. More research is needed to further understand the factors that influence women to pursue part-time versus full-time employment.

Our results also highlight that, while some stay-at-home mothers have high-earning husbands, these mothers are *not* disproportionately the white, college-educated, married women that have been the focus of previous research. In fact, women who experience labor market patterns other than continuous employment tend to have poor wage prospects, including less education, less prior work experience, younger age, and lower prebirth wages. Thus, future research should avoid focusing on white, married mothers under the assumption that only these women can "afford" to stay home. Although higher spousal earnings are associated with long-term disengagement from the labor market, only about half of the mothers in the Continuous

Nonemployment and Returners groups are married the year prior to the birth, and women with college degrees are actually *underrepresented* in these groups.

Like all studies, our analyses have limitations: they disproportionately exclude women who had their children at particularly young ages (prior to the beginning of data collection) or old ages (so that their oldest child is not yet age 18). Although we have demonstrated the robustness of our results to alternative substitution cost-setting schemes and alternative clustering algorithms, we do not claim that there are exactly four "ideal types" of maternal employment patterns: one could of course choose more or fewer.

Our approach is not designed to identify the time-varying forces that shape mothers' month-by-month decisions about employment, such as job satisfaction, family policies in the workplace, and availability and costs of child care, each of which is associated with maternal employment (Glass 1988; Glass and Riley 1998; Hofferth and Collins 2000; Kimmel 1998). Some mothers may return to paid work after the birth of a first child, but then exit later, perhaps after the birth of a second child (Damaske 2011; Hynes and Clarkberg 2005; Stone 2007). Our six-cluster solution identified this pattern as one cluster, but it included only 4 percent of mothers and therefore was too small to examine separately. Understanding how mothers' decisions about employment vary with changing circumstances is a worthy topic for future research, both quantitative and qualitative.

In this paper, we have provided what we believe is the first description of American mothers' long-term employment sequences following the birth of their first child. Although much research has documented the rise of women's employment in the second half of the twentieth century, previous research on maternal employment has privileged theory testing — the relevance of economic circumstances and preferences, among other traits — rather than rich

description of the wide variety of employment patterns experienced by mothers over the course of their lives. Our results demonstrate the considerable heterogeneity in how women combine employment and motherhood. We also show that research that considers only total employment hours, does not consider part-time work separately, or focuses only on the years immediately following a birth, is likely to provide a sorely underdeveloped picture of work-family balance across the life course. This incomplete picture, in turn, will limit understandings of how the traits of mothers and their families shape their work outcomes. By exploring employment trajectories as they are experienced by a wide range of American women, we hope to encourage future research that will embed the intersection of maternity and employment in the life course perspective. The long periods out of the labor market experienced by many of the mothers in our sample and underrepresentation of less advantaged women in clusters characterized by consistent employment also suggest that efforts to increase maternal employment rates will need to move beyond a focus on new mothers and college-educated mothers, considering instead the needs of women across the economic distribution and the life course.

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Table 1 Theory-Derived Substitution Cost Matrix

	Full-time	Part-time	Working, missing hours	Maternity leave	Nonemployment	Missing
Full-time	0	2	1	3	4	2
Part-time	2	0	1	2	2	2
Working, missing hours	1	1	0	2.5	3	2
Maternity leave	3	2	2.5	0	1	2
Nonemployment	4	2	3	1	0	2
Missing	2	2	2	2	2	0

Table 2 Weighted Descriptive Statistics, by Cluster

	Continuous nonemployment	Continuous part-time	Continuous full-time	Returners	Full sample
Population share (%)	24	20	38	18	100
Unweighted case count	640	373	988	457	2,458
Work experience and human capital					
Cumulative experience (hours per year)***	368	1,044	1,938	1,262	1,264
	(289)	(339)	(330)	(352)	(695)
Education***					
< High school***	0.14	0.02	0.02	0.07	0.06
High school**	0.37	0.29	0.30	0.39	0.33
Some college*	0.26	0.35	0.34	0.33	0.32
College graduate	0.13	0.17	0.17	0.12	0.15
> College***	0.11	0.16	0.18	0.09	0.14
Ever worked by one year prebirth***	0.89	0.98	0.98	0.93	0.95
Working one year prebirth***	0.70	0.84	0.90	0.78	0.82
Job tenure (weeks)	20.9	24.1	23.0	20.6	22.3
	(21.6)	(25.7)	(19.6)	(19.9)	(21.5)
Wage***	14.7	15.5	15.6	12.7	14.9
	(8.4)	(7.5)	(8.0)	(7.3)	(7.9)
Attitudes and aspirations					
Would like to work at age 35	0.84	0.86	0.89	0.85	0.86
Ideal number of children (top-coded at 4)*	2.4	2.4	2.3	2.5	2.4
	(1.1)	(1.0)	(1.0)	(1.0)	(1.1)
Gender role traditionalism (range 5–20)***	10.9	10.2	10.1	10.4	10.4
	(2.8)	(2.6)	(2.6)	(2.8)	(2.7)
Mother's education***					
< High school***	0.40	0.23	0.36	0.43	0.36
High school*	0.39	0.51	0.46	0.44	0.45
Some college**	0.10	0.15	0.11	0.06	0.11
College graduate*	0.08	0.08	0.05	0.05	0.06
> College	0.02	0.03	0.02	0.02	0.02
Mother employed full time					
Yes	0.41	0.41	0.48	0.41	0.43
No	0.56	0.58	0.51	0.57	0.55
NA (no mother figure)	0.03	0.02	0.02	0.02	0.02

Table 2 Weighted Descriptive Statistics, by Cluster (continued)

	Continuous Nonemployment	Continuous part-time	Continuous full-time	Returners	Full sample
Family experiences					
Age at first maternity***	24.6	25.6	25.3	23.5	24.9
	(4.4)	(3.8)	(4.1)	(4.1)	(4.2)
Marital status one year prebirth ***					
Single***	0.44	0.30	0.37	0.50	0.40
Married***	0.50	0.66	0.57	0.45	0.55
Previously married	0.06	0.04	0.06	0.06	0.05
Spouse's usual hours worked per week					
< Full-time	0.04	0.04	0.07	0.07	0.06
Full-time**	0.77	0.84	0.79	0.73	0.79
Overwork	0.19	0.12	0.13	0.19	0.15
Spouse's earnings***	54,793	52,919	40,511	46,674	47,408
	(35,864)	(36,636)	(26,067)	(35,367)	(32,922)
Race* **					
Hispanic***	0.09	0.03	0.07	0.06	0.07
African American***	0.14	0.05	0.16	0.15	0.13
White***	0.77	0.92	0.77	0.79	0.80

NOTE: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard deviations are in parentheses. Wage and earnings are expressed in 2014 dollars. Respondents with missing values are removed when calculating descriptive statistics. Log job tenure and log wage are defined only for respondents who had ever worked by one year prebirth and are set to zero otherwise. Spouse's earnings is defined only for respondents who were married with spouse present one year prebirth and is set to zero otherwise. Spouse's usual hours worked per week is also defined only for respondents who were married with spouse present one year prebirth and is set to less than full time otherwise.

Table 3 Multinomial Logistic Regression Results (N=2,458)

Baseline group	Cont. full-time			Cont. part-time		Cont. nonemp.
Comparison group	Cont. nonemp.	Cont. part-time	Returners	Cont. nonemp.	Returners	Returners
Work experience and human capital						
Education:						
High school	−1.11***	0.31	−0.31	***		***
	(0.24)	(0.42)	(0.28)			
Some college	−1.66***	0.29	−0.44	***		***
	(0.24)	(0.43)	(0.28)			
College graduate	−1.79***	0.27	−0.63	***		***
	(0.29)	(0.45)	(0.32)			
> College	−2.11***	−0.01	−0.83*	***		***
	(0.30)	(0.46)	(0.34)			
Ever worked by one year prebirth	0.49	0.82	1.17**			
	(0.38)	(0.52)	(0.40)			
Working one year prebirth	−1.35***	−0.77***	−0.67***	**		***
	(0.15)	(0.19)	(0.17)			
Log job tenure	−0.13*	−0.03	−0.05			
	(0.06)	(0.06)	(0.06)			
Log wage	−0.27*	−0.16	−0.59***		**	*
	(0.13)	(0.14)	(0.13)			
Attitudes and aspirations						
Would like to work at age 35	−0.09	0.03	−0.12			
	(0.18)	(0.21)	(0.19)			
Ideal number of children (top-coded at 4)	0.06	0.03	0.12*			
	(0.05)	(0.06)	(0.05)			
Gender role traditionalism	0.09***	0.05	0.02			**
	(0.02)	(0.03)	(0.02)			
Mother's education						
High school	0.15	0.46**	0.21			
	(0.13)	(0.15)	(0.14)			
Some college	0.41	0.55*	−0.07		*	
	(0.22)	(0.23)	(0.26)			
College graduate	1.12***	0.98**	0.53			
	(0.29)	(0.30)	(0.33)			
> College	0.45	0.51	−0.23			
	(0.46)	(0.44)	(0.58)			

Table 3 Multinomial Logistic Regression Results (continued)

Baseline group	Cont. full-time			Cont. part-time		Cont. nonemp.
Comparison group	Cont. nonemp.	Cont. part-time	Returners	Cont. nonemp.	Returners	Returners
Mother employed full-time						
Yes	−0.33**	−0.35**	−0.41**			
	(0.12)	(0.13)	(0.13)			
NA (no mother figure)	0.31	0.14	−0.33			
	(0.37)	(0.45)	(0.46)			
Family experiences						
Age at first maternity	0.03	0.01	−0.06**		**	***
	(0.02)	(0.02)	(0.02)			
Marital status one year prebirth						
Married	−2.33*	−1.92	−1.98*			
	(0.94)	(1.00)	(0.99)			
Previously married	−0.26	−0.46	−0.02			
	(0.28)	(0.34)	(0.29)			
Spouse's usual hours worked per week						
Full-time	0.19	0.25	0.01			
	(0.40)	(0.38)	(0.43)			
Overwork	0.48	0.06	0.46			
	(0.45)	(0.45)	(0.48)			
Log spouse's earnings	0.19*	0.17	0.16			
	(0.09)	(0.10)	(0.09)			
Race						
Hispanic	0.02	−0.82***	−0.40*	***		*
	(0.15)	(0.20)	(0.17)			
African American	−0.60***	−1.42***	−0.51***	***	***	
	(0.15)	(0.20)	(0.15)			
Intercept	1.06	−1.39	1.96**	**	***	
	(0.58)	(0.78)	(0.63)			

NOTE: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors are in parentheses. Wage and earnings are expressed in 2014 dollars. Log job tenure and log wage are defined only for respondents who had ever worked by one year prebirth and are set to zero otherwise. Log spouse's earnings is defined only for respondents who were married with spouse present one year prebirth and is set to zero otherwise. Spouse's usual hours worked per week is also defined only for respondents who were married with spouse present one year prebirth and is set to less than full time otherwise. Item-missing data are multiply imputed.

Figure 1 Monthly Employment Status Distribution, by Time since First Birth

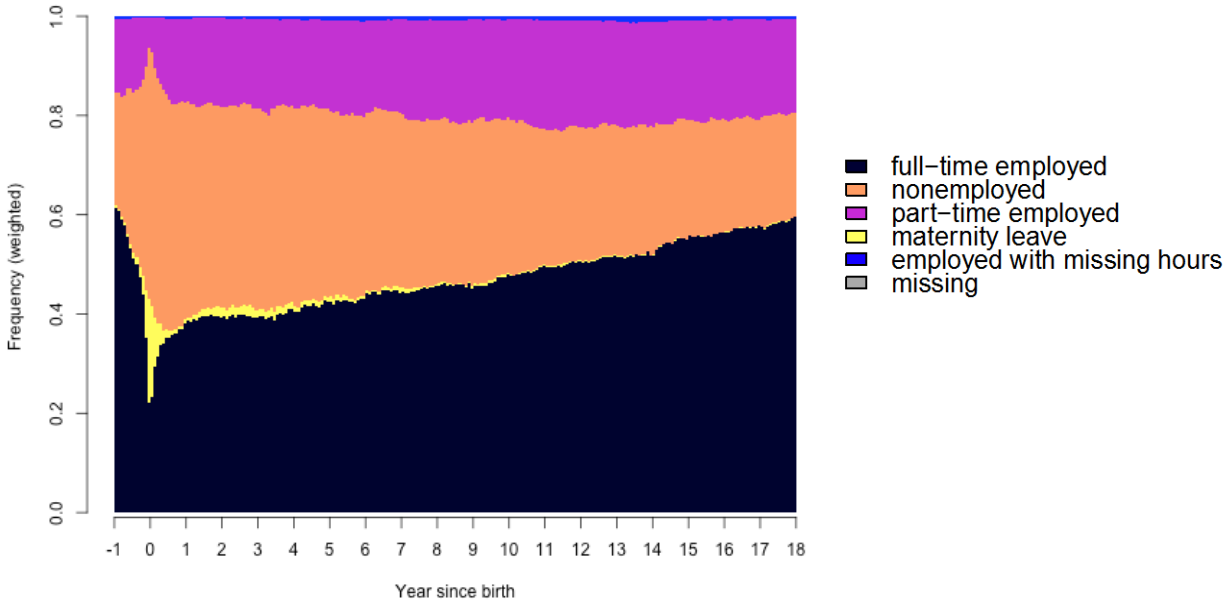


Figure 2 Cluster Medoids

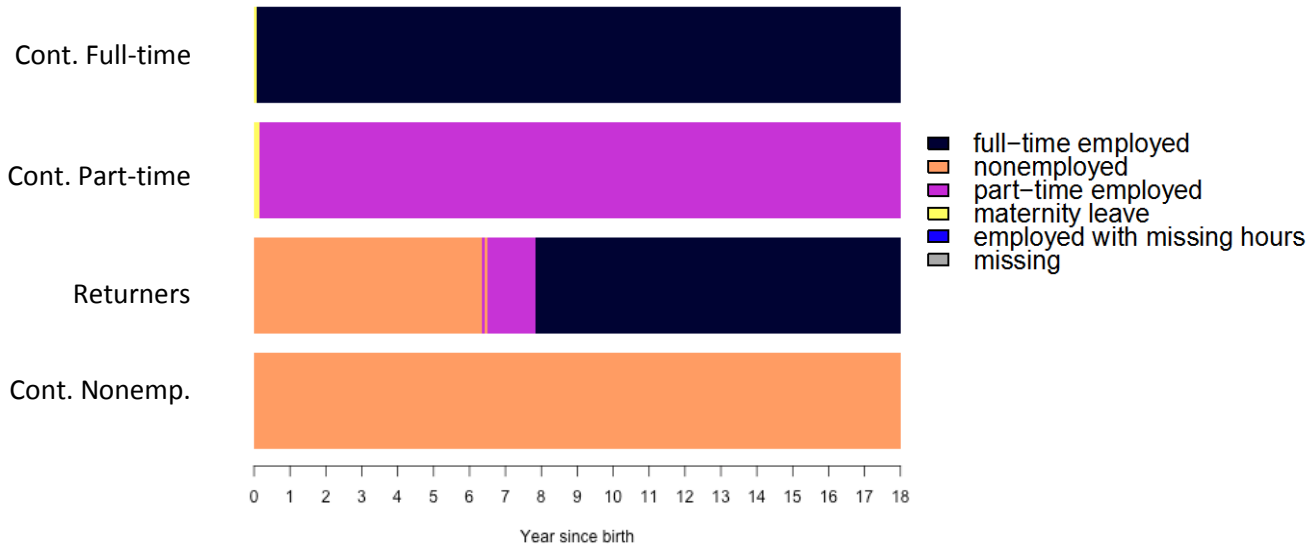
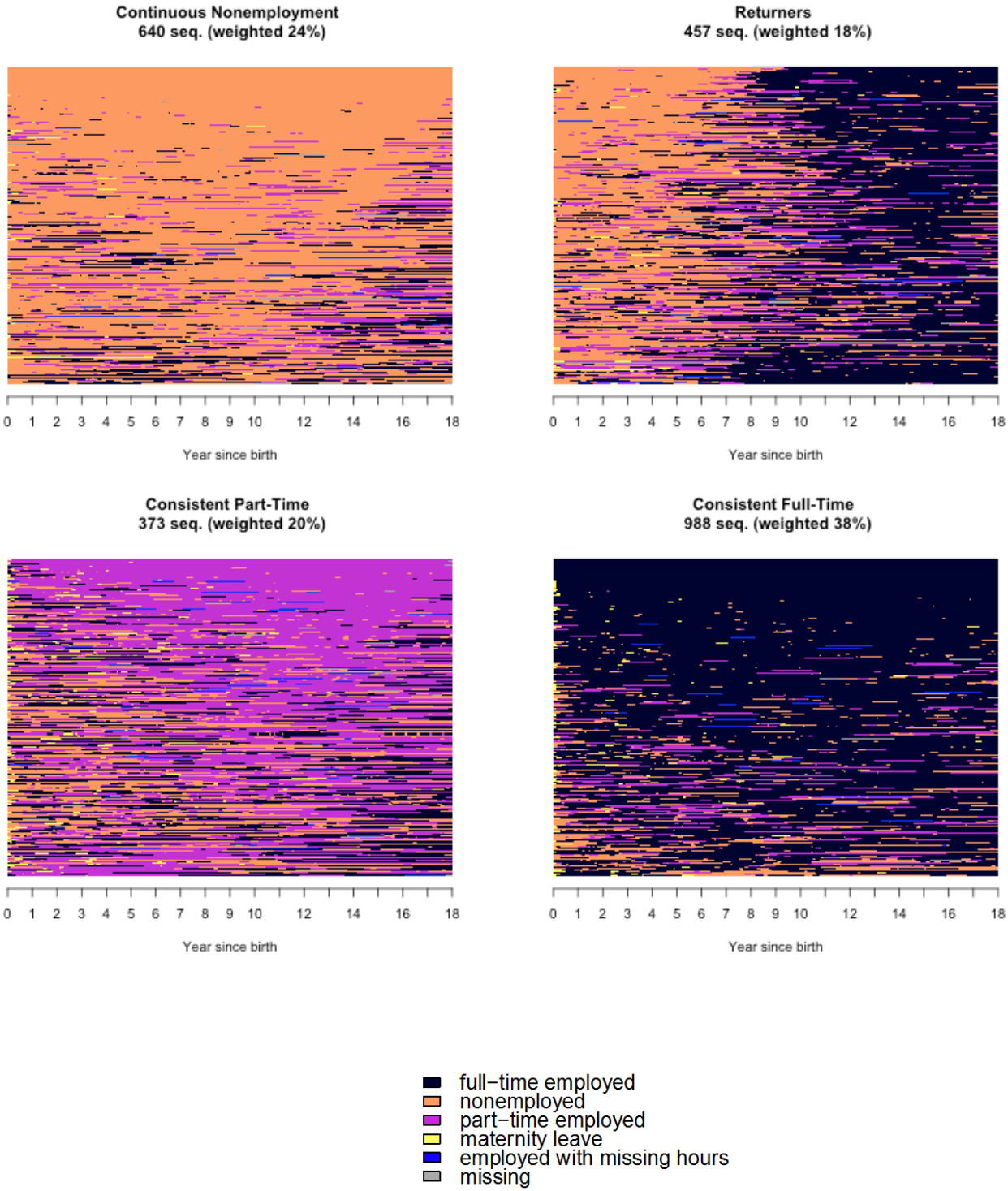


Figure 3 All Employment Sequences, by Cluster, Sorted by Closeness to Medoid



Appendix

To ensure the robustness of our cluster results, we considered a range of cluster numbers (from two to fifteen) and clustering algorithms (k-medoids, Ward's, and average linkage). An optimal cluster solution maximizes inter-cluster dissimilarity and minimizes intra-cluster dissimilarity. We assess the quality of results from each combination of clustering algorithm and number of clusters using two measures, R^2 statistics and weighted average silhouette width (ASW).

The ASW index assesses the fitness of the data set to a cluster partition. It is the average of $s(i)$ for each observation i, which compares the average distance of the observation i to other members in its own cluster and the lowest average distance to any other cluster. An $s(i)$ of one means the observation is well matched to its own cluster, a value of negative one indicates misclassification, and a value of zero shows equal fits to both clusters. The ASW of all observations in a cluster tells us about the compactness of the cluster and its separation from other clusters, with a larger value representing a better fit. The overall ASW for the entire data set, furthermore, evaluates the validity of the chosen partition and can help with selecting an appropriate number of clusters (Rousseeuw 1987). The ASW measure can also be extended to weighted data (Studer 2013).

The weighted R^2 statistics capture the share of variation in the data explained by the clustering solution, computed using squared distances (Studer et al. 2011).[8]

Figure A.1 displays the quality measures of various clustering results. The weighted ASW decreases as the number of clusters increases, whereas the opposite trends hold for the R^2

[8] Following the recommendation of Studer et al. (2011), we also present in Figure A1 the results using non-squared distances.

statistics. The k-medoids algorithm generally performs better on both quality measures than Ward's and average linkage do. Although the R^2 plot displays an upward trend, the slope declines between the four-cluster and six-cluster solutions, suggesting that 4 to 6 clusters is optimal. Considering the typology of employment patterns implied and ensuring a relatively large size and stability of each cluster, we chose the four-cluster result. Figures A.2 and A.3 show the medoids from the five- and six-cluster solutions and their relative frequencies.

Next, we show that our clustering results are robust across substitution cost matrices. We used three distinct cost matrices – theory-derived (Table 1), constant (a cost of two for any substitution), and transition-rate-based (Table A.2) – and compared the results, applying the k-medoids algorithm and choosing four clusters. The medoids identified using the three cost matrices resemble one another, and the membership crosstabs show only eight percent of sequences are differently grouped using different cost matrices (Figure A4 and Table A3).

We also analyzed three alternative samples – a larger sample using a shorter time window, 14 years, of maternal employment sequences (N = 2,713), a subgroup of respondents who participated in *all* survey waves (N = 1,629, implemented with NLSY79 weights for respondents in *all* survey waves), and a subgroup of mothers ever employed by a year prior to the birth (N = 2,261). The alternative samples produce similar sets of common employment patterns (Figures A.5–-A.7), and the results from multinomial logit models remain robust as well (Tables A.5–A.7).

Table A.1 Variables with Missing Values

Variable	Missing case count	Share (%)
Would like to work at age 35	108	4
Whether R's mother worked full time	93	4
Wage	255	10
Ideal number of children	29	1
Gender role traditionalism	87	4
Spouse's earning	187	8
Spouse's usual hours worked per week	97	4

NOTE: N=2,458. Wage and spouse's earnings are top-coded at ninety-ninth percentile, imputed, top-coded again to adjust for outliers created in the imputation process, and then logged. Ideal number of children was top-coded at 4 before imputation.

Table A.2 Transition-rate-based Substitution Cost Matrix

	Full-time	Part-time	Working, missing hours	Maternity leave	Nonemployment	Missing
Full-time	0	1.97	1.97	1.84	1.95	2
Part-time	1.97	0	1.97	1.89	1.94	2
Working, missing hours	1.97	1.97	0	1.99	1.98	2
Maternity leave	1.84	1.89	1.99	0	1.98	2
Nonemployment	1.95	1.94	1.98	1.98	0	2
Missing	2	2	2	2	2	0

Table A.3 Sequences Cross-classified by Clusters Identified Using Different Substitution Cost Matrices

Constant

		Cont. nonemp.	Cont. part-time	Cont. full-time	Returners
Theory-derived	Continuous nonemployment	*625*	1	0	14
	Continuous part-time	40	*256*	43	34
	Continuous full-time	0	0	*979*	9
	Returners	4	4	34	*415*

NOTE: 183 sequences (weighted 8%) are differently categorized (i.e., off-diagonal).

Transition-rate-based

		Cont. nonemp.	Cont. part-time	Cont. full-time	Returners
Theory-derived	Continuous nonemployment	*627*	0	1	12
	Continuous part-time	40	*256*	44	33
	Continuous full-time	0	0	*979*	9
	Returners	4	4	36	*413*

NOTE: 183 sequences (weighted 8%) are differently categorized (i.e., off-diagonal).

Table A.4 Sequences Cross-Classified by Clusters Identified Using 18-Year and 14-Year Maternal Employment Sequences 18-Year

		Cont. nonemp.	Cont. part-time	Cont. full-time	Returners
14-Year	Continuous nonemployment	*588*	51	2	71
	Continuous part-time	22	*281*	27	40
	Continuous full-time	6	25	*957*	2
	Returners	24	16	2	*344*
	Total	640	373	988	457
	(Weighted %)	(24)	(20)	(38)	(18)
	Newly added respondents	63	51	117	24
	(Weighted %)	(23)	(27)	(43)	(7)

Table A.5 Multinomial Logistic Regression Results, Expanded Sample with 14-Year Sequences (N=2,713)

Baseline group	Cont. full-time			Cont. part-time		Cont. nonemp.
Comparison group	Cont. nonemp.	Cont. part-time	Returners	Cont. nonemp.	Returners	Returners
Work experience and human capital						
Education:						
High school	−1.25***	−0.09	−0.56*	***		***
	(0.21)	(0.33)	(0.25)			
Some college	−1.71***	−0.30	−0.60*	***		***
	(0.22)	(0.34)	(0.26)			
College graduate	−1.61***	−0.19	−0.57	***		***
	(0.25)	(0.36)	(0.30)			
> College	−2.29***	−0.52	−0.85*	***		***
	(0.29)	(0.38)	(0.34)			
Ever worked by one year prebirth	0.59	0.29	1.55***		*	**
	(0.37)	(0.50)	(0.40)			
Working one year prebirth	−1.38***	−0.53**	−0.67***	***		***
	(0.14)	(0.19)	(0.17)			
Log job tenure	−0.08	−0.05	−0.05			
	(0.05)	(0.06)	(0.06)			
Log wage	−0.30*	−0.14	−0.72***		***	**
	(0.12)	(0.14)	(0.13)			
Attitudes and aspirations						
Would like to work at age 35	−0.07	−0.02	−0.13			
	(0.17)	(0.20)	(0.20)			
Ideal number of children	0.09	0.01	0.13*			
	(0.05)	(0.06)	(0.06)			
Gender role traditionalism	0.10***	0.01	0.02	***		**
	(0.02)	(0.02)	(0.02)			
Mother's education						
High school	0.17	0.57***	0.15	*	*	
	(0.12)	(0.15)	(0.14)			
Some college	0.06	0.78***	−0.13	**	**	
	(0.22)	(0.22)	(0.27)			
College graduate	0.73**	0.86**	0.17			
	(0.26)	(0.27)	(0.34)			
> College	0.46	0.49	0.05			
	(0.42)	(0.44)	(0.53)			

Table A.5 Multinomial Logistic Regression Results, Expanded Sample with 14-Year Sequences (continued)

Baseline group		Cont. full-time		Cont. part-time		Cont. nonemp.
Comparison group	Cont. nonemp.	Cont. part-time	Returners	Cont. Nonemp.	Returners	Returners
Mother employed full-time						
Yes	−0.34**	−0.43***	−0.41**			
	(0.11)	(0.13)	(0.13)			
NA (no mother figure)	0.39	0.18	−0.30			
	(0.35)	(0.45)	(0.47)			
Family experiences						
Age at first maternity	0.01	0.02	−0.07***		***	***
	(0.01)	(0.02)	(0.02)			
Marital status one year prebirth						
Married	−2.15*	−0.97	−1.75			
	(0.85)	(0.79)	(0.99)			
Previously married	−0.28	−0.80*	0.14		*	
	(0.26)	(0.33)	(0.29)			
Spouse's usual hours worked per week						
Full-time	−0.24	−0.25	−0.03			
	(0.35)	(0.34)	(0.47)			
Overwork	−0.03	−0.37	0.45			
	(0.39)	(0.39)	(0.51)			
Log spouse's earnings	0.22**	0.10	0.15			
	(0.08)	(0.08)	(0.09)			
Race						
Hispanic	−0.15	−0.75***	−0.24	**	*	
	(0.15)	(0.19)	(0.17)			
African American	−0.62***	−1.50***	−0.49**	***	***	
	(0.14)	(0.19)	(0.16)			
Intercept	1.27*	−0.49	2.01***	**	***	
	(0.51)	(0.67)	(0.61)			

NOTE: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors are in parentheses. Wage and earnings are expressed in 2014 dollars. Log job tenure and log wage are defined only for respondents who had ever worked by one year prebirth and are set to zero otherwise. Log spouse's earnings is defined only for respondents who were married with spouse present one year prebirth and is set to zero otherwise. Spouse's usual hours worked per week is also defined only for respondents who were married with spouse present one year prebirth and is set to less than full time otherwise. Item-missing data are multiply imputed.

Table A.6 Multinomial Logistic Regression Results, Subsample of Respondents Who were in All Surveys (N=1,629)

Baseline group	Cont. full-time			Cont. part-time		Cont. nonemp.
Comparison group	Cont. nonemp.	Cont. part-time	Returners	Cont. nonemp.	Returners	Returners
Work experience and human capital						
Education:						
High school	−1.44***	−0.34	−0.78*	*		*
	(0.35)	(0.53)	(0.40)			
Some college	−1.99***	−0.28	−0.91*	***		***
	(0.36)	(0.54)	(0.40)			
College graduate	−2.20***	−0.44	−1.21**	***		**
	(0.40)	(0.56)	(0.44)			
> College	−2.38***	−0.67	−1.59***	**		
	(0.41)	(0.57)	(0.47)			
Ever worked by one year prebirth	0.53	0.89	1.28*			
	(0.48)	(0.60)	(0.50)			
Working one year prebirth	−1.32***	−0.78***	−0.55**	*		***
	(0.19)	(0.22)	(0.21)			
Log job tenure	−0.24**	−0.09	−0.15			
	(0.07)	(0.08)	(0.08)			
Log wage	−0.19	−0.19	−0.49**			
	(0.17)	(0.16)	(0.16)			
Attitudes and aspirations						
Would like to work at age 35	−0.19	0.09	0.09			
	(0.23)	(0.27)	(0.25)			
Ideal number of children	0.05	0.06	0.19**			
	(0.06)	(0.07)	(0.07)			
Gender role traditionalism	0.10***	0.02	0.02	*		*
	(0.03)	(0.03)	(0.03)			
Mother's education						
High school	0.10	0.28	0.24			
	(0.17)	(0.19)	(0.17)			
Some college	0.36	0.47	−0.38		*	*
	(0.27)	(0.27)	(0.35)			
College graduate	1.34***	1.00**	0.57			
	(0.33)	(0.34)	(0.41)			
> College	0.42	0.92	0.43			
	(0.63)	(0.52)	(0.69)			

Table A.6 Multinomial Logistic Regression Results, Subsample of Respondents Who were in All Surveys (continued)

Baseline group		Cont. full-time		Cont. part-time		Cont. nonemp.
Comparison group	Cont. nonemp.	Cont. part-time	Returners	Cont. nonemp.	Returners	Returners
Mother employed full-time						
Yes	−0.42**	−0.53**	−0.63***			
	(0.15)	(0.16)	(0.16)			
NA (no mother figure)	0.50	0.43	−1.37		*	*
	(0.45)	(0.49)	(0.79)			
Family experiences						
Age at first maternity	0.02	0.00	−0.08**		**	***
	(0.02)	(0.02)	(0.02)			
Marital status one year prebirth						
Married	−2.45	−0.90	−2.73			
	(1.38)	(1.07)	(1.69)			
Previously married	−0.55	−0.28	−0.14			
	(0.37)	(0.39)	(0.37)			
Spouse's usual hours worked per week						
Full-time	0.23	0.02	−0.26			
	(0.53)	(0.44)	(0.54)			
Overwork	0.53	−0.13	0.04			
	(0.59)	(0.52)	(0.61)			
Log spouse's earnings	0.20	0.10	0.27			
	(0.13)	(0.10)	(0.17)			
Race						
Hispanic	−0.07	−0.96***	−0.46*	***		
	(0.20)	(0.25)	(0.22)			
African American	−0.42*	−1.23***	−0.39*	**	**	
	(0.19)	(0.23)	(0.19)			
Intercept	1.40	−0.26	2.43**		**	
	(0.74)	(0.94)	(0.81)			

NOTE: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors are in parentheses. Wage and earnings are expressed in 2014 dollars. Log job tenure and log wage are defined only for respondents who had ever worked by one year prebirth and are set to zero otherwise. Log spouse's earnings is defined only for respondents who were married with spouse present one year prebirth and is set to zero otherwise. Spouse's usual hours worked per week is also defined only for respondents who were married with spouse present one year prebirth and is set to less than full time otherwise. Item-missing data are multiply imputed.

Table A.7 Multinomial Logistic Regression Results, for Subsample with Prebirth Work Experience (N=2,261)

Baseline group	Cont. full-time			Cont. part-time		Cont. nonemp
Comparison group	Cont. nonemp.	Cont. part-time	Returners	Cont. nonemp.	Returners	Returners
Work experience and human capital						
Education:						
High school	−1.09***	0.16	−0.46	**		*
	(0.26)	(0.43)	(0.30)			
Some college	−1.63***	0.17	−0.53	***		***
	(0.27)	(0.43)	(0.31)			
College graduate	−1.77***	0.14	−0.75*	***		**
	(0.31)	(0.46)	(0.35)			
> College	−2.04***	−0.10	−0.94**	***		**
	(0.32)	(0.46)	(0.36)			
Ever worked by one year prebirth	−1.36***	−0.77***	−0.66***	***		***
	(0.15)	(0.19)	(0.17)			
Working one year prebirth	−0.13*	−0.03	−0.04			
	(0.06)	(0.06)	(0.06)			
Log job tenure	−0.29*	−0.15	−0.57***		**	*
	(0.13)	(0.14)	(0.13)			
Log wage						
	−0.08	0.02	−0.15			
Attitudes and aspirations	(0.19)	(0.21)	(0.20)			
Would like to work at age 35	0.06	0.02	0.13*			
	(0.05)	(0.06)	(0.06)			
Ideal number of children	0.08***	0.05	0.03			
	(0.02)	(0.03)	(0.02)			
Gender role traditionalism						
	0.17	0.43**	0.21			
Mother's education	(0.14)	(0.16)	(0.14)			
High school	0.43	0.54*	−0.05		*	
	(0.23)	(0.23)	(0.26)			
Some college	1.12***	0.95**	0.38			*
	(0.29)	(0.30)	(0.35)			
College graduate	0.50	0.37	−0.18			
	(0.46)	(0.46)	(0.58)			

Table A.7 Multinomial Logistic Regression Results, for Subsample with Prebirth Work Experience (Continued)

Baseline group	Cont. full-time			Cont. part-time		Cont. nonemp
Comparison group	Cont. nonemp.	Cont. part-time	Returners	Cont. nonemp.	Returners	Returners
Mother employed full-time						
Yes	−0.32*	−0.32*	−0.39**			
	(0.13)	(0.13)	(0.13)			
NA (no mother figure)	0.21	−0.01	−0.47			
	(0.39)	(0.48)	(0.50)			
Family experiences						
Age at first maternity	0.03	0.00	−0.07**		**	***
	(0.02)	(0.02)	(0.02)			
Marital status one year prebirth						
Married	−2.85**	−1.94	−2.00			
	(1.11)	(1.02)	(1.06)			
Previously married	−0.30	−0.46	−0.07			
	(0.28)	(0.34)	(0.30)			
Spouse's usual hours worked per week						
Full-time	0.20	0.26	−0.01			
	(0.41)	(0.38)	(0.43)			
Overwork	0.49	0.08	0.41			
	(0.46)	(0.45)	(0.48)			
Log spouse's earnings	0.23*	0.17	0.17			
	(0.11)	(0.10)	(0.10)			
Race						
Hispanic	0.05	−0.81***	−0.49**	***		**
	(0.16)	(0.20)	(0.18)			
African American	−0.63***	−1.48***	−0.49**	***	***	
	(0.16)	(0.20)	(0.16)			
Intercept	1.64*	−0.34	3.29***	*	***	*
	(0.64)	(0.77)	(0.69)			

NOTE: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors are in parentheses. Wage and earnings are expressed in 2014 dollars. Log job tenure and log wage are defined only for respondents who had ever worked by one year prebirth and are set to zero otherwise. Log spouse's earnings is defined only for respondents who were married with spouse present one year prebirth and is set to zero otherwise. Spouse's usual hours worked per week is also defined only for respondents who were married with spouse present one year prebirth and is set to less than full time otherwise. Item-missing data are multiply imputed.

Figure A.1 Quality Measures of Clustering Results

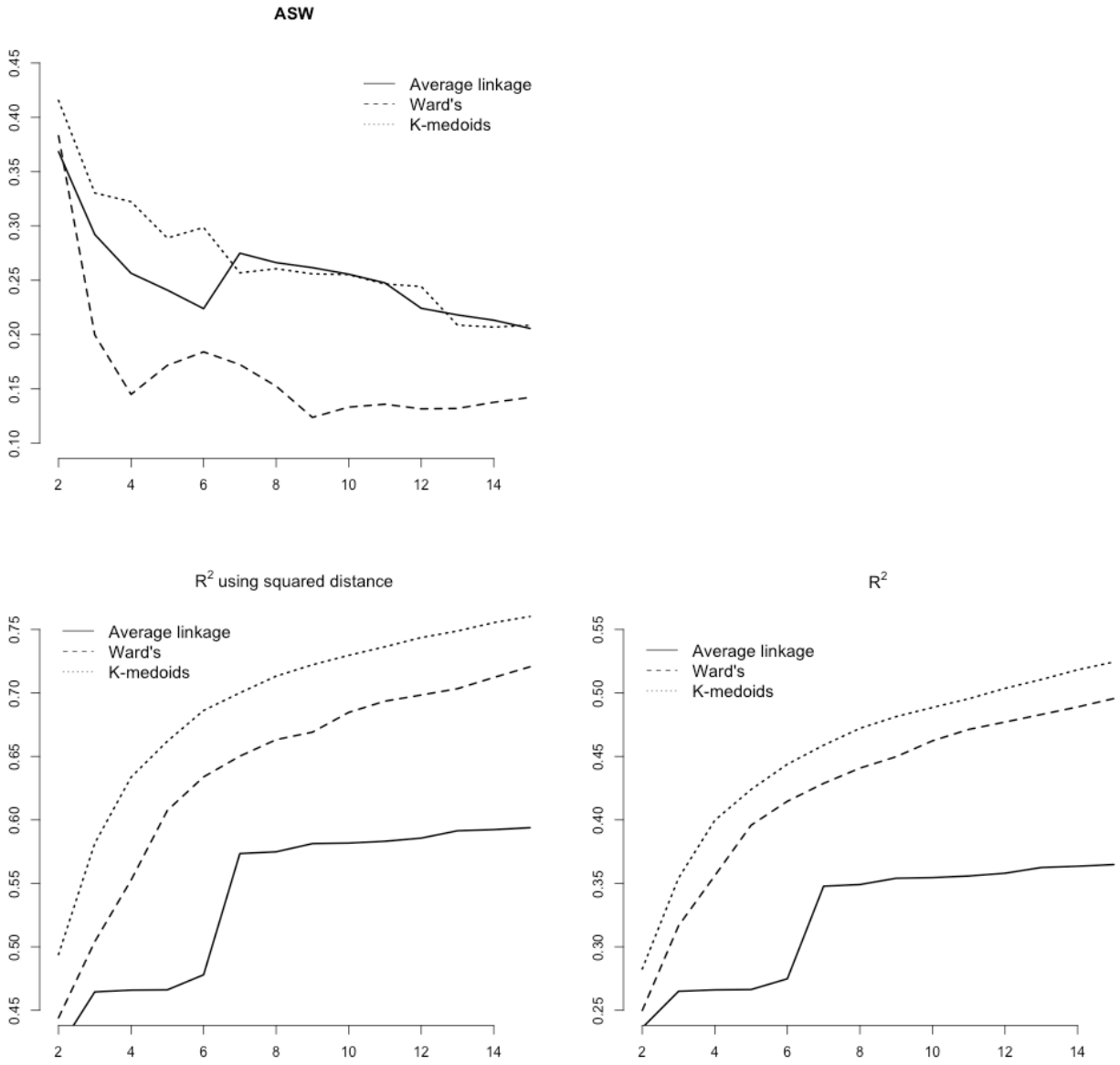


Figure A.2 Medoids from Five-Cluster Solution

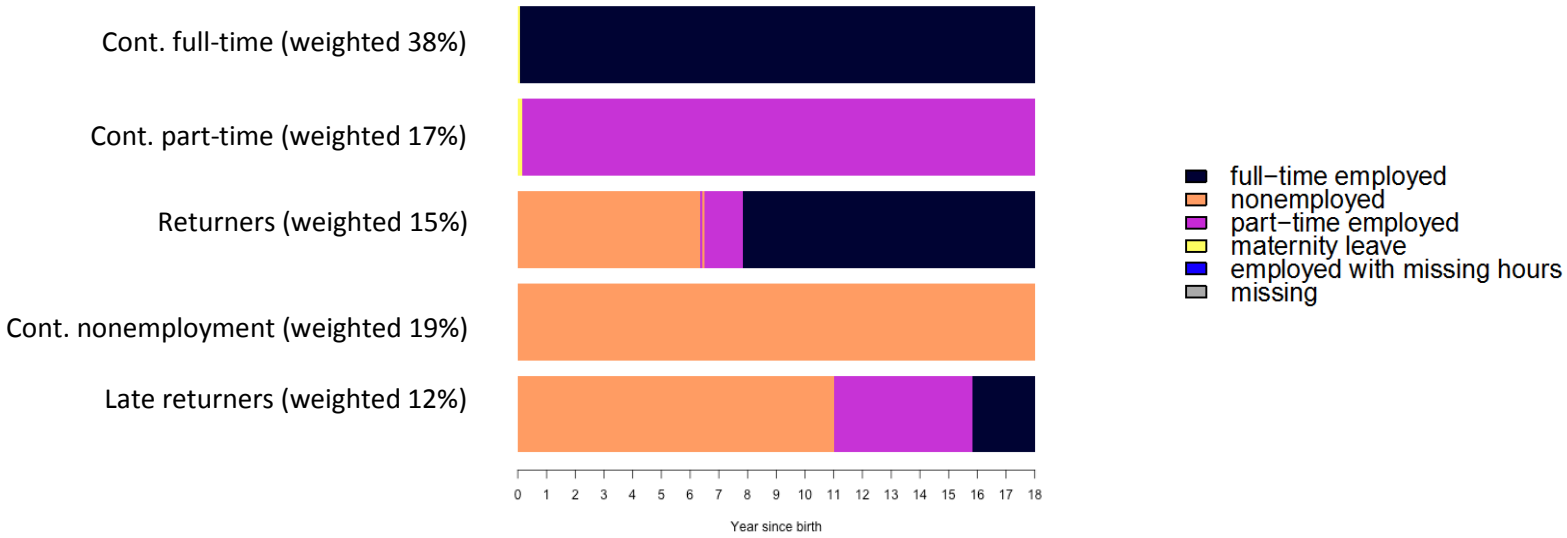


Figure A.3 Medoids from Six-Cluster Solution

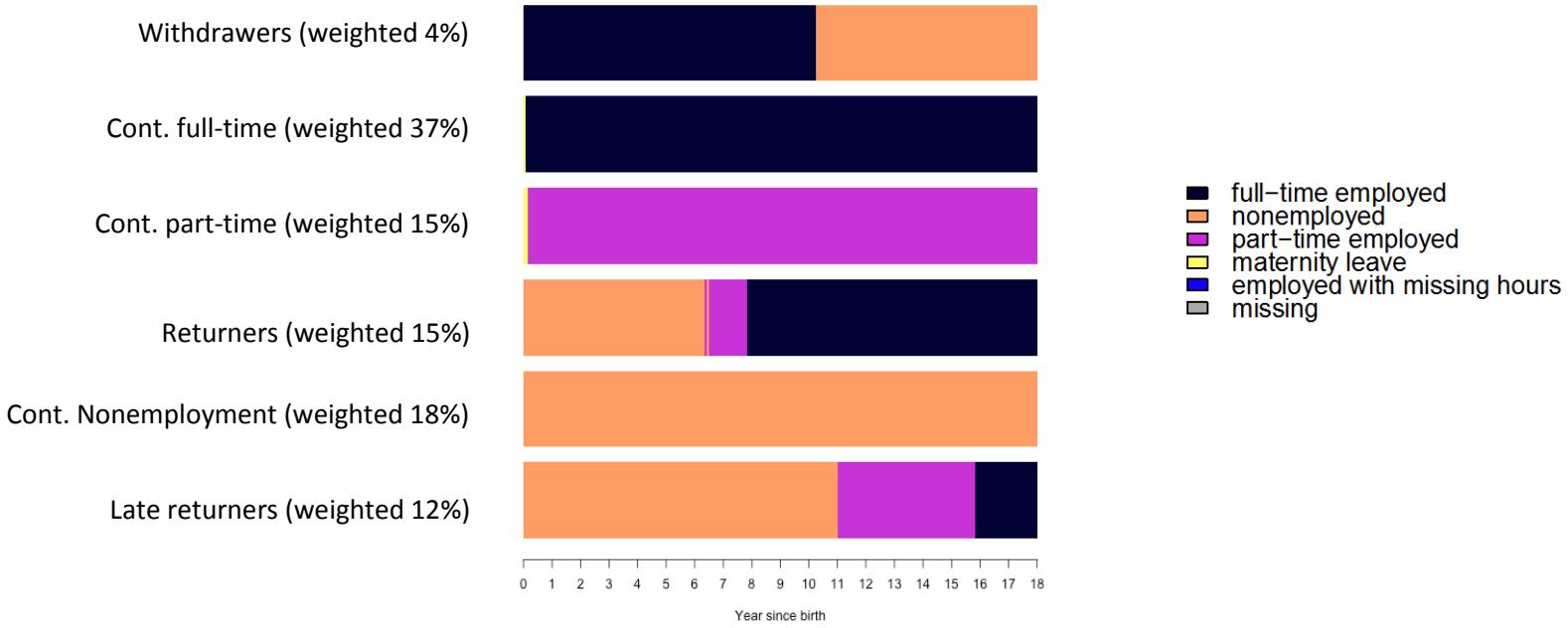


Figure A.4 Medoids Derived Using Different Substitution Cost Matrices

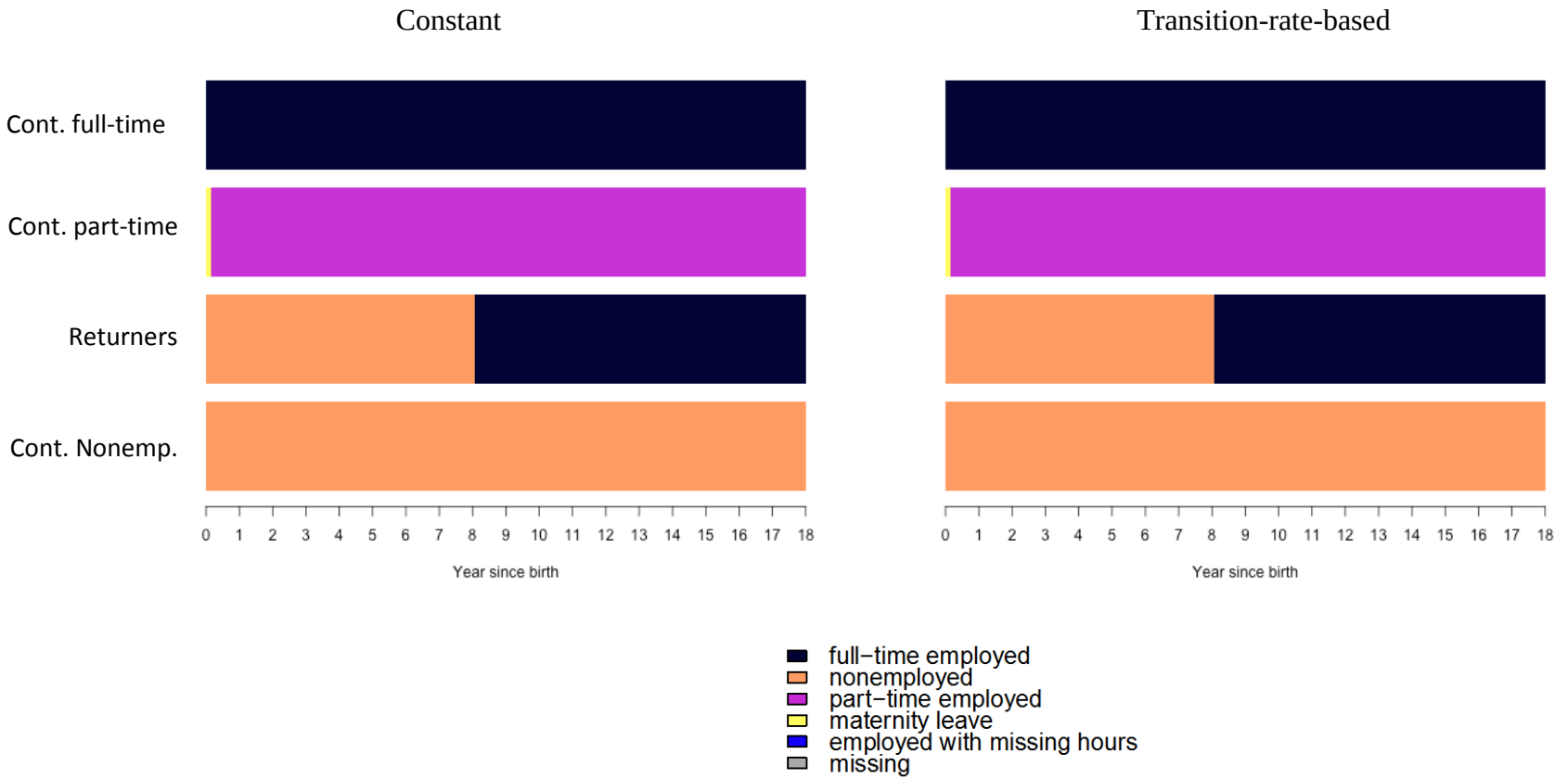


Figure A.5 Medoids from 14-Year Maternal Employment Sequences (N=2,713)

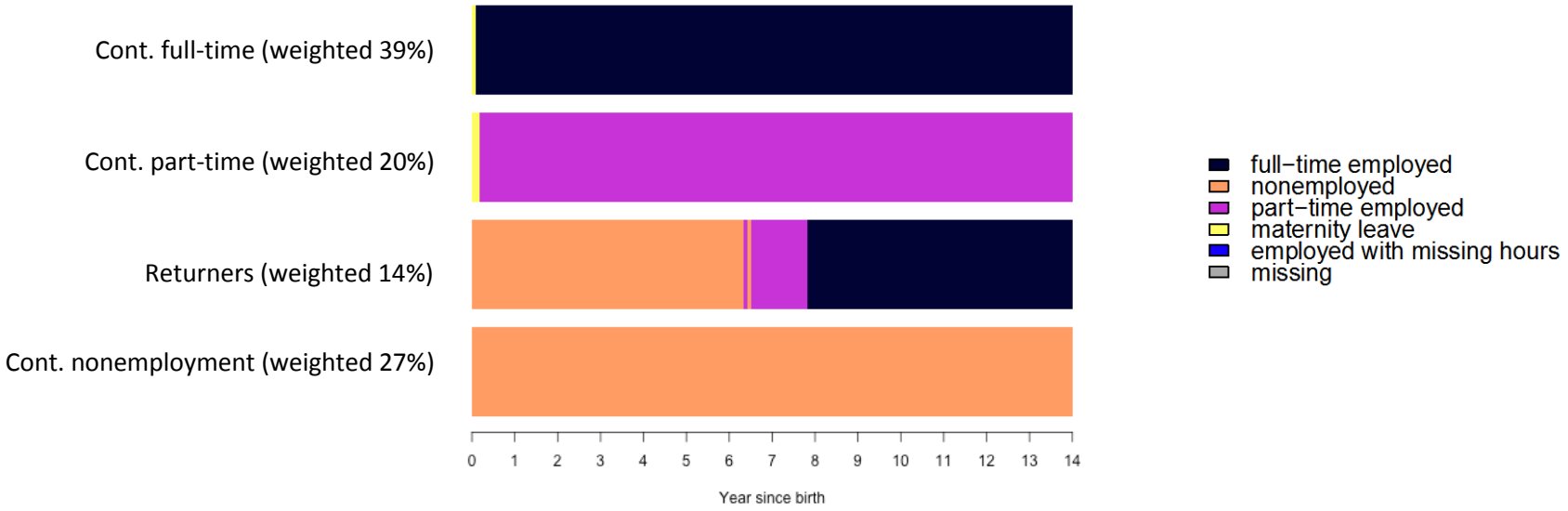


Figure A.6 Medoids from Subgroup of Mothers Who Were in All Survey Waves (N=1,629)

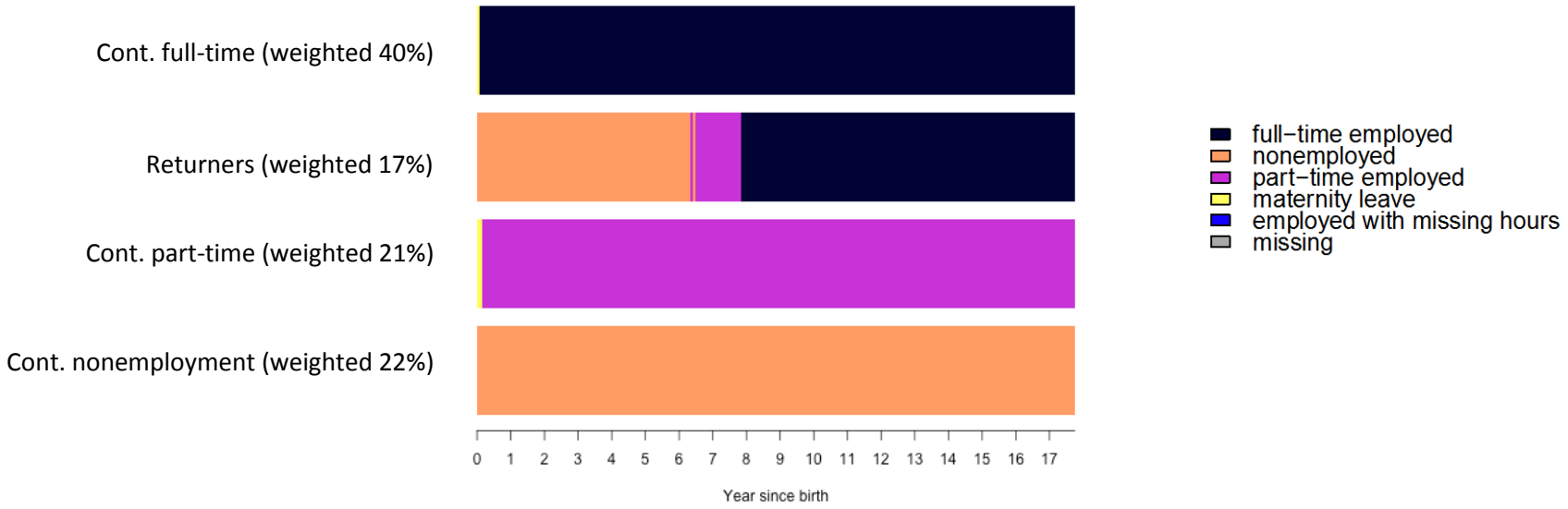


Figure A.7 Medoids from Subgroup of Mothers with Prebirth Work Experience (N=2,261)