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Mothers' Night Work and Children's Behavior Problems

Rachel Dunifon,
Cornell University

Ariel Kalil,
University of Chicago

Danielle Crosby, and
The University of North Carolina at Greensboro

Jessica Houston Su
Cornell University

Abstract

Many mothers work in jobs with nonstandard schedules (i.e., schedules that involve work outside of the traditional 9–5, Monday through Friday schedule); this is particularly true for economically disadvantaged mothers. The present paper uses longitudinal data from the Fragile Families and Child Wellbeing Survey ($n = 2,367$ mothers of children ages 3–5) to examine the associations between maternal nonstandard work and children's behavior problems, with a particular focus on mothers' night shift work. We employ three analytic strategies that take various approaches to adjusting for observed and unobserved selection factors; these approaches provide an upper and lower bound on the true relationship between night shift work and children's behavior. Taken together, the results provide suggestive evidence for modest associations between exposure to maternal night shift work and higher levels of aggressive and anxious/depressed behavior in children compared to mothers who are not working, those whose mothers work other types of nonstandard shifts, and, for aggressive behavior, those whose mothers work standard shifts.

Keywords

Maternal employment; nonstandard work; night shift; children's behavior; parenting

In 2010, the labor force participation rate for all mothers with children was 70.8%, and 55.8% among mothers with children under a year old (Bureau of Labor Statistics, 2011). This stands in sharp contrast to the 21% of women with a child under a year old who were in the labor force in 1968 (cited in Han, Ruhm, Waldfogel, & Washbrook, 2008). Much research has explored the consequences of maternal employment for working mothers and their children (Han, Waldfogel, & Brooks-Gunn, 2001; James-Burdumy, 2005; Ruhm, 2000; Waldfogel, Han, & Brooks-Gunn, 2002). Beyond labor force participation itself, however, the characteristics and quality of mothers' jobs play an important role in maternal and child well-being.

In particular, a substantial share of working mothers is employed in jobs with nonstandard schedules—that is, schedules that involve hours outside of the traditional 9–5, Monday through Friday schedule, including work in the evenings, at night, or on weekends and/or on an irregular or rotating schedule (i.e., one that varies from week to week). Data gathered in a

special 2004 supplement to the Current Population Survey (CPS) show that, among all workers, 17.7% usually worked shifts that fell at least partially outside the daytime shift range (McMenamin, 2007). Other studies have shown that 12% of employed women with children work nonstandard schedules, (Connelly & Kimmel, 2007), and 27.8% of dual-earner households include at least one spouse who works a schedule other than a regular fixed daytime schedule (Presser, 2003).

Nonstandard work is more common among low-income and less-educated individuals than among those who are more advantaged (Presser, 2003). Over one-third of workers in service occupations (36.1%) work nonstandard shifts, including half of workers in food preparation and protective services, whereas only 8.7% of workers in management and professional positions do so (McMenamin, 2007). Therefore, the potential implications of nonstandard work are particularly salient for low-income populations.

The current study examines the linkages between nonstandard work and children's socio-emotional adjustment using a large sample of urban, lower-income mothers of young children. We focus in particular on night shift work given the large literature suggesting detrimental effects of night shift work on worker health and well-being. We argue that night shift work in particular could affect the quality of maternal time with children with ultimate impacts on child well-being. Further, given the strong possibility for omitted variables bias in observational studies relating maternal employment to child development, we employ three analytic strategies that take various approaches in adjusting for observed and unobserved selection factors and that help to clarify the nature of the linkages between night shift work and children's behavioral adjustment.

Background

The nature of any associations between maternal nonstandard work and child behavior will depend in part on the reasons that mothers work different types of schedules. Working nonstandard hours may be preferable for some parents to the extent that they can rely on "split-shift" parenting with another caregiver, ensuring that one parent is home at all times (Presser, 1989). Others may choose to work nonstandard shifts because the employer offers higher wages for doing so. Yet, nonstandard schedules may also be dictated by the requirements of the job. Women who are less educated tend to have fewer employment options and are over-represented in jobs that require nonstandard work, such as those in the service industry. Evidence from the Current Population Survey suggests that a majority of nonstandard workers work such schedules in response to constraints rather than preferences (McMenamin, 2007).

Mothers' nonstandard work schedules may influence family life and child well-being in a variety of ways, including household financial resources, children's child care, parental time use, and parenting behaviors (Dunifon, Ziol-Guest & Kalil, 2012). At the same time, selection factors may account for any observed associations between nonstandard work and family and child functioning. That is, numerous "third factors" could predict both mothers' nonstandard work as well as children's behavior. Failure to control for these factors could lead to biased estimates of the linkages between nonstandard work and child outcomes. For instance, Wight, Raley and Bianchi (2008) showed that mothers who work evening or night shifts have attained less education, work fewer hours per week, and earn less than those who work standard daytime hours only. Further, among mothers, as the number of children in the household increases, the relative risk of working night (relative to day or evening) hours increases. All of these family demographic characteristics could be associated both with night shift work and with children's developmental outcomes. A variety of techniques is available for dealing with problems of selection bias but the most common approaches are to

include rich controls for observed characteristics or to employ econometric techniques such as fixed effects or residualized change models to control for the possible unobserved characteristics (NICHD & Duncan, 2003).

To the extent that nonstandard work is causally linked with family functioning and child outcomes, economically disadvantaged families may be particularly affected. Lower-income mothers' greater likelihood of working nonstandard work schedules due to job requirements rather than personal preferences could increase the challenges of balancing work and family demands. Furthermore, lower-income parents may have more limited resources to mitigate these challenges.

Indeed, several studies have reported correlations between nonstandard work and diminished functioning in economically disadvantaged families. In these studies, work on nonstandard schedules (relative to work on standard weekday schedules) has been associated in cross-sectional analyses with increased parental stress and depression (Joshi & Bogen, 2007; Strazdins, Clements, Korda, Broom, & D'Souza, 2006) and more hostile and ineffective parenting (Strazdins et al., 2006). Heymann and Earle (2001) used fixed-effects techniques to show that parental evening work (relative to no parental evening work) had a significant negative impact on the quality of the home environment for poor families. Rapoport and Le Bourdais (2008), who used advanced econometric techniques to deal with selection effects, found that as the number of hours single mothers worked at a nonstandard time increased, parental time with children decreased.

Nonstandard work schedules have also been linked to children's socio-emotional development in low-income families. Strazdins et al. (2006) and Joshi and Bogen (2007) found that children whose parents work nonstandard hours (relative to work on standard weekday schedules) have higher levels of social and emotional difficulties compared to the children of parents who work standard weekday times, and that these associations are explained by parent depressive symptoms, parenting stress, and ineffective parenting behavior. Furthermore, Han et al. (2008), who relied on fixed-effects techniques, reported that of all children whose mothers worked non-day shifts, the strongest associations with behavioral outcomes were found for children who lived in single-mother or low-income families. On the other hand, Dunifon, Kalil, and Bajracharya (2005), who also used fixed-effects techniques to study children of mothers transitioning from welfare to work, did not find any evidence that non-day shifts or rotating shifts affected the behavior of children aged five to 15, compared to standard shift work. Phillips' (2002) cross-sectional study also found no associations between working the night shift and young children's behavior in low-income families.

Distinguishing among nonstandard schedules

The influence of maternal nonstandard work on children may vary depending on the specific time of day that mothers work. Mothers working the night shift (defined in our data as between 11:00 pm–7:00 am) are presumably home during the day to provide care for children not yet in school, to take part in daytime activities involving children, and to eat dinner with their children. In fact, Wight, Raley, and Bianchi (2008) showed that mothers who work the night shift spend significantly more time overall with their children compared to those who work during the day or evening. However, such women are likely tired during much of their time at home, which raises questions about the quality of time with children in these circumstances. Indeed, Wight, Raley and Bianchi (2008) also report that working night hours is associated with mothers' daily half-hour sleep deficit and also less personal and leisure time compared with mothers working day and evening shifts.

Mothers working the evenings (between 6:00 pm–11:00 pm as measured in our data) are at particular risk of missing children’s homework, dinner, and bedtime routines (Joshi & Bogen, 2007; Rapoport & Le Bourdais, 2008; Wight et al. 2008) but would be potentially more rested than mothers working the night shift and, like such mothers, would be available during the day to provide care for and be involved with children. Mothers working an irregular schedule (which changes frequently), may find it difficult to arrange care for children and to develop family routines, potentially increasing stress and reducing effective parenting behaviors. Finally, mothers who work on weekends may also find it difficult to find child care, and may miss out on opportunities for family interactions and activities that typically occur on weekends.

Clearly, different work schedules come with costs as well as benefits. We propose that night shift work in particular will present risks for children’s socio-emotional adjustment. This hypothesis is based on numerous studies (largely conducted on health professionals) that link night shift work to adverse worker health outcomes including insufficient sleep (Gold et al., 1992), mental health problems (Munakata et al., 2001) reduced happiness (Smith-Coggins, Rosekind, Hurd, & Buccino, 1994), cancer, heart disease, and ulcers (Knutsson, 2003; Schernhammer et al., 2003), an increased propensity for driving accidents (assessed using a driving simulator) (Akerstadt, Peters, Anund, & Kecklund, 2005), and lower marital quality and increased likelihood of divorce (White & Keith, 1990).

A limitation of much existing large-scale quantitative research linking nonstandard work to child well-being is that all work outside of the typical 9–5, Monday-Friday schedule is combined into a single measure of “nonstandard work”, making it impossible to distinguish a unique role for night shift work (e.g., Joshi & Bogen, 2007; Strazdins et al, 2006). Research by Han and Miller (2009) and by Han, Miller and Waldfogel (2010) are important exceptions. In these studies, greater exposure to maternal night shift work (defined as working between 9pm–8am), from birth to early adolescence is associated with adolescents’ depression (Han & Miller, 2009) and engagement in risky behaviors (Han, Miller & Waldfogel, 2010) at ages 13 and 14. These associations were especially pronounced for boys, children in families with low incomes, and children who were in preschool or middle school when their mothers worked nighttime hours. These findings suggest that early childhood may be a particularly sensitive period for the influence of maternal night shift work. Analyses in these studies suggest mediating roles for lower quality parenting behavior, fewer family meals, less parent-child time together, and lower levels of parent-child closeness. However, neither of these studies, both of which used data from the National Longitudinal Survey of Youth-Child Supplement (NLSY-CS) used methods designed to account for omitted factors that may influence night shift work and child well-being.

Using rich data collected from a large sample of lower income and less-educated urban mothers and their young children (the Fragile Families and Child Wellbeing Study), the goal of this study is to examine the linkages between maternal work schedules and young children’s behavioral adjustment, with a special focus on the night shift. Unfortunately, our data are not ideal from the perspective of assessing the impacts of fathers’ work schedules, as has been done in other studies (e.g., Han et al., 2010; Heymann & Earle, 2001; Strazdins et al., 2006) because the FFCWS only collects work schedule information from children’s biological fathers, and few children in our sample live with their fathers.

Our work employs several methods to address the non-random selection of women into various work schedules. Further, given evidence that the associations between nonstandard work and child well-being are strongest in lower income and single-parent families (Han et al., 2008) for male children (Han, Miller, & Waldfogel, 2010), and because associations may

operate different for children of various racial and ethnic backgrounds, or at varying levels of work intensity, we also test whether these characteristics moderate the association between night shift work and young children's behavior. Finally, we examine whether parenting behaviors account for any associations between night shift work and child behavior.

Conceptual Model

Our analyses seek to understand how maternal work schedules in general, and night shift work in particular, are associated with young children's behavioral adjustment. For several reasons, we focus exclusively on the work schedules of mothers, rather than fathers. First, many children in our sample do not live with their fathers. Additionally, evidence suggests that mothers spend more time on child care and housework than do fathers, even in dual-career households (Bianchi, Milkie, Sayer, & Robinson, 2000), and that whereas employed mothers perform fewer household and child-related tasks than do those who stay at home, this is not offset by increased time contributions at home from husbands (Cawley & Liu, 2012). As such, there is reason to believe that maternal nonstandard work is the most relevant for children's development.

Our conceptual model proposes concurrent associations between maternal night work and child behavior. In particular, we expect maternal night shift work to translate into concurrent impacts on maternal sleep, mental health, and stress, which is expected to translate into concurrent impacts on her parenting behavior and, finally, concurrent associations with children's emotional adjustment. This conceptual model differs from ones that hypothesize lags from parental inputs into child cognitive development outcomes (e.g., the association between caregiver cognitive stimulation and children's academic achievement; NICHD and Duncan, 2003; Cunha & Heckman, 2007) and is based on the assumption that children's behavior will likely respond quickly to mothers' work.

One threat to this proposed conceptual model is the issue of bidirectional influences. For instance, mothers' mental health or her children's socio-emotional adjustment could influence her choice of work schedules; also, children's development and behavior may elicit parental behaviors (Powers, 2003). Additionally, given the observational nature of our data, issues of omitted-variable bias are of paramount concern. We employ a variety of methods to address these concerns.

Method

Data

To test linkages between maternal night shift work and child behavior, we use data from the Fragile Families and Child Wellbeing Study (FFCWS), a longitudinal birth cohort study of 4,898 children born between 1998 and 2000 in 20 large U.S. cities (see Reichman, Teitler, Garfinkel, & McLanahan, 2001 for a detailed description of the sample design). The FFCWS is a national study based on a stratified random sample of all U.S. cities with 200,000 or more people; it first sampled cities according to policy environments and labor market conditions, then hospitals within cities, and finally births within hospitals (Reichman et al., 2001). The study includes an oversample of nonmarital births, which also resulted in a large minority and low-income sample. This study therefore allows for a detailed measurement of the employment patterns of a primarily lower-income, minority sample of new mothers.

Mothers were initially interviewed in the hospital within two days of their child's birth, and follow-up interviews were completed when the child was one, three, and five years old. Of particular interest to our analysis, the study provides measures of employment

characteristics such as the timing and regularity of work schedules. In addition to the core survey, a subset of the sample participated in another component of the study named the In-Home Longitudinal Study of Pre-School Aged Children. The In-Home component was conducted at age three and age five, and includes a primary caregiver survey and in-home child assessments.

The sample for this study consists of mothers who participated in both the core and in-home surveys at age 3 and age 5, lived with their children at least half time, and were not missing data for the child behavior variables used as dependent variables in the analysis. Starting with the original sample of $n = 4,898$ respondents interviewed at baseline, we removed respondents who did not complete both the age 3 and age 5 in-home interviews (removed $n = 2,373$, 48%). We also removed respondents who did not live with their children at least half-time at either wave (removed $n = 76$, 2%). The final analytic sample is comprised of $n = 2,367$ respondents. The data are pooled such that respondents contribute an observation for each wave they are interviewed, resulting in $n = 4,734$ person-year observations ($n = 2,367$ respondents contribute two waves of data). Descriptive analyses (not shown) indicate that our analytic sample differs from the full FFCWS in that it contains slightly fewer Hispanics, mothers with slightly higher education, mothers with higher welfare receipt, and consists of families less likely to have other adults living in the household.

Seventy-one percent of the analytic sample had complete data for all variables included in the analysis, and the amount of missing data ranged from 0%–2% for most of our measures. Missing data were multiply imputed by chained equations, which facilitates statistically valid inference when data are missing at random (Rubin, 1987). We used the ICE commands for STATA to generate 25 imputed data sets (Royston, 2004; Johnson & Young, 2011). We follow the strategy of Multiple Imputation, then Deletion (MID), whereby respondents who are missing the dependent variables ($n = 82$) were included in the imputation but excluded from the analytic sample to improve the efficiency of estimates (von Hippel, 2007). Results from the analysis using imputed data did not vary substantively from analysis using listwise deletion (analysis not shown).

Measures

Outcome: Child behavior—The FFCWS collects data on child behavior problems as part of the in-home survey at the age 3 and age 5 follow-ups using maternal reports of some items from the Child Behavior Checklist (CBCL) (Achenbach, 1992; Achenbach & Rescorla, 2000). In this study we use the anxious/depressed and aggressive subscales rather than the full Internalizing and Externalizing scales because the Fragile Families study does not provide all items for the full scale at either follow-up interview. The anxious/depressed scale consists of items such as being fearful, clingy, feeling unloved, or feeling sad, and the aggressive scale consists of items such as being defiant, arguing, being disobedient, and destroying things. Mothers are asked to rate their child's behavior in the past two months by indicating whether each item is never true (0), somewhat or sometimes true (1), or very true or often true (2). Scores are calculated for respondents who have valid responses for at least 75% of the scale. The items are summed and divided by the number of valid responses, and then standardized to have a mean of 0 and a standard deviation of 1. The values on the standardized subscales therefore represent the difference from the mean in terms of the number of standard deviations. Cronbach's alpha for the anxious/depressed subscale is .66 at age 3 and .68 at age 5. Cronbach's alpha for the aggressive subscale is .86 at age 3 and .84 at age 5.

Predictor: Maternal work schedules—The key independent variables in our analyses are the mother's work schedule, collected at ages three and five. Respondents who reported

ever working two or more consecutive weeks for pay were asked, “(At your primary job,) (Do/Did) you regularly work...” and selected from the following options: “Weekdays” “Evenings (6pm – 11pm),” “Nights (11pm – 7am),” “Weekends,” and “Different times each week.” Respondents were able to select more than one option, making the nonstandard schedule categories non-mutually exclusive. We only use information on work schedules for those who were currently employed at the time of the study. We created dummy variables indicating whether the mother reported working (a) **evenings**, (b) **nights**, (c) **weekends**, and (d) **different times each week**. Respondents are therefore coded 1 if they indicated working a particular schedule at the time of the survey, and 0 if they did not work that schedule or if they reported being unemployed at the time of the survey. This coding captures multiple schedules; for instance, a respondent who is working both a night and weekend schedule will be counted in both variables. As such, our measures of nonstandard work are not mutually exclusive and instead capture exposure to particular types of nonstandard schedules, whether experienced in isolation or in combination with other types of nonstandard schedules. For example, the night shift indicator identifies women who work nights only, as well as those who work the night shift along with other schedules (i.e., evenings, or weekends). Indeed, among respondents who report working the night shift, only 11% report doing so exclusively; the vast majority works some other type of shift as well. This highlights the fact that the work schedules of women in this sample are extremely complex. Given the design of the FFCWS, which allowed women to choose more than one schedule to describe their work, our analysis reflects women’s actual work experiences, capturing night shift work among women who would likely be missed in other studies that required them to choose only one type of schedule to describe their work.

We also created a dummy variable to indicate whether the respondent worked a **standard schedule**. Respondents are considered to work a standard schedule if they were employed but indicated they did not work any of the nonstandard schedules listed (i.e., a respondent is coded 1 for the standard schedule variable if they were employed but coded 0 for evenings, nights, weekends, *and* different times each week).

This coding of the maternal employment measures results in three mutually-exclusive groupings of mothers: 1) those who are not working at the time of the survey, 2) those who work a standard schedule (defined as not regularly working during a nonstandard time), and 3) those who regularly work during a nonstandard time. The third category of nonstandard workers is further broken down into four non-mutually exclusive groups: weekends, nights, evenings, and different times each week. We include in our analysis an indicator that the mother works a standard schedule, and indicators for all of the measures of nonstandard work. Thus, the omitted category in our analysis is mothers who are not working at the time of the survey (i.e., not working a standard schedule or any of the nonstandard schedules). This group consists both of those who had never worked over the course of the study, as well as those who had been working, but are currently unemployed.

Control variables—We control for several variables related to mothers’ and fathers’ characteristics, household composition, and child’s characteristics. We specifically control for factors that may be associated with mothers’ work schedule, but are likely not directly influenced by her work schedule. Mothers were asked to report the number of hours they usually work per week, and we recoded this continuous variable into dummy variables indicating 1–19 hours, 20–34 hours, 35–44 hours, and 45+ hours per week (women who are not working are given zero hours and serve as the omitted category). Mother’s race is measured with dummy variables representing non-Hispanic Black, Hispanic, and “other” race, which includes Asian or Pacific Islander and American Indian or Eskimo (non-Hispanic white is the omitted category). Mother’s and father’s age is measured in years; mother’s age is measured at age 3 and 5, while father’s age is measured at the baseline

wave. Mother and father education is measured with dummy variables to indicate less than a high school degree, high school degree or General Equivalency Degree (GED), and some college or technical school (college degree or more is the omitted category); maternal education is measured at age 3 and age 5, while father's education is measured at the baseline interview. Welfare receipt in the past 12 months is indicated with a dummy variable (1 = yes, 0 = no). Mother's cognitive ability is measured at age 3 using a subset of the Similarities subtest of the Wechsler Adult Intelligence Scale – Revised (WAIS-R). Correct items are summed to create the overall score, with higher scores indicating higher cognitive ability (range: 0–16, alpha .60).

Dummy variables indicate whether the mother is married to or cohabiting with the biological father of the focal child or another partner. These variables were constructed for the public data set using the mother's report of relationship status, but occasionally the father's report was incorporated to fill in missing information or correct discrepancies; this was done by the Fragile Families team before imputation. The number of children in the household is a continuous measure of children under age 18. We use a dummy variable to indicate the presence of grandparents in the household (1 = grandmother or grandfather living in household, 0 = no grandparent living in household). We also use a dummy variable to indicate whether another adult, such as a sibling, aunt/uncle, or unrelated adult over age 18, is living in the household. Household income is measured at birth, and represents total household income before taxes in the previous year (in ten thousand dollar units). The Fragile Families data set includes imputed data for respondents who reported a range of income or were missing data for this variable.

Child's age is measured in years. We include a dummy variable for child's gender (1 = male, 0 = female). A dummy variable for low birth weight indicates whether the focal child weighed less than 2,500 grams at birth. Mothers reported whether their child had any physical disabilities in the core survey age 1 follow-up (coded so 1 indicates the presence of a physical disability, and 0 indicates no physical disability).

We also leverage a rich set of covariates measured prior to the dependent variables of interest to tap into maternal characteristics that might be associated with both maternal work schedules and child well-being and that, if not controlled, may bias our results. These measures attempt to get at aspects of mothers' personality, motivation or other characteristics that might be associated both with the type of job she has and her child's functioning. Mother's mental health is measured at age 1 with two dichotomous variables that indicate whether the respondent is a probable "case" or "non-case" of depression or generalized anxiety disorder based on the World Health Organization's Composite International Diagnostic Interview Short Form (CIDI-SF). Maternal and prenatal health is reported at the baseline wave and is measured with two dichotomous variables that indicate whether the mother smoked during pregnancy or received no prenatal care or received late prenatal care (third trimester or later). Pregnancy intentions are measured at the baseline wave with a dichotomous variable that indicates whether the mother considered aborting her pregnancy with the focal child. A dichotomous variable indicates whether the focal child's father was ever incarcerated at age 3 (1 = currently or ever incarcerated). Nativity is measured with a dichotomous variable (1 = mother was born in the U.S., 0 = mother was born in some other country). We also include a variable that indicates whether the mother was living in public housing at the baseline wave (1 = living in public housing, 0 = not living in public housing).

Analytic Plan

In order to evaluate, and more importantly, minimize bias in our estimates of the links between maternal work schedule and children's behavioral adjustment, we use three analytic

approaches that vary in their ability to adjust for observed and unobserved heterogeneity. First, we perform Ordinary Least Squares (OLS) regression analyses of the type shown in Equation 1, using clustered standard errors to account for the fact that data are pooled across the Age 3 and Age 5 assessments:

$$Y_{it} = \alpha + \beta_{1-4} \text{NONSTANDARD}_{,it} + \beta_5 \text{STANDARD}_{,it} + \beta_{6-9} \text{HOURS}_{,it} + \mathbf{Z}_{it} \gamma_{1-34} + e_{it} \quad (1)$$

Here, Y_{it} is the behavior of child i at time t . The vector **NONSTANDARD** represents a series of four variables capturing mothers' nonstandard work (exposure to working evenings, nights, weekends, or irregular schedules), the dummy variable **STANDARD** indicates women who work regular daytime schedules and do not work during nonstandard times. The vector **HOURS**₁ represents a series of four mutually-exclusive categorical variables indicating whether the woman worked: 1–19 hours per week, 20–34 hours per week, 35–44 hours per week, or 45+ hours per week, with 0 hours of work as the omitted category. Finally, the vector \mathbf{Z}_{it} represents a series of 34 control measures. For all tests of significance, we use a p-value of $< .10$.

The omitted category in this analysis is women who are not working (i.e., a value of zero for all of the work schedule indicators and work hour variables). Therefore, a significant coefficient on night shift work indicates that the behavior problems of children whose mothers work some night hours differ significantly from those whose mothers do not work. We also perform post-hoc tests to determine whether coefficients for night shift work are statistically different from coefficients for a standard weekday shift or any of the other nonstandard shift measures, thereby testing whether levels of problem behavior among children whose mothers work nights differ from those whose mothers do not work nights but do work at other times.

We include a very rich set of control variables (described above) in the OLS regressions, allowing us to account for a wide range of child, parent and household characteristics that may select mothers into certain types of jobs and also influence children's behavior. However, the possibility of bias remains given that some selection factors may be difficult to measure or observe. To address this potential problem, our second analytic strategy is to estimate individual fixed effects (or first-difference) change models, as shown in Equation 2:

$$\begin{aligned} Y_{i5} - Y_{i3} = & \alpha + \beta_{1-4} (\text{NONSTANDARD}_{,i5} \\ & - \text{NONSTANDARD}_{,i3}) + \beta_5 (\text{STANDARD}_{,i5} \\ & - \text{STANDARD}_{,i3}) + \beta_{6-9} (\text{HOURS}_{,i5} \\ & - \text{HOURS}_{,i3}) + (\mathbf{Z}_{i5} - \mathbf{Z}_{i3}) * \gamma_{1-34} + e_5 - e_3 \end{aligned} \quad (2)$$

Here, the dependent variable represents the change in behavior problems for child between time Age 5 and Age 3. This is predicted by changes over the same period in maternal work schedules (i.e., movement into or out of working day, evening, night, weekend, or irregular shifts). All factors not changing over time, such as gender or race, are controlled, but not estimated in this type of model. Such models rely on mothers and children exhibiting variation over time in employment conditions and in child outcomes. Of the respondents in our sample who completed both age 3 and age 5 interviews ($n = 2,367$ respondents), 14% had variation in night shift work and, overall, 52% of our sample experienced at least one change in schedule between the two waves. In order to facilitate comparisons across our OLS and fixed-effects models, we also perform a series of OLS regressions on the subsample of women who contribute to the fixed-effects models—i.e., those who changed work schedules during the study.

The advantage of the change method is that it removes from the analysis any time-invariant characteristics of the mother or child that may be unmeasured, but associated with both maternal work and child outcomes. Comparing these estimates to those obtained in the first set of OLS regressions is a useful exercise, providing some indication of the amount of bias introduced by unobservable factors. Yet, change models have some limitations. Such models cannot control for unmeasured factors that change with time. Change models also assume that any omitted factors have consistent influences on child outcomes across various ages (NICHD and Duncan, 2003). Finally, as noted above, estimates from within child fixed-effects models are taken only from those who change work schedules; such women differ in a variety of ways from those who do not change work schedules over a two-year period. Our own analysis shows that mothers who worked nights at both age 3 and age 5 were older and more likely to be married to the child's biological father compared to mothers who stopped or started working a night shift during this period (results not shown).

Our third set of models are residualized change (or lagged dependent variable) models. This model is represented in Equation 3, where Y_{i5} is the measure of child behavioral problems of respondent i at age 5, **NONSTANDARD** and **STANDARD** represent the work schedule variables at age 5, **HOURS** _{$i5$} represents the work hour variables at age 5, Y_{i3} is the age 3 measure of the dependent variable, \mathbf{Z}_{i5} represents the control variables, and e_{it} is the error term. Standard errors are adjusted to account for clustering (i.e., the fact that the age 3 and age 5 measures of child behavioral problems are not independent).

$$Y_{i5} = \alpha + \beta_{1-4} \text{NONSTANDARD}_{i5} + \beta_5 \text{STANDARD}_{i5} + \beta_{6-9} \text{HOURS}_{i5} + \beta_{10} Y_{i3} + \mathbf{Z}_{i5} \gamma_{1-34} + e_{it} \quad (3)$$

The residualized change model improves upon the fixed effects model in that it is not limited to mothers who change their work schedule. Additionally, as noted by Allison (1990), such models are preferred when time-varying omitted variables (such as changes in child well-being) may be correlated with the key independent variable (night shift work). This would be the case if mothers select into work schedules on basis of unmeasured aspects of their child's well-being. Residualized change models are also preferred if there is persistence over time in children's behavior, which seems likely. However, there are conditions under which residualized change models are problematic. Such models assume that the prior measure of child behavior is uncorrelated with unobserved characteristics of the child or mother, an assumption that is unlikely given that maternal reports of child behavior are used. Such models also assume that the discrepancy in behavior problems related to night shift work is lower at age 5 than at age 3; again, this assumption may not be justified here.

Overall, each of these approaches has strengths and weaknesses, and is based on different assumptions. None is superior to the others; however by comparing across them, we can enhance our understanding of the nature of the linkages between maternal night shift work and child behavior.

Results

Descriptive Analysis

Table 1 presents descriptive statistics for the variables used in this analysis, relying on the twenty five multiply imputed datasets described above. The numbers presented here are unweighted because we rely on the FFCWS In-Home data, which does not include weights. Looking across both waves (ages 3 and 5), 40% of the sample is not working at the time of the survey, about one quarter of the sample works a standard shift (27%). A total of 33% of the sample works a nonstandard shift; 8% report working nights, 16% work evenings, 24%

work weekends, and 15% work different times each week (recall that nonstandard shifts are not mutually exclusive categories). Among those who are employed, 44% work a standard shift and 56% work a nonstandard shift; 13% work nights, 27% work evenings, 40% work weekends, and 25% work different times each week. Half of the sample is non-Hispanic Black, one quarter is Hispanic, and nearly one quarter is non-Hispanic White. Mothers are 29 years old on average during the time of the survey, while fathers were 28 years old on average at the baseline wave. Slightly more than a quarter of mothers have less than a high school education, 27% have a high school diploma or GED, and 34% have attended some college or technical school. About one out of five respondents received welfare in the past 12 months, and the average income was roughly \$32,000 at baseline. Nearly a third of mothers are married to the focal child's biological father and another 18% are cohabiting with the biological father. The average household has 2.47 children under age 18, and 14% of the households include at least one of the child's grandparents.

As described above, a key goal of this paper is to examine the influence of night shift work on children's behavioral adjustment. As such, it is most useful to examine whether and how the characteristics of those who work nights differ from those who work other shifts. Results from this analysis are shown in the Online Appendix and indicate that women working a night shift are more disadvantaged than women working a standard daytime shift, replicating patterns found in nationally representative data (Wight et al., 2008; Presser & Cox, 1997). In analyses not shown, we also examined the types of jobs held by mothers working different schedules. As expected, compared to those working a day shift, those working at night were significantly more likely to be in service occupations (43% vs. 22%) and in sales (14% vs. 9%), and were less likely to be in administrative positions (14% vs. 35%) or professional or executive positions (19% vs. 28%). Finally, children of mothers who work nights exhibit higher average levels of aggressive and anxious behavior than children whose mothers work at different schedules.

Relation of Maternal Work Schedule to Children's Aggressive Behavior

We rely on multiple analytic strategies for estimating the relationship between mothers' night shift work and children's behavior in order to address potential biases and evaluate the robustness of our results. Table 2 presents estimates across these different model specifications for the relation of maternal work schedules to children's aggressive behavior.

Model 1 presents results from an OLS regression, using pooled data from ages 3 and 5, in which children's aggressive behavior scores are regressed on indicators of mothers' work schedules from the same time period, controlling for a rich set of observed variables likely to be associated both with work conditions and child well-being. Standard errors are corrected to account for multiple observations of children. Results indicate that exposure to night shift work is significantly associated with higher levels of aggressive behavior among young children. Mothers who work at least some nighttime hours on a regular basis report that their children exhibit more aggressive behavior than do mothers who are unemployed, who work standard daytime hours only, or who work other types of nonstandard shifts. Exposure to any night shift work is associated with a 20 percent of a standard deviation increase in aggressive behavior compared to non-work, and a 27 percent of a standard deviation increase compared to work at a standard schedule exclusively (obtained from subtracting the coefficient on standard shift work from that of night shift work). In contrast, exposure to other types of maternal nonstandard schedules (i.e., evenings, weekends, or different times) is not associated with children's aggressive behavior compared to maternal unemployment or standard work hours. While most mothers working the night shift also work other types of nonstandard shifts, results from Model 1 suggest that it is exposure to night shift work, regardless of other types of shift work that mothers experience, that is associated with child aggressive behavior.

We next estimate a fixed effects (first-difference) model relating changes in a mother's work schedule between the Age 3 and Age 5 assessment to changes in her child's behavior over the same time period. Because the variation in such models comes from families who experienced some change in maternal work, this analysis draws on a different sample than the OLS regression in Model 1. To get some sense of potential sample differences between women who do and do not change work schedules, and to obtain a more accurate point of comparison for the fixed effects model, we rerun our initial OLS model for the "changer" sample only (52% of the study sample). As shown in Model 2, the estimates for this subsample closely mirror those obtained for the full sample. The consistency of results across Models 1 and 2 helps to reduce concerns that any differences in results between the OLS and fixed-effects models is due to differences in sample composition between the two sets of analyses.

In contrast to the first two models, the fixed effects estimates in Model 3 indicate no significant associations between the timing of mothers' work and children's aggressive behavior. The coefficient on night shift work remains positive, but is reduced by more than two-thirds and no longer differs significantly from any other maternal work schedule (including nonwork). Notably, the standard errors are of similar size across the models. That the more controlled fixed effects specification provides no evidence of a link between mothers' night shift work and children's externalizing behavior suggests that our OLS estimates of this relationship are upwardly biased. Despite our rich set of controls, there appear to be unobserved factors that select mothers into certain types of work schedules and also influence children's behavior.

Our third analytic strategy is to employ a residualized change (or lagged dependent variable) model in which a child's earlier level of aggressive behavior (at age 3) is used as a control in estimating the association between mother's work schedule and child aggressive behavior at age 5. The pattern of results in the residualized change model (Model 4) is similar to that observed in the OLS analyses. Night shift work is associated with higher levels of externalizing child behavior relative to non-work, standard work hours, evening hours and weekend shifts. The difference in behavior between a child whose mother works a standard schedule and one whose mother works some night hours is .18 of a standard deviation (obtained by subtracting the coefficient on standard work from that of night shift work), compared to an effect size of .27 in Model 1.

Relation of Maternal Work Schedule to Children's Anxious/Depressive Behavior

Table 3 presents results from the same four model specifications for our second outcome of interest, children's anxious and depressive behavior. Here, we find a pattern of associations quite similar to that observed for aggressive behavior. The OLS analyses (Models 1 and 2) suggest that mothers' nighttime work is associated with higher levels of internalizing behavior among young children with an effect size of .20 compared to non-work. The coefficient on night work differs significantly from those of evening shifts, weekend shifts, and schedules characterized by different times each week. However, night work does not differ from standard schedule work when predicting children's anxious behavior. In the fixed effects analysis (Model 3) the coefficient on night shift work is reduced by more than half and is no longer significant. However, results from the residualized change approach in Model 4 show a significant positive association between night shift work and internalizing behavior. Here, some night shift work is associated with a .21 standard deviation increase in behavior problems compared to non-work. Night shift work differs significantly from that of evening hours and irregular schedules, but, in contrast to the results for aggressive behavior shown in Table 2, not from standard or weekend shifts.

Extensions

To further explore the relations between maternal work schedule and child behavior, we conducted supplementary analyses of potential mediating and moderating factors. We first tested whether mothers' harsh parenting behavior serves to mediate linkages between night shift work and children's behavioral adjustment. If mothers working nonstandard shifts prefer not to do so, or find doing so difficult, they may experience increased levels of depression or stress, with subsequent increases in harsh parenting behaviors. Theory predicts that if nonstandard work increases mothers' harsh parenting, this may interfere with children's behavioral adjustment (Yeung, Linver, & Brooks-Gunn, 2002). Such processes may be especially relevant for young children given the primacy of sensitive mother-child interactions for the development of young children's emotion regulation (Waters & Sroufe, 1983).

Following the standard three-step procedure described by Baron and Kenny (1986) to investigate whether harsh parenting behavior mediates the association between maternal nonstandard work and children's difficult behaviors. Results are shown in the Online Appendix and indicate that, while mothers who work the night shift to exhibit significantly higher levels of harsh parenting than those who do not work, there is no evidence that harsh parenting accounts for previously observed associations between maternal night shift work and child behavior problems.

We also examined factors that may moderate the associations between night shift work and child behavior. It is possible that the difficulties balancing night shift work and parenting are hardest for mothers with no other adult in the household. We tested this by examining the interaction between night shift work and having no other adult in the household, focusing on the residualized change models. Results (not shown) indicate that the association between night shift work and children's problem behavior does not differ by family living arrangement, a result that largely parallels the evidence in Joshi and Bogen (2007). We also tested whether mothers' night shift work differentially impacts boys and girls, given some evidence of gender differences in the broader literature on maternal employment (e.g., Han et al., 2001; but see Joshi & Bogen, 2007 for results indicating no gender differences). However, the interaction between night shift work and child gender is not statistically significant and does not support the hypothesis that mothers of young boys have more difficulties balancing the night shift with parenting. Finally, we examined moderation by race and gender, as well as by whether the mother worked part-time, and found no evidence of significant differences across these groups.

Discussion

In an era when most mothers are employed, understanding the ways in which different aspects of employment are associated with family functioning and child well-being is of paramount importance. The timing and regularity of work have been identified as key employment parameters with multiple implications for workers and their families (Presser and Cox, 1997; Presser, 2003). Nonstandard work may be especially relevant to economically disadvantaged families, not only because working mothers in these families are over-represented in jobs that require nonstandard schedules, but also because they may have fewer resources available to help negotiate work and family demands.

The current study examined the influence of exposure to maternal night shift work on the behavior of young children using large scale longitudinal data. Understanding the implications of mothers' work lives for young children is important given the primacy of parent-child interactions during this developmental period, heightened issues of child care for preschool versus school-aged children, and the well-established link between early

childhood experiences and later development. Our focus on the social and emotional adjustment of children in relation to mothers' work schedules is of consequence given that behavior problems during the preschool years can portend difficulties in the transition to school (Raver, 2002).

Overall, we find suggestive evidence of modest positive associations between exposure to maternal night shift work and children's aggressive and anxious behavior. We employ several methods to examine these associations and, not surprisingly, results differ across each of these methods. Comparing across methods can provide an upper- and lower-bound estimate of these linkages (see NICHD and Duncan, 2003, for a similar approach) and suggests a range of effect sizes between .06 and .20 when comparing night work to non-work, and a range of $-.03$ to .27 when comparing night work to standard work, suggesting a small, mainly positive, association between exposure to maternal night shift work and child behavior problems.

Results from the OLS models show higher levels of child behavior problems when mothers work night shifts, compared to work during standard hours (for aggressive behavior only), to work during other nonstandard times, and to non-work. Additionally, results from the residualized change models provide evidence of a reduced, but still significant, link between exposure to maternal nonstandard work and child behavior. However, the coefficient on night shift work dropped by 30%–50% and became insignificant in the fixed-effects analyses, suggesting that OLS estimates linking maternal shift work to child well-being are likely biased to some extent by unobserved time-invariant factors that distinguish families working nonstandard schedules to those who do not. Indeed, other studies employing a change model have similarly failed to find significant associations between maternal nonstandard work and child well-being (Dunifon, Kalil and Bajracharya, 2005). This is an important contribution to work in this area and highlights the need for future studies to employ robust methods to address issues of selection.

The overall pattern of results is quite consistent across the two outcomes of anxious and aggressive behavior. The one exception is that night shift work is consistently associated with higher levels of aggressive behavior compared to both non-work and standard shift work; in contrast, night shift work is only associated with higher levels of anxious behavior when compared to non-work. It is not clear why this might be the case, and future research is needed to better understand the nuanced situations in which certain shifts are associated with specific child outcomes.

Regardless of which model we examine, it is important to note that in no model was any other type of nonstandard schedule (i.e., evenings, weekends, or rotating shifts) a significant predictor of children's behavior, suggesting that night shift work plays a unique role. Additionally, the effect size for nonstandard work was often larger than other key covariates in the model, including maternal education, welfare receipt and marriage, suggesting again the potential for night work to play a key role in children's development.

We found that harsh parenting does not seem to explain the link between night shift work and children's aggressive and anxious behavior. We also tested and found no evidence for mediation by parenting stress, work stress, and mother's mental and physical health. One factor that might account for the modest association we observe between night schedules and harsh parenting is mothers' sleep (i.e., reduced sleep as a result of nighttime work increases harsh parenting). However, this measure is only available at the Age 5 assessment and therefore could not be used in our preferred longitudinal models. Other possible factors that should be investigated in future work are mothers' and children's time use or the care that children receive while mothers are working.

Contrary to expectations, we find no evidence that mothers' night shift work has more significant consequences for children in single parent households, for boys, for different racial and ethnic groups, or for mothers working part-time. While the presence of another adult in the household may mean that a child can sleep at home when their mother works nighttime hours, this may have little impact on mothers themselves if other adults do not substitute for the care that mothers provide children. Our lack of findings related to child gender stands in contrast to some prior study reports of more negative effects of maternal night shift work for boys (Han & Miller, 2009; Han, Miller & Waldfogel, 2010), but may reflect age differences across the samples and sample composition itself. Indeed, our results finding similar associations for boys and girls corresponds to those reported in Joshi and Bogen (2007) who relied on a large sample of economically disadvantaged children in a similar age range (2–4 years old). Clearly, additional work is needed to better understand whether and how the developmental implications of mothers' night shift work change over time.

It should be noted that our analysis measures the linkages between of *any* exposure to nighttime hours and child behavior. Additional work is needed to examine whether intensity, duration and stability of night shift work matter. Additionally, we were not able to examine the influence of other household caregivers on children's behavior. Particularly lacking is information on children's fathers and their employment; because relatively few of the children in our sample were living with their fathers, including this information was not possible. We were also limited to maternal reports of children's well-being—though widely used in the field, this measure may partially reflect mothers' well-being and adjustment. Although such reports may be biased, the fact that, in some models, our results remain robust to an extensive set of controls for maternal characteristics and functioning may alleviate this concern.

The results presented here cannot do justice to the complex set of interactions and tradeoffs that operate within families who must make choices between work and parenting. To better understand these complex dynamics will require moving beyond the analysis of secondary data to include qualitative studies of how parents (and children) think about their work constraints; daily diary data to better understand how such constraints play out in families lives; biomarker data to track the role of stress as related to nonstandard work, particularly at key times of day when mothers working a nonstandard schedule are not available. A promising design involves randomized experiments, in which maternal work schedules are randomly varied, and subsequent changes in child and family outcomes are observed (see Lambert, 2009 for an example). Despite their potential contribution, such designs can be costly to implement and are difficult to generalize.

Finally, studies of the association between maternal nonstandard work and child well-being would benefit from more rigorous research designs. Our study employed an unusually rich set of control variables that are typically not available in smaller-scale studies. We also relied on a variety of methods to discern very modest linkages between maternal night shift work and child behavior. While no one method is perfect, testing the robustness of findings across a variety of methods is necessary to understand the extent to which bias may exist.

In summary, this paper joins a small body of research highlighting the prevalence of nonstandard work among the mothers of today's children, especially those at the lower end of the economic ladder. Capitalizing on the availability of detailed work schedule information for a large sample of mothers with young children, we demonstrate the importance of considering the specific times of day that mothers work, thereby underscoring efforts to develop policy solutions to help working families achieve the work-life balance that can promote children's healthy development.

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References

- Achenbach, TM. Manual for the child behavior checklist/2-3 and 1992 profile. Burlington, VT: Dept of Psychiatry, University of Vermont; 1992.
- Achenbach, TM.; Rescorla, LA. Manual for the ASEBA preschool forms and profiles. Burlington, VT: University of Vermont, Research Center for Children, Youth & Families; 2000.
- Akerstadt T, Peters B, Anund A, Kecklund G. Impaired alertness and performance driving home from the night shift: A driving simulator study. *Journal of Sleep Research*. 2005; 14(1):17–20. [PubMed: 15743329]
- Allison PD. Change scores as dependent variables in regression analysis. *Sociological Methodology*. 1990; 20:93–114.
- Baron RM, Kenny DA. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*. 1986; 51(6):1173–1182.10.1037/0022-3514.51.6.1173 [PubMed: 3806354]
- Bianchi SM, Milkie MA, Sayer LC, Robinson JP. Is anyone doing the housework? Trends in the gender division of household labor. *Social Forces*. 2000; 79(1):191–228.
- Bureau of Labor Statistics. Employment characteristics of families–2010. Washington, D.C.: United States Department of Labor; 2011. Retrieved from http://www.bls.gov/news.release/archives/famee_03242011.htm
- Cawley JC, Liu F. Maternal employment and childhood obesity: A search for mechanisms in time use data. *Economics and Human Biology*. 2012; 10:352–364. [PubMed: 22790446]
- Connelly, R.; Kimmel, J. The role of nonstandard work hours in maternal caregiving for young children. 2007. IZA Discussion Paper No. 3093. Retrieved from <http://ssrn.com/abstract=1028205>
- Cunha F, Heckman J. The technology of skill formation. *American Economic Review*. 2007; 97(2): 31–47.
- Dunifon RE, Kalil A, Bajracharya A. Maternal working conditions and child well-being in welfare-leaving families. *Developmental Psychology*. 2005; 41:851–859. [PubMed: 16351332]
- Dunifon, RE.; Ziol-Guest, KM.; Kalil, A. Nonstandard work schedules and child development. In: Maholmes, V.; King, R., editors. *Understanding children and poverty: The science and ecology of early development*. Oxford University Press; 2012. p. 260-277.
- Gold DR, Rogacz S, Bock N, Tosteson TD, Baum TM, Speizer FE, Czeisler CA. Rotating shift work, sleep, and accidents related to sleepiness in hospital nurses. *American Journal of Public Health*. 1992; 82(7):1011–1014.10.2105/AJPH.82.7.1011 [PubMed: 1609900]
- Han W, Miller DP. Parental work schedules and adolescent depression. *Health Sociology Review*. 2009; 18(1):36–49. [PubMed: 20936086]
- Han W, Miller DP, Waldfogel J. Parental work schedules and adolescent risky behaviors. *Developmental Psychology*. 2010; 46(5):1245–1267. [PubMed: 20822236]
- Han W, Ruhm C, Waldfogel J, Washbrook E. The timing of mothers' employment after childbirth. *Monthly Labor Review*. 2008; 131(6):15–27. [PubMed: 21701695]
- Han W, Waldfogel J, Brooks-Gunn J. The effects of early maternal employment on later cognitive and behavioral outcomes. *Journal of Marriage and Family*. 2001; 63(2):336–354.
- Heymann SJ, Earle A. The impact of parental working conditions on school-age children: The case of evening work. *Community, Work & Family*. 2001; 4(3):305–325.
- James-Burdumy S. The effect of maternal labor force participation on child development. *Journal of Labor Economics*. 2005; 23:177–211.
- Johnson DR, Young R. Toward best practices in analyzing datasets with missing data: Comparisons and recommendations. *Journal of Marriage and Family*. 2011; 73(5):926–945.10.1111/j.1741-3737.2011.00861.x

- Joshi P, Bogen K. Nonstandard schedules and young children's behavioral outcomes among working low-income families. *Journal of Marriage and Family*. 2007; 69:139(1)(18)
- Knutsson A. Health disorders of shift workers. *Occupational Medicine*. 2003; 53:103–108. [PubMed: 12637594]
- Lambert, SJ. Making a difference for hourly employees. In: Crouter, AC.; Booth, A., editors. *Work-life policies*. Washington, D.C.: Urban Institute Press; 2009. p. 169-196.
- McMenamin T. A time to work: Recent trends in shift work and flexible schedules. *Monthly Labor Review*. 2007; 130(12):3–15.
- Munakata M, Ichi S, Nunokawa T, Saito Y, Ito N, Fukudo S, Yoshinaga K. Influence of night shift work on psychologic state and cardiovascular and neuroendocrine responses in healthy nurses. *Hypertension Research*. 2001; 24(1):25–31. [PubMed: 11213026]
- Duncan GJ. NICHD. Modeling the impacts of child care quality on children's preschool cognitive development. *Child Development*. 2003; 74(5):1454–1475.10.1111/1467-8624.00617 [PubMed: 14552408]
- Phillips, KR. Parent work and child well-being in low-income families. Urban Institute, Occasional Paper Number 56. 2002. Retrieved from http://www.urban.org/UploadedPDF/310509_OP56.pdf
- Powers ET. Children's health and maternal work activity: Estimates under alternative disability definitions. *Journal of Human Resources*. 2003; 38(3):522–556.
- Presser HB. Some economic complexities of child care provided by grandmothers. *Journal of Marriage and the Family*. 1989; 51(3):581–591.
- Presser, HB. *Working in a 24/7 economy: Challenges for American families*. New York: Russell Sage Foundation; 2003.
- Presser HB, Cox AG. The work schedules of low-educated American women and welfare reform. *Monthly Labor Review*. 1997; 120(4):25–34.
- Rapoport B, Le Bourdais C. Parental time and working schedules. *Journal of Population Economics*. 2008; 21(4):903–932.
- Raver, CC. Harris School of Public Policy Studies, University of Chicago, Working Papers 0206. 2002. Emotions matter: Making the case for the role of young children's emotional development for early school readiness.
- Reichman NE, Teitler JO, Garfinkel I, McLanahan S. Fragile Families: Sample and design. *Children & Youth Services Review*. 2001; 23(4–5):303–326.
- Royston P. Multiple imputation of missing values. *Stata Journal*. 2004; 4(3):227–241.
- Rubin, DB. *Multiple imputation for nonresponse in surveys*. New York: Wiley; 1987.
- Ruhm CJ. Parental leave and child health. *Journal of Health Economics*. 2000; 19(6):931–60. [PubMed: 11186852]
- Schernhammer ES, Laden F, Speizer FE, Willett WC, Hunter DJ, Kawachi I, Colditz GA. Night-shift work and risk of colorectal cancer in the nurses' health study. *Journal of the National Cancer Institute*. 2003; 95:825–828. [PubMed: 12783938]
- Smith-Coggins R, Rosekind MR, Hurd S, Buccino KR. Relationship of day versus night sleep to physician performance and mood. *Annals of Emergency Medicine*. 1994; 24(5):928–934.10.1016/S0196-0644(94)70209-8 [PubMed: 7978567]
- Strazdins L, Clements MS, Korda RJ, Broom DH, D'Souza RM. Unsociable work? Nonstandard work schedules, family relationships, and children's well-being. *Journal of Marriage and Family*. 2006; 68(2):394–410.
- von Hippel PT. Regression with missing Ys: An improved strategy for analyzing multiply imputed data. *Sociological Methodology*. 2007; 37(1):83–117.10.1111/j.1467-9531.2007.00180.x
- Waldfoegel J, Han W, Brooks-Gunn J. The effects of early maternal employment on child cognitive development. *Demography*. 2002; 39(2):369–392. [PubMed: 12048957]
- Waters E, Sroufe LA. Social competence as a developmental construct. *Developmental Review*. 1983; 3(1):79–97.
- White L, Keith B. The effect of shift work on the quality and stability of marital relations. *Journal of Marriage and the Family*. 1990; 52(2):453–462.

- Wight VR, Raley SB, Bianchi SM. Time for children, one's spouse and oneself among parents who work nonstandard hours. *Social Forces*. 2008; 87243(1)(29)
- Yeung WJ, Linver MR, Brooks-Gunn J. How money matters for young children's development: Parental investment and family processes. *Child Development*. 2002; 73(6):1861–1879. [PubMed: 12487499]

Table 1

Descriptive statistics

Variable	<i>M</i> or %	<i>SD</i>
Standard only (said no to all nonstandard)	0.27	
Mother worked nights	0.08	
Mother worked evenings	0.16	
Mother worked weekends	0.24	
Mother worked different times each week	0.15	
Mother worked 0 hours (unemployed)	0.40	
Mother worked 1–19 hours per week	0.04	
Mother worked 20–34 hours per week	0.12	
Mother worked 35–44 hours per week	0.34	
Mother worked 45+ hours per week	0.09	
Mother is white	0.22	
Mother is Black	0.51	
Mother is Hispanic	0.24	
Mother is “other” race	0.03	
Mother’s age	29.18	6.14
Mother has less than high school	0.26	
Mother has high School/GED	0.27	
Mother has some college or technical school	0.34	
Mother has a college degree or more	0.13	
Mom on welfare in past year	0.22	
Father’s age (baseline)	27.60	7.07
Father has less than high school (baseline)	0.32	
Father has High School/GED (baseline)	0.36	
Father has some college or technical school (baseline)	0.21	
Father has college degree or more (baseline)	0.11	
Mother married to child’s bio dad	0.31	
Mother married to partner (not child’s bio dad)	0.02	
Mother cohabits with child’s bio dad	0.18	
Mother cohabits with partner (not child’s bio dad)	0.10	
Number of kids < 18 in HH	2.47	1.36
Presence of grandparent in the HH	0.14	
Presence of other adult (sibling, aunt/uncle, cousin, unrelated adult)	0.16	
Child is male	0.52	
Child’s age (years)	4.01	1.09
Child low birthweight	0.10	
Child physical disability	0.03	
HH income in tens of thousands (baseline measure)	3.22	3.14
Mother’s WAIS-R	6.81	2.64
Harsh parenting (factor score)	0.03	1.00

Variable	<i>M</i> or %	<i>SD</i>
Mother's depression (age 1)	0.13	0.34
Mother's generalized anxiety (age 1)	0.03	
Focal child's father ever in jail (age 3)	0.45	
Mother smoked during pregnancy (baseline)	0.19	
Mother received no or late prenatal care (baseline)	0.06	
Mother born in US (baseline)	0.88	
Mother considered abortion (baseline)	0.28	
Mother lived in public housing (baseline)	0.11	
Aggressive CBCL (standardized)	0.00	1.00
Anxious/Depressed CBCL (standardized)	0.00	1.00
<i>n</i> (person-years pooled across age 3 and age 5)	4734	

Table 2

Maternal work schedule predicting child's aggressive behavior

	Model 1: OLS		Model 2: OLS (sample w/schedule)		Model 3: Fixed Effects		Model 4: Residualized Change (DV: age 5 aggressive)	
	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>
Standard only (said no to all nonstandard)	-0.072	0.069	0.000	0.074	0.013	0.069	-0.045	0.078
Mother worked nights	0.198 ^{a**}	0.065	0.196 ^{a**}	0.068	0.061	0.064	0.132 ^{a†}	0.074
Mother worked evenings	-0.040 ^b	0.052	-0.026 ^b	0.055	0.023	0.052	-0.043 ^b	0.059
Mother worked weekends	-0.038 ^b	0.059	-0.010 ^b	0.061	-0.031	0.060	-0.059 ^b	0.068
Mother worked different times each week	-0.002 ^b	0.051	-0.005 ^b	0.052	0.052	0.053	0.048	0.059
Mother worked 1–19 hours per week	0.041	0.089	-0.038	0.097	-0.178 [†]	0.097	-0.075	0.099
Mother worked 20–34 hours per week	0.048	0.077	0.031	0.084	-0.055	0.077	0.012	0.088
Mother worked 35–44 hours per week	0.055	0.071	0.025	0.078	0.072	0.073	0.101	0.083
Mother worked 45+ hours per week	0.153 [†]	0.087	0.083	0.098	0.037	0.088	0.128	0.096
Aggressive CBCL (standardized) (year 3)							0.520 ^{***}	0.019
Constant	-0.181	0.172	-0.191	0.241	1.276	1.340	0.935 [*]	0.470
Observations	4734		2651		4734		2367	
Adjusted R-Squared	0.068						0.326	

^{***} $p < 0.001$,

^{**} $p < 0.01$,

^{*} $p < 0.05$,

[†] $p < 0.10$

^a Nonstandard shift significantly different from standard schedule at $p < .10$

^b Nonstandard shift significantly different from night shift at $p < .10$

Notes:

All models control for mother's race, age, and education, father's age and education, union status, household composition, child characteristics, maternal mental health, paternal incarceration, health behaviors, nativity, and public housing

Sample sizes for schedule changers vary slightly by imputation. Reported observations reflect the average number of schedule changers across imputations.

Lagged DV model predicts age 5 aggressive behavior, controlling for age 5 work schedule, demographics, and age 3 aggressive behavior

Table 3

Maternal work schedule predicting child's anxious behavior

	Model 1: OLS		Model 2: OLS (sample w/schedule)		Model 3: Fixed Effects		Model 4: Residualized Change (DV: age 5 anxious)	
	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>	<i>b</i>	<i>se</i>
Standard only (said no to all nonstandard)	0.039	0.067	0.021	0.075	0.117	0.084	0.114	0.084
Mother worked nights	0.190**	0.063	0.205**	0.067	0.095	0.078	0.213**	0.082
Mother worked evenings	-0.008 ^b	0.052	-0.008 ^b	0.055	0.042	0.065	0.008 ^b	0.067
Mother worked weekends	-0.008 ^b	0.056	-0.034 ^b	0.059	0.031	0.072	0.046	0.071
Mother worked different times each week	0.013 ^b	0.051	-0.007 ^b	0.054	0.027	0.063	0.005 ^b	0.067
Mother worked 1–19 hours per week	-0.017	0.091	0.032	0.103	-0.139	0.117	-0.152	0.112
Mother worked 20–34 hours per week	-0.031	0.078	-0.017	0.088	-0.116	0.094	-0.113	0.097
Mother worked 35–44 hours per week	-0.039	0.069	-0.001	0.078	-0.050	0.088	-0.086	0.085
Mother worked 45+ hours per week	0.034	0.084	0.064	0.099	0.008	0.106	0.036	0.104
Anxious CBCL (standardized) (year 3)							0.345***	0.022
Constant	0.032	0.164	0.126	0.230	1.580	1.604	0.522	0.544
Observations	4734		2651		4734		2367	
Adjusted R-Squared	0.069						0.171	

p < 0.001.

**
p < 0.01.

*
p < 0.05.

[†]
p < 0.10

^aNonstandard shift significantly different from standard schedule at p < .10

^bNonstandard shift significantly different from night shift at p < .10

Notes:

All models control for mother's race, age, and education, father's age and education, union status, household composition, child characteristics, maternal mental health, paternal incarceration, health behaviors, nativity, and public housing

Sample sizes for schedule changers vary slightly by imputation. Reported observations reflect the average number of schedule changers across imputations.

Lagged DV model predicts age 5 anxious behavior, controlling for age 5 work schedule, demographics, and age 3 anxious behavior