Long Work Hours and the Effect of Motherhood on Earnings

Eunjeong Paek[1]

University of Southern California

[1]Author Note: Correspondence should be addressed to Eunjeong Paek, Department of Sociology, University of Southern California, Los Angeles, CA 90089-1059. Email: paeke@usc.edu. Thank you Jennifer Hook for guidance and comments throughout many revisions of this paper. Thank you Lynne Casper, Sarah Thébaud, and Jennifer Candipan for helpful comments. Thank you the participants of the USC Sociology Wednesday Colloquium and the UCSB Gender & Sexuality Workshops for helpful comments and suggestions. Thank you Yael Findler, Alli Coritz, Mary Ippolito, Latoya Council, Briana Jex, and Lizette Solorzano for your help in polishing the draft.

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Abstract

This study examines whether working long hours alters the motherhood earnings penalty. On the one hand, overwork could have a protective effect on mothers' earnings by signaling work commitment or increasing the autonomy to reduce unpaid work. Overwork may also appear protective because it is populated by a more select group of mothers, with higher levels of human capital or work effort. On the other hand, overwork could exacerbate the motherhood penalty by intensifying work-family conflict or introducing normative discrimination. The author uses the data from the National Longitudinal Survey of Youth (1979-2014) to model the annual earnings penalty mothers incur per child. The results support that among white women, overwork can protect against the total penalty; mothers who work long hours (50+ hours per week) have a lower penalty than full-time workers (35-49 hours per week). Once controlling for human capital and work effort, however, there is no difference in the effect of children on wages between full-time workers and overworkers. The findings suggest that overwork itself may not be protective, but mothers who work long hours may exhibit a smaller penalty because of positive selection.

Keywords: motherhood penalty, long work hours, overwork, maternal employment, earning trajectories, work and family

Although more men engage in overwork (working 50 hours or more weekly) than women, women's incidence of overwork has increased over the past decades (Cha and Weeden 2014; Jacobs and Gerson 2004; Weeden, Cha, and Buccac 2016). Despite the increase in overwork among women, mothers are less likely to overwork than childless women, at 6 and 9 percent in 2010, respectively (Weeden et al. 2016). The gap between childless women and mothers, however, substantially shrinks among younger cohorts of professional women (Percheski 2008), suggesting that the gap may be narrowing.

Studies show that working long hours can exacerbate gender disparities in the U.S. labor market. As overworkers tend to experience steeper wage growth and more promotion opportunities than full-time workers, the gender gap in overwork explains a good portion of gender wage inequality (Cha and Weeden 2014; Landers, Rebitzer, and Tylor 1996). Moreover, working long hours fortifies occupational gender segregation by increasing the exit of mothers from male-concentrated occupations (Cha 2013). The prevailing belief that physical presence at the workplace indicates job commitment poses a particular challenge to overworking mothers because mothers tend to assume a disproportionate share of family responsibilities (Blair-Loy 2003; Casper and Bianchi 2002; Hochschild and Machung 1989; Stone 2007). Given that the majority of women become a mother at some point in their life, these mother-specific challenges in working long hours can deter the progress toward gender equity in the labor market (for a similar argument, see Correll, Benard, and Paik 2007).

Despite growing interest in how overwork impacts gender inequality, little is understood about how overwork impacts the earning gap between mothers and childless women. Although some studies have noted whether the motherhood wage penalty is more pronounced in full-time work than part-time work (Budig and England 2001; Budig and Hodges 2010), the primary

interest of work hours in the existing literature is generally limited to the assumption that reducing work hours after becoming a mother or having an additional child has confounding effects on the motherhood penalty. Researchers have used work hours or part-time employment status as control variables for work effort or mother-friendly work conditions to parcel out the motherhood penalty from wage reductions as a result of change in work hours after childbirth (England et al. 2016; Killewald and García-Manglano 2016; Waldfogel 1997; Yu and Kuo 2017). Although this conventional assumption and methodological approach reveal the motherhood penalty net of work hours, such practices focus little on the variance of the motherhood penalty across work hours, and especially how working long hours can condition the motherhood penalty.

To my knowledge, only one study explores the association between working long hours and the motherhood penalty. Using the Current Population Survey, Weeden, Cha, and Bucca (2016) reported a closing wage gap between childless women and mothers who work long hours during the 2010s, which contrasts with a widening wage gap between childless men and fathers who work long hours. Although this study reveals an important trend in the motherhood wage penalty among women who work long hours, its analytical models and dataset structure do not permit substantiating a causal inference for the association between within-person variations in motherhood status and wages.

The primary motivation of this study is to reconsider the role of work hours in the motherhood penalty by testing whether working long hours alters the negative effect of motherhood on earnings. Drawing on gender, work, and family research, this study presents the argument that working long hours is a crucial context for assessing the motherhood penalty through two competing hypotheses—the *extra-effort* and the *extra-squeeze* hypotheses. The

extra-effort hypothesis predicts lower penalties among mothers who engage in overwork than mothers who work full-time because working long hours can signal commitment to work, reduce unpaid work, and attract highly-selected mothers. In contrast, the extra-squeeze hypothesis predicts greater penalties for mothers who engage in overwork than mothers work full-time because overwork could exacerbate work–family conflict affecting productivity, and time commitment to work might trigger normative discrimination. Using data from the National Longitudinal Survey of Youth (https://www.bls.gov/nls/nlsy79.htm) and fixed-effect models, this study tests whether within-person change in the number of children affects earnings in overwork, in contrast to full-time work. The results support that working long hours can protect against the total motherhood penalty in which basic demographic characteristics are held constant; among white women, mothers who work long hours have lower penalties than full-time workers. Once controlling for human capital and work effort, however, there is no difference in the effect of children on wages between full-time and overworkers. The findings suggest that overwork itself may not be protective, but that mothers who work long hours may experience smaller per child penalties because of positive selection. By providing a better causal inference on the motherhood penalty, this study advances the understanding of the implications of rising overwork for mothers' disadvantages at work. These findings can spur further discussions of the complex implications of working long hours on the motherhood penalty.

Theoretical Framework

The Motherhood Penalty

Mothers, on average, have unique disadvantages at work. Although the overall wage gap between childless women and mothers has been narrowing (Pal and Waldfogel 2016), mothers tend to get paid less than equally qualified childless women (Budig and England 2001; Correll et

al. 2007; Killewald and García-Manglano 2016; Waldfogel 1997). Cultural beliefs that associate motherhood with prioritizing family and lacking work commitment lead to lower performance expectation and workplace outcomes for mothers (Correll et al. 2007; Ridgeway and Correll 2004). Studies have shown that this "motherhood penalty" can be conditioned by various contexts, including skill-level (England et al. 2016), educational attainment (Anderson, Binder, and Krause 2003), occupational characteristics (Yu and Kuo 2017), sex segregation (Buchman & McDaniel, 2016; Glauber, 2012), and earnings level (England et al. 2016).

Previous studies have further shown that mothers' distinctive supply-side characteristics play a key role in explaining the wage gap between childless women and mothers. Mothers, on average, tend to have lower job qualifications and commitments than childless women. As educational attainment has a positive association with childlessness and delayed childbearing (Blackburn, Bloom, and Neumark 1993; Casper and Bianchi 2002; Hout 2012), mothers tend to have lower levels of human capital. Also, although there exists only little difference in work effort—measured by how much thought or effort respondents put into work—between childless women and mothers (Bielby and Bielby 1988; Kmec 2011), women tend to reduce work hours and therefore, forgo gaining more work experience after childbearing (Gangl and Ziefle 2009; Killewald and García-Manglano 2016; Klerman and Leibowitz 1999; Whittington 2011), largely because they perform a disproportionate share of housework compared to fathers (Bianchi et al. 2012; Gupta 1999; Killewald and García-Manglano 2016) and lack institutional supports for balancing work and family life (Gerson 2010; Gornick and Meyers 2003). Besides human capital and work effort, some researchers posit that mothers trade "mother-friendly" benefits for less demanding, low-paying jobs to combine their work and their family responsibilities (e.g. Becker 1985), but empirically, these "compensating differentials" explain little of the motherhood

penalty (Budig and England 2001; Estes and Glass 1996; Glauber 2012). Whereas human capital and work effort can mediate a substantial portion of the motherhood penalty (Anderson et al. 2003; Budig and England 2001; Gangl and Ziefle 2009; Staff and Mortimer 2012), the motherhood penalty is not explained solely by these observed supply-side characteristics (Anderson et al. 2003; Budig and England 2001; Correll et al. 2007; Gangl and Ziefle 2009). It is possible that the motherhood penalty may be attributable to unobserved supply-side characteristics, such as job productivity (Budig and England 2001).

Another strand of research underscores the salience of demand-side factors. Due to the prevailing belief that mothers are less committed and competent at work, employers tend to have lower expectations for mothers' effort and ability (Ridgeway and Correll 2004). Correll and colleagues (2007) have shown that mothers tend to be evaluated as less competent than childless women who have the same qualification and who exhibit the same amount of effort and productivity, suggesting that discrimination against mothers exists in the hiring and promotion process. These arguments support the idea that the motherhood penalty results, at least partially, from discriminatory practice against mothers at the workplace (Budig & England, 2001; England et al., 2016; Glauber, 2012; Killewald & García-Manglano, 2016).

Working Long Hours and the Motherhood Penalty

Studies have shown what forces drive employees to work long hours. As job evaluation processes often treat working long hours as evidence of commitment to work, especially in workplaces where productivity is difficult to measure, employees tend to face pressure to be physically present in their workplace for long hours (Blair-Loy 2003; Schaufeli and Rhenen 2008; Sharone 2004). In addition, as technology, such as computer and smart-phones, makes work more permeable to non-work life, employees who may have some degree of autonomy to

choose the location of work are easily expected to stay nearly always connected to work (Blair-Loy 2009; Perlow 2012).

In this study, I build two competing hypotheses for whether working long hours alters the motherhood penalty. On the one hand, working long hours may protect against the motherhood penalty by signaling commitment to work. Although the expectation of the ideal worker conflicts with the expectation of the ideal mother (Blair-Loy, 2003; Ridgeway & Correll, 2004), mothers' work commitment may mitigate this contradiction. Indeed, working long hours can increase promotion opportunities (Landers et al. 1996), economic reward (Cha and Weeden 2014; Gicheva 2013), and workplace support (Hochschild 1997). Moreover, even if there is a difference in human capital and work effort between childless women and mothers who engage in overwork, the substantial time commitment to work may mitigate this distinction. If overwork leads to more autonomy at work, mothers may experience fewer motherhood penalties because of the ability to adjust work demands and schedules to help combine work and family responsibilities and reduce emotional distress, even when work-family conflict is pronounced (Kelly et al. 2014; Schieman and Glavin 2011; Yu and Kuo 2017).

In addition to signaling commitment to work, mothers who engage in overwork may reduce the motherhood penalty by reducing the burden of unpaid work. Mothers who work long hours may spend less time on unpaid work than mothers who work fewer hours because their earnings allow them to decrease their housework time (Gupta 2006, 2007; Hook 2017; Killewald 2011). For this reason, compared with mothers who work full-time, mothers who engage in overwork tend to spend less time on housework (Hook 2017) potentially by relying more on child care services (Hofferth 1999), housekeeping services (Cohen 1998), and dining out (Cohen 1998). Besides the ability to purchase market substitutes of unpaid work, mothers who work long

hours may have a particularly strong preference to "opt out" of housework (Killewald 2011). A relatively lighter domestic burden can help overworking mothers enhance productivity at work by lessening the potential interference of family responsibilities with work responsibilities.

Furthermore, mothers who engage in overwork may be unique because of their highly selected characteristics. Given that overwork is more common in professional/managerial occupations (Cha and Weeden 2014; Jacobs and Gerson 1998) and these occupations are disproportionately comprised of highly-educated individuals (Schieman and Glavin 2011; Smart 1986), mothers who engage in overwork tend to have a high level of human capital. In addition, the rigid expectation for working long hours may prevent overworking mothers from reducing work effort according to their family responsibilities as much as mothers who work full-time. Mothers who reduce work effort for family responsibilities may have opted out of overwork (Stone 2007). Thus, the gap in work hours between childless women and mothers may be smaller among those who engage in overwork than among those who work full-time. Based on these arguments, I make the following *extra-effort* hypothesis for the *protective* effect of overwork on the motherhood penalty:

Hypothesis 1: The motherhood penalty is less pronounced among overworkers than full-time workers.

Alternatively, the motherhood penalty might be similar or more pronounced among those who work long hours. Overwork may not necessarily protect mothers from the motherhood penalty because of mothers' particularly intensive work-family conflict. Despite the availability of strategies to reduce unpaid work, mothers who engage in overwork may still be subject to a disproportionate burden of family responsibilities (Bianchi et al. 2012; Gupta 1999; Killewald and García-Manglano 2016) and lack of support to combine work and family life from spouses

(Brines 1994; Cha 2010), workplaces (Glass and Camarigg 1992), and the state (Gornick and Meyers 2003). Unlike childless women and men in the labor market, most mothers in the labor market are still expected to be primary caregivers (Hochschild and Machung 1989; Kimmel and Connelly 2007). Unlike men who have demanding careers, women who have demanding careers are less likely to receive spouse's support (Brines 1994; Cha 2010). Compared with mothers who work fewer hours, mothers who work long hours also tend to have greater difficulties with balancing work and family life (Maume and Houston 2001; Voydanoff 2004). As a result, mothers who engage in overwork tend to experience intense time squeezes, burnout, and work-family conflict (Hochschild and Machung 1989; Schaufeli and Rhenen 2008; Sharone 2004). As working long hours is often associated with competitive workplaces that expect employees to be immersed in work (Blair-Loy 2003; Sharone 2004), the effect of family-to-work spillover may be more severe and costly in overwork than in full-time work.

Furthermore, overwork may not significantly reduce the resilience of the negative stereotype of mothers' lower workplace competency and commitment. If the contradiction between the ideal worker and ideal motherhood is salient in a workplace (Blair-Loy 2003; Ridgeway and Correll 2004), the devaluation of motherhood may not be alleviated but could even be heightened by mothers' commitment to work. For example, highly-achieving mothers tend to be evaluated as having lower interpersonal skills than equally achieving childless women (Benard and Correll 2010). Benard and Correll (2010) have found evidence in support of "normative discrimination", which indicates that people tend to disapprove of committed and productive mothers, thus amplifying the negative stereotype that competent mothers are less warm and more hostile. Given that interpersonal relationship can play a key role in intraorganizational mobility (Podolny and Baron 1997), mothers who have high levels of

competence and commitment may still face mother-specific penalties at workplace. These arguments allow me to construct the alternative *extra-squeeze* hypothesis, on the damaging effect of overwork on the motherhood penalty (for a similar argument, see Cha 2010, Cha 2013):

Hypothesis 2: The motherhood penalty is more pronounced among overworkers than full-time workers.

The motherhood penalty can be confounded with employed mothers' demographic characteristics. Because age, marital status, spouses' full-time status, region, and urban residence may affect childbearing and be further associated with earnings (Budig and England 2001; Iacovou and Tavares 2011; Taniguchi 1999; Yu and Kuo 2017), these variables are controlled for in all models to prevent the spurious association between motherhood and earnings.

Data, Variables, and Methods

Data and Sample

This study uses the 26 waves of the National Longitudinal Survey of Youth 1979 (NLSY 79) from 1979 to 2014. As the NLSY is a panel data, it allows to examine the association between within-difference in motherhood status and labor outcomes. The survey is administered to a nationally representative sample (N of persons=12,686). The waves from 1979 to 1994 were collected annually and the waves from 1994 to 2014 were collected biannually. As the minimum observations for fixed effect models per person is two (Allison 2009), this study limits the sample to women who are employed, work for at least 35 hours per week, and have earnings in at least two waves (N of persons= 5,387).

Multiple imputation methods were used for the variables that have more than 5% missing values except the dependent variables (annual earnings). The percentage of females in a given

occupation in 2000 and spouses' work hours in 1979, 1987, 1988, 2006, 2010, 2012, 2014 are imputed with fifteen values through chained equations. After the multiple imputation, there remain 85,537 observations and 5,384 persons in the sample. Without this multiple imputation, the sample would be composed of 84,850 observations and 5,384 persons.

Due to the fact that the effects of motherhood on labor outcomes are most pronounced among white women (England et al. 2016; Florian 2018; Glauber 2007), the analyses for black and white women were conducted separately. Consistent with previous findings (England et al., 2016; Glauber, 2007; Waldfogel, 1997), the motherhood penalty is statistically insignificant among black women (not shown in the result). Among black women, each additional child does not have a significant effect on earnings either in full-time work or overwork. For this reason, further comparison of full-time work and overwork were restricted to the sample to white women whose motherhood penalty is more substantial (N of persons=3,122).

In total, 30,115 person-year observations were collected: 26,416 for full-time work and 3,699 for overwork. The final pooled sample is comprised of 3,112 persons: 3,098 full-time workers and 1,329 overworkers. As people often change work hours across their life course, some respondents are included in both the full-time work and overwork samples. As a result, the sum of the number of persons for each group is larger than the number of persons in the pooled sample.

Variables

The dependent variable is annual earnings. Annual earnings allow us to address the general economic status of employees (Glauber, 2008). Whereas some studies on the fatherhood premium use annual earnings as the primary outcome (Glauber, 2008; Hodges & Budig, 2010),

little is known about the effect of motherhood on annual earnings because the motherhood penalty is often measured with hourly wage (Budig & England, 2001; England et al., 2016; Glauber, 2012; Killewald & García-Manglano, 2016). Although hourly wage measures "standardized compensation per hour on the job", it may not comprehensively capture the association between work hours and pecuniary compensation among salaried workers. For example, the hourly wage of salaried workers, which is conventionally calculated by dividing annual earnings by annual work hours in the NLSY, can be lowered by either the increase in work hour or the decrease in annual earnings. If salaried workers reduce their work hour after having a child and retain the same pay, this would increase their hourly wage. Given that such standardized compensation per hour can complicate an estimation of the within-person motherhood penalty among salaried workers, this study considers annual earnings similar to studies on the fatherhood premium (Glauber, 2008; Hodges & Budig, 2010). Annual earnings are adjusted to 2014 US dollars (extracted from the Bureau of Labor Statistics Consumer Price Index) and top-/bottom-coded at the 95th and 1st percentile, respectively. Due to the fact that annual earnings tend to be highly skewed, this study uses the natural log of annual earnings. Following von Hippel (2007), I include annual earnings in multiple imputation but did not use the imputed dependent variable in the analysis.

Following the practice of previous studies (Budig and England 2001; England et al. 2016), this study measures motherhood with the number of children ever born to or adopted by the respondent for the main results. I use a continuous variable for the number of children instead of dummy variables--having one child and having two or more children— because the sample size of overworkers is small compared to that of full-time workers. Dummy variables produce large standard errors for the overworker sub-sample. A supplementary analysis with dummy

variables, however, leads to similar substantive conclusions and is described in the sensitivity analyses below.

Work hours per week is calculated by dividing the number of hours worked over the course of the previous calendar year by the number of weeks worked in the same timeframe. In accordance with previous research (e.g. Cha 2013; Killewald and García-Manglano 2016), full-time work is defined as 35 or more hours but less than 50 hours per week and overwork is defined as 50 or more hours per week.

Similar to previous studies (Budig and England 2001; England et al. 2016), this study progressively includes basic demographics, human capital, work effort, and job characteristics in the model. Basic demographic characteristics include age, marital status and spouse's full-time status (if a spouse is present). Age is included as a continuous variable, and marital status is measured with two dummy variables—married and divorced (reference group is never married). Spouses' full-time work is indicated by a dummy variable for whether a spouse works 35 or more hours per week. Spouses' full-time work is coded as 0 if the respondent is not nor has never been married or divorced. Human capital is measured by the number of years of schooling, years of seniority and years of work experience. Work effort is measured by weekly work hours and the number of weeks worked in the past years. Weekly work hour is included as a continuous variable to control for the potential difference in work hours between childless women and mothers among full-time workers and overworkers, separately. Years of seniority, years of work experience, and weekly work hours are top- and bottom-coded at 95th percentile and 1st percentile, respectively.

Job characteristics include percentage of female workers in the occupation, employment in the public sector, and professional/managerial occupations. The percentage of female workers

in a given occupation are obtained from Current Population Studies (CPS) and combined with the data collected from the NLSY through an occupation code crosswalk (Meyer and Osborne 2005). The CPS 1990 is extrapolated and used for the NLSY 1989-1998, and the NLSY 2000-2014 is matched to the same year of the CPS 2000-2014. Public sector refers to being employed in the government sector and is included as a dummy variable. Working in a professional or managerial occupation is included as a dummy variable.

Methods

This study uses fixed effect models to explore whether within-person change in motherhood status affects earnings and how the within-person motherhood penalty varies across work hour status. Compared with ordinary least square regressions, fixed effect models have advantages in drawing a causal inference for the motherhood penalty because they adjust for time-invariant unobserved characteristics (Allison 2009). Although fixed effect models do not control unobserved time-varying characteristics, fixed effect models reduce selection bias by dropping out the time-invariant confounding factors that can potentially affect both motherhood status and earnings. For this reason, previous studies on the motherhood penalty use fixed-effect models (Anderson et al. 2003; Budig and England 2001; England et al. 2016; Waldfogel 1997; Yu and Kuo 2017). The Hausman test also suggests that fixed effect models are preferred to random effect models in this case.

The following fixed effect equation is used to estimate the natural log of annual earnings. In this equation, α indicates the intercept and the βs indicate the coefficients of time-varying independent variables, including the number of children, basic demographics, human capital and work effort. *Year* is created and included as dummy variables for years, μ indicates the coefficients for each year, and ε indicates the error term. The term *i* and *t* refer to person and

year, respectively. Because the dependent variable is log-transformed and the independent variables are original metrics in the analyses, 100*($e^b - 1$), where b is a coefficient, refers to the change in percent of the dependent variable.

$$Ln(Annual\ Earnings_{it}) = \alpha_0 + \sum_{j=1}^{J} \beta_j X_{it} + \sum_{t=2}^{T} \mu_t Year_t + \varepsilon_{it}$$

The models are run separately for full-time workers and overworkers in order to investigate whether the effects of within-person change in the number of children on earnings vary by work hour status. In each group, the baseline models demonstrate the motherhood penalties with only the basic demographics included. Similarly to the previous studies on the motherhood penalty (Budig and England 2001; Glauber 2012; Killewald and García-Manglano 2016), I investigate how the baseline motherhood penalty changes according to the progressive adjustment for human capital, work effort, and job characteristics.

Results

Table 1 provides descriptive statistics by work hours and motherhood status. The results suggest that among white women, overworking mothers have several distinct characteristics from mothers who work full-time. Compared with mothers who work full-time, overworking mothers tend to have more children, be older, divorced and are less likely to have a spouse who has full-time work. Mean annual earnings are roughly $12,580 higher per year among overworking mothers than mothers who work full-time. Overworking mothers report higher human capital than mothers who work full-time, measured by years of schooling, years of seniority, and years of work experience. Overworking mothers also exhibit greater work effort—the number of weekly work hours and weeks worked in the past year-- than mothers who work full-time. Overworking mothers are also more likely to be in professional occupations and in the

public sector, and are less likely to be in female-dominated occupations than mothers who work full-time.

Overworking mothers are distinguished from overworking childless women in many ways. Overworking mothers are older, at least partially because many overworking childless women eventually have children over time. If overworking childless women continue to overwork after childbearing, these observations will be coded as overworking mothers, decreasing the mean of the age of the remaining overworking childless women. If overworking childless women do not continue to overwork after having children (moving to full-time work, moving to part-time work, or exiting from paid work), these observations will be moved out of the sample of overworking childless women.

Overworking mothers are more likely to be divorced and have a spouse who has a full-time work than overworking childless women. Overworking mothers also tend to have fewer years of schooling, and more years of tenure and work experience than overworking childless women. They are also more likely to work in the public sector and at professional occupations than overworking childless women. Overworking mothers provide greater or similar levels of work effort—more weekly work hours and similar number of weeks worked in the past year—compared with overworking childless women. The difference between the percentage of women in a given occupation for childless women and mothers is not considerable among overworkers.

Table 2 shows the effect of motherhood status on earnings among full-time workers and overworkers. The coefficient for the number of children represents the impact of each additional child on annual earnings. In Model 1, results show that although each additional child may decrease earnings to some extent, per child penalties are not statistically significant among overworkers. This suggests that there is no indication of the significant motherhood penalty in

overwork. The absence of per child penalties among overworkers are in contrast to significant child penalties among full-time workers. In full-time work, each additional child reduces earnings by 11.3% on average. This earning penalty is consistent with the wage penalty from previous studies (Budig and England 2001; Killewald and García-Manglano 2016; Waldfogel 1997).

The magnitude of the difference in the coefficients for the number of children between full-time workers and overworkers identifies whether the motherhood penalty differs between full-time workers and overworkers. The test on comparisons of the coefficients (Clogg, Petkova, and Haritou 1995) shows that, when basic demographics are held constant, per child penalties in full-time work are statistically greater than per child penalties in overwork. This finding provides evidence to reject the hypothesis that motherhood penalties in full-time work and overwork are similar, thus, supporting the extra-effort hypothesis.

[Table 1 is about here]

Once human capital is adjusted for in Model 2, the gap in the motherhood penalty between full-time workers and overworkers is reduced to statistical non-significance. The gap in per child penalties between full-time workers and overworkers narrows due to a considerable decrease in per child penalties for full-time workers after adjusting for human capital. Controlling for human capital reduces the motherhood penalty to 8.6% in full-time work. In sensitivity analyses (results not shown), years of schooling and years of work experience significantly reduce the motherhood penalty in full-time work, but years of seniority does not. In contrast to the motherhood penalty in full-time work, adjusting for human capital does not change the statistically insignificant motherhood penalty in overwork. Sensitivity analyses (results not shown) show that none of the human capital indicators—years of schooling, years of

tenure, or years of experience— significantly change the motherhood penalty for overworking mothers. This finding suggests that although human capital explains a good portion of the motherhood penalty for full-time workers, the statistically insignificant motherhood penalty in overwork is little altered by human capital. This may reflect that mothers who select into overwork tend to have fairly high levels of schooling, tenure, and work experience.

Model 3 includes weekly work hours and annual work weeks to capture the mediation of work effort in the motherhood penalty. This model introduces work hours as a continuous variable to rule out the potential differences between childless women and mothers in each work hour group. The continuous variable for work hour is bounded between 35 and 49 for full-time workers and 50 and more for overworkers. In this model, which controls for work effort, the gap in the motherhood penalty between full-time workers and overworkers becomes even smaller. This further reduction in disparity of per child penalties between full-time workers and overworkers is driven by the drastic decline in the motherhood penalty for full-time workers. For full-time work, adjusting for work effort substantially reduces the motherhood penalty to 4%, although the motherhood penalty remains robust (Model 3). Sensitivity analyses (results not shown) reveal that whereas the number of work hours only minimally explains the motherhood penalty, the annual number of weeks worked explains a considerable amount of the motherhood penalty for full-time workers. Indeed, although work effort captures a key mechanism of the motherhood penalty in full-time work, it does not alter the statistically insignificant motherhood penalty for overworkers. This might be due to the fact that overworking mothers do not differ from overworking childless women on number of weeks worked per year and slightly exceed them on weekly work hours.

Including job characteristics in the analysis—public sector, percent of female workers in a given occupation, and professional occupations—does little to explain the motherhood penalty for both full-time work and overwork. Similar to Models 2 and 3, the difference in the effects of each job characteristic on earnings between full-time work and overwork is not statistically significant. Consistent with Budig and England (2001), this suggests that there is little evidence to support that the motherhood penalty is associated with privileged occupations or mother-friendly job characteristics.

[Table 2 is about here]

Sensitivity Analyses

In the models where motherhood is measured with dummy variables (having one child and having two or more children), results are largely similar. The supplementary results show that similar to the main results, having any children has a significantly negative effect on earnings only among full-time workers, and not among overworkers. Whereas the difference in the earnings penalty for having one child between full-time workers and overworkers is not statistically significant in all models, the gap in the earnings penalty for having two or more children between full-time workers and overworkers is statistically significant in Models 1 and 2. Similar to the main results, the supplementary results show that the gap in the earnings penalty for having two or more children between full-time workers and overworkers is largely reduced by the inclusion of human capital. However, this gap between full-time workers and overworkers still remains statistically significant. Similar to the main results, the supplementary results show that adding work effort to Model 2 substantially closes this gap between full-time workers and overworkers, and including job characteristics does not significantly affect this gap.

Considering that the intensity of overwork is often greater in professional occupations (Blair-Loy 2009; Glass and Fodor 2018; Moen et al. 2013; Perlow 1998), these results may mask the occupational contexts of overwork that can potentially reshape the motherhood penalty. To explore the occupational context of overwork, I investigated whether per child penalties in overwork vary by professional and nonprofessional occupations. The results (not shown) reveal that each additional child significantly negatively affects earnings among full-time workers, both in professional and non-professional occupations, but not among overworkers – either in professional or non-professional occupations. Moreover, there is little difference in the motherhood penalty between professional and nonprofessional occupations either among full-time workers or overworkers. The adjustment of human capital, work effort, and job characteristics does not change these results. Thus, I found no evidence that professional occupations lessen or exacerbate the motherhood penalty in overwork.

Conclusion and Discussion

The goal of this study is to develop and test competing hypotheses about how overwork affects the motherhood penalty. This study provides evidence in support of the protective effect of working long hours against the motherhood penalty. Among white women, the number of children has no statistically significant effect on earnings in overwork. This is in contrast to the results for full-time work, where each additional child reduces earnings by 11.3% on average. The statistically insignificant motherhood penalty in overwork is significantly less than the motherhood penalty in full-time work, supporting the extra-effort hypothesis. The gap in the motherhood penalty between full-time workers and overworkers, however, becomes non-significant when adjusting for human capital. This closing gap between full-time workers and overworkers is due to a significant decrease in the motherhood penalty of full-time workers. The

gap in the motherhood penalty between full-time workers and overworkers is further reduced when controlling for work effort, which similarly results from a sizable decrease in the motherhood penalty for full-time workers. This contrast between full-time workers and overworkers suggests that working long hours appears to be protective against the motherhood penalty, potentially, because overworking mothers tend to have fairly high levels of human capital and work effort. In other words, overwork itself may not be protective; its protective effect is largely associated with the positive selection on human capital and work effort.

These findings are limited to white women. Black women are less likely to experience the motherhood penalty in both full-time work and overwork, and there is no difference in the motherhood penalty between full-time workers and overworkers among black women. Although little is yet known about why black mothers have lower wage penalties than white mothers (see also England et al. 2016), some studies suggest that this may be associated with racial difference in gender role attitude and employment behaviors. Despite the fact that black women are subject to historical and contemporary racial discrimination in the labor market, black mothers are more likely to stay in full-time work and return quickly to work after childbirth than white mothers (Florian 2018). Compared to white women, black women are more likely to be financially independent and rely on caregiving support from kin and community members (Dow 2016). Such high propensity to attach to the labor market after childbearing may potentially prevent black mothers from mother-specific penalties in the labor market.

The findings suggest that work hours, especially long work hours, play an important role in the motherhood penalty among white women. Whereas previous studies have shown that the reduction of work hours explains a good portion of the motherhood penalty (Budig and England 2001), this study reveals that along with other contexts of the motherhood penalty, such as skill

level and occupational characteristics (England et al. 2016; Yu and Kuo 2017), working long hours is a significant work condition that may lessen the motherhood penalty. Given that working long hours is increasingly common among mothers (Percheski 2008; Weeden et al. 2016), it is important to further investigate how overwork can reshape performance expectations and evaluation processes.

Importantly, the finding does not imply that mothers in demanding jobs do not face any significant mother-specific challenges at work. The lesser extent of the motherhood penalty in overwork is not incompatible with substantial difficulties in balancing work and family responsibilities among mothers who have demanding careers. Rather, working long hours, which is often a mixture of long paid work hours, extra work without notice, and time pressure, can have a considerable impact on work-family conflict (Maume and Houston 2001; Voydanoff 2004). Given that the severe conflict between work and family responsibilities may push mothers who work long hours to reduce work hours or quit their careers (Stone 2007), this finding may underestimate the salience of work-family conflict in overwork by limiting the sample to those who continue to work long hours.

This study has three key limitations. First, it does not fully disentangle the potential different mechanisms of how overwork can protect women from per child penalties. Due to a lack of information in the dataset, this study is not able to examine whether the protective effect of overwork is associated with signaling job commitment or enhancing productivity. Future studies can explore how child penalties in overwork can be mediated by job achievement, job autonomy, and time spent on housework. Second, despite the advantages gained by controlling for unmeasured time-invariant characteristics, fixed effect models do not guarantee a perfect causal inference because they do not adjust for unobserved time-varying individual

characteristics (Allison 2009), such as the potential decline in productivity as a result of having an additional child. Third, whereas this study is primarily interested in the association between within-individual difference in motherhood status and within-individual difference in earning among women who remain in the same work-hour group, it does not capture the motherhood penalty among women who change their work hour status (e.g. change from overwork to full-time work). Future studies can further investigate how the transition in work hour status can affect the motherhood earning penalty.

This study advances our understanding of the role of working long hours in the motherhood penalty. Similar to Weeden and colleagues' (2016) findings from the cross-sectional analyses, the results support the idea that the motherhood earnings penalty is less pronounced among overworkers than full-time workers. Whereas Weeden and colleagues (2016) have documented the changing wage gap between overworking childless women and mothers, this study provides a better causal inference of the motherhood penalty than cross-sectional analyses by controlling for unobserved time-invariant individual characteristics (such as cognitive ability and generalized productivity). This analytic strategy further reveals that the earnings penalty in overwork is distinguished from the penalty in full-time work, and changes in within-individual human capital and work effort explain a substantial portion of the motherhood earning penalty only among full-time workers. This approach helps us better understand the role of primary earning predictors – human capital and work effort - in mediating the motherhood penalty between full-time work and overwork.

Whereas previous studies have explored how overwork has long excluded mothers (Blair-Loy 2003; Cha 2013; Hochschild and Machung 1989; Stone 2007), this study shifts the focus to the systematic differences between overworking mothers and mothers who work full-

time, revealing a lower motherhood penalty for overworking mothers than mothers who work full-time. It is beyond the theoretical framework of this study to investigate the effect of overwork on fathers' earnings. Future studies, however, should extend this framework to consider the role of working long hours in shaping fatherhood bonuses, and more broadly, gender differences in the effect of overwork on the relationship between parenthood and earnings.

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Table 1. Means and standard deviations (in parentheses) of the variables (NLSY 1979-2014)

	Full-time work		Overwork	
	Childless	Mothers	Childless	Mothers
Number of observations	13216	13200	1760	1939
Log of annual earnings ($ 2014) [ab]	10.09	10.11	10.40	10.42
	(0.81)	(0.90)	(0.89)	(0.92)
Annual earnings ($2014) [abcd]	30544.88	32653.92	42742.61	45230.54
	(18906.66)	(22088.85)	(25577.85)	(30202.49)
Number of children [b]	-	1.87	-	2.02
	-	(0.91)	-	(0.91)
Basic demographics				
Age [abcd]	27.04	35.21	30.94	39.25
	(7.35)	(9.49)	(8.18)	(9.19)
Marital status (Reference: never married)				
Married [abcd]	0.37	0.72	0.29	0.67
	(0.48)	(0.45)	(0.46)	(0.47)
Divorced [abcd]	0.09	0.23	0.15	0.30
	(0.29)	(0.42)	(0.36)	(0.46)
Spouse's full-time work [abcd]	0.37	0.70	0.30	0.64
	(0.48)	(0.46)	(0.46)	(0.48)
Region (Reference: East)				
North Central [bcd]	0.28	0.31	0.26	0.33
	(0.45)	(0.46)	(0.44)	(0.47)
South [cd]	0.32	0.39	0.32	0.41
	(0.47)	(0.49)	(0.47)	(0.49)
West [ad]	0.16	0.16	0.19	0.16
	(0.37)	(0.37)	(0.39)	(0.37)
Urban [cd]	0.76	0.65	0.77	0.66
	(0.43)	(0.48)	(0.42)	(0.48)
Human capital				
Years of schooling [abcd]	13.66	12.96	14.82	13.81
	(2.16)	(2.17)	(2.53)	(2.71)
Years of seniority [abcd]	3.19	5.42	4.01	5.87
	(3.90)	(5.88)	(5.06)	(6.46)
Years of work experience [abcd]	8.03	13.69	11.39	17.03
	(6.75)	(8.76)	(7.63)	(8.93)
Work effort				
Weekly work hours [abcd]	40.63	40.50	54.80	55.34
	(3.10)	(2.89)	(4.29)	(5.00)
Weeks worked in the past year [abc]	46.70	45.87	47.26	47.10
	(10.70)	(11.90)	(10.62)	(10.62)
Job characteristics				
Professional occupations [ab]	0.32	0.31	0.51	0.51
	(0.47)	(0.46)	(0.50)	(0.50)
Public [abcd]	0.13	0.17	0.17	0.21
	(0.34)	(0.37)	(0.37)	(0.41)
% female in occupation [abc]	63.23	64.17	56.68	56.23
	(27.67)	(26.72)	(26.24)	(26.58)

a. The difference between full-time workers and overworkers among childless women is statistically significant ($p<.05$).
b. The difference between full-time workers and overworkers among mothers is statistically significant ($p<.05$).
c. The difference between childless women and mothers among full-time workers is statistically significant ($p<.05$).
d. The difference between childless women and mothers among overworkers is statistically significant ($p<.05$).

Table 2. Fixed effects for the motherhood earning penalty among white women, by work hour (NLSY 1979-2014)

	Model 1		Model 2		Model 3		Model 4	
	Full-time work	Overwork	Full-time work	Overwork	Full-time work	Overwork	Full-time work	Overwork
Number of children	-0.12***	-0.05 [a]	-0.09***	-0.05	-0.04***	-0.05	-0.04***	-0.05
	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)	(0.03)	(0.01)	(0.03)
Basic Demographics	Included	Included	Included	Included	Included	Included	Included	Included
Human capital								
Years of schooling			0.14***	0.10**	0.08***	0.06*	0.08***	0.06*
			(0.01)	(0.03)	(0.01)	(0.03)	(0.01)	(0.03)
Years of tenure			0.02***	0.01***	0.01***	0.01	0.01***	0.005
			(0.002)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
Years of experience			0.03***	-0.01	0.03***	0.001	0.03***	0.003
			(0.01)	(0.02)	(0.004)	(0.015)	(0.004)	(0.015)
Work effort								
Weekly work hours					0.02***	-0.00004	0.02***	-0.0003
					(0.001)	(0.00257)	(0.001)	(0.0025)
Annual work weeks					0.04***	0.03***	0.04***	0.03***
					(0.0006)	(0.002)	(0.001)	(0.002)
Job characteristics								
Public sector							-0.01	-0.03
							(0.02)	(0.05)
% female in occupation							-0.001***	-0.0005
							(0.0002)	(0.001)
Professional occupations							0.07***	0.09**
							(0.01)	(0.03)
Constant	9.38***	8.16***	7.79***	6.64***	6.25***	6.49***	6.45***	6.65***
	(0.26)	(0.65)	(0.28)	(0.77)	(0.22)	(0.66)	(0.22)	(0.65)

Note : *p<0.05, **p<0.01, ***p<0.001

a. The coefficient is significantly larger from the coefficient for full-time workers (one-tailed test, p<0.05).

Basic demographics include age, marital status, spouse's full-time work, region, and urban residence.

Dummy variables for years are included in all the models.

Weekly work hour adjusts for the difference in work hours between childless women and mothers among full-time workers and overworkers, separately.

N of observations in full-time work =26416, N of observations in overwork=3699.