As an increasing number of American parents work nonstandard schedules, social scientists are beginning to understand the wide-ranging consequences of these arrangements. Compared to parents working traditional work schedules, parents with nonstandard schedules struggle to arrange child care, have more strained parent-child and marital relationships, endure greater work/family conflict, and exhibit poorer health outcomes. This study expands that line of inquiry by considering the consequences of parents' non-standard work for children's cognitive development.

Surprisingly few studies have explored the relationship between parents' non-standard work schedules and child outcomes. These few studies have been mainly cross-sectional, mostly based on small and nonrepresentative data, or rely exclusively on maternal reports. In this study, I use the first two available waves (9 and 24 months) of the Early Childhood Longitudinal Study-Birth Cohort (ECLS-B), a nationally representative dataset of children born in year 2001. I address four questions: a) Do children with parents who both work non-day (shift or irregular) hours exhibit less cognitive growth between 9-24 months than children with parents who work during the day? b) Do associations between different work schedules and child's cognitive development persist after controlling for parental and child characteristics?, c) If these associations exist, does parental involvement and depression mediate the relationship?

The Negative Consequences of Non-Standard Work – Adult and Family Outcomes

Scholars have found that working nonstandard hours is negatively associated with a wide range of outcomes. Weekend work and non-day shift are significantly related to work/family conflict for men (Voydanoff, 1988). Shift work is also associated with lower marital quality

(White and Keith 1990), lower efficiency on the job, poorer sleep, and lower mental health (Harrington 2001).

Overall, the findings in these studies suggest that working shift hours has detrimental consequences for parents and family life, regardless of having a child in the household yet we know less about whether these negative effects extend to young children.

Effects of Non-Standard Shift Hours on Children

There are many reasons to suspect that young children are vulnerable to the stresses caused by parents working non-standard schedules. One reason might be that working nonstandard hours creates more stress when parents need to balance between work and child care responsibilities. This pressure could reduce marital quality and stability and ultimately child development. A change in mother's schedule from standard to nonstandard hours and from nonstandard to standard hours increases child care by the father and center-care child care respectively (Han, 2004). Considering that working nonstandard hours influences employee's health, well-being and marriage and when these employees are parents, then some of the influences of shift hours might be more detrimental for children's development (Strazdnis et al. 2004).

The literature on the effect of non-standard hours on children development is a rather underdeveloped area. We know very little about this question. The few studies that explore this question suggest that non-standard work schedule has a negative effect on children's development. Using the 1990 data from the National Longitudinal Survey of Youth (NLSY), Heymann and Earle (2001) estimated the effect of parental evening work on HOME scores [that's not a child outcome] for 1133 school children, aged 5-10 years who live with both

parents. HOME score decreased by 11 and 8 % when mothers and fathers worked evenings respectively. Having a mother who works a nonstandard schedule for 3 years continuously significantly reduces child's verbal comprehension at 36 months by around 6 %, net of all controls (Han 2005a). Using data from a representative sample of 4433 dual-earner Canadian families and their 2-11 year old children, Strazdnis et al. (2004) found that after adjusting for control variables, the odds of children having any emotional or behavioral difficulties were 40 % higher when both parents worked nonstandard schedules compared to whose parents worked standard schedules. Using the same data, Strazdnis et al. (2006) found that when either or both parents worked nonstandard hours, this increased the likelihood of children having social and emotional difficulties, these associations were partially mediated by family relations and well-being.

Joshi and Bogen (2007) made improvement to the previous studies by estimating the influence of nonstandard work schedules on three child outcomes. They found that mother's nonstandard work schedule significantly increases child's internalizing and externalizing behavior, whereas it reduces child's positive behavior. Parenting stress fully mediates this relationship. This study was based on 206 low-income working mothers only with children who are between 2-4 years old. In this study, I expect to find that children will exhibit less cognitive growth between 9-24 months when they live in households where parents work nonstandard hours than when both parents work during the day.

My literature review uncovered only one study that has followed children over time and considered the effects of non-standard hours on their cognitive development. Han (2005a) examined the associations between mother's work schedules and children's cognitive outcomes in the first 3 years of 900 children from the National Institute of Child Health and Human

Development Study of Early Child Care. Han did not estimate growth models, however. He predicted cognitive development only at one point in time.

Another aspect of this question that needs more emphasis is the influence of nonstandard work schedules on children's development across different ages. The association might differ for children across different ages. Working nonstandard schedules might be more detrimental for children's development when they are infants and require the most time of their parents. Using both the 1997 and 1999 waves of the nationally representative dataset collected by the Urban Institute and Child Trends, Han (2005b) explored the association between contemporary work schedules and children's outcomes between 6-17 years of age. Han found some weak associations. In 1997, children, whose mothers worked nonstandard hours aged 6-11, had significantly lower school engagement than did children whose mothers worked standard hours, whereas no association was found in 1999. In 1997, children, whose mothers worked nonstandard hours aged 12-17, attended significantly fewer extracurricular activities than did children whose mothers worked standard hours. Han also estimated the influence of both parents' work schedules on child's different outcomes for dual-earner families. No significant association was found, except that in 1997, children aged between 12-17 and whose parents worked nonstandard hours, had more school engagement, but the effect was moderate ($p<.05$).

The most recent study by Barnett and Gareis (2007) focuses on a sample of 55 dual-earner families with children aged 8-14 years old where mothers work either day or evening shifts. Surprisingly, they found that children whose mothers worked evening shifts, had significantly less internalizing and externalizing behavior, due to partial mediation between maternal evening shift and the increase in the amount of time fathers spend with the child.

Whether this positive effect of non-standard hours generalizes to a broader population is an important question.

Using the 2002 wave of the National Survey of America's Families (NSAF), and focusing on married dual-earner families with a focal child aged 6-17, Bajracharya (2006) found that having both parents work night schedules has detrimental effects for the child's development in extracurricular activities for both younger (6-11) and older children (12-17). Rather than focusing only on the influence of work schedules, researchers need to include whether parents chose to work nonstandard schedule voluntarily or involuntarily. This might change the influence of nonstandard work schedules on child development. Bajracharya (2006) found that the influence of working night schedule on child's school engagement is significantly less when parents arrange nonstandard schedules to facilitate child care controlling for mother's mental health, aggravation, type of child care as well as number of hours in child care for younger children (6-11), whereas there was so significant interaction for older children (12-17), controlling for mother's mental health and aggravation score.

Extending Past Work and Contributions of This Study

(1) A focus on infants

Except Han (2005a), previous studies have mainly focused on either preschool children or older children. It is harder for researchers to estimate the influence of nonstandard work schedules on child's development net of other effects during this period, because as children get older, there are more non-family factors (neighborhood, peer or school effects) which might influence children. Therefore, this study makes an important contribution to the previous studies

because I am studying infants when the non-family factors are limited. This period is also crucial because early trajectories are important for later development.

(2) Estimating Growth Models with Longitudinal Data

A limitation of these studies, however, is the use of a cross-sectional data and so struggle to address the challenges of omitted-variable bias. Instead of non-standard working schedules causing poor child outcomes, it may be that the kinds of parents who work nonstandard hours are the kinds who have children who struggle, regardless of the work arrangements. These cross-sectional studies often control for potential omitted-variables like socioeconomic status, family structure, and race, but these may be insufficient. Longitudinal models estimating growth models, while not eliminating the problem of omitted-variable bias, are better positioned to potentially isolate causal effects.

The main limitation of previous studies is the use of a cross-sectional design. Therefore, one can not assume that the relationship between parents' nonstandard work schedule and child's well-being reflects causality (Strazdnis et al. 2004). Use of a longitudinal data on children between 9-24 months, will allow me to address temporal ordering between parents' work schedules and child mental development more clearly between two waves of data. By using a gains model approach, I will be able to test the "cumulative" effects of parental work schedules on child's development.

(3) Greater attention to different types of nonstandard work schedules.

Previous studies have argued that the influence of certain type of work schedule might be more detrimental than the others. Presser (2003) has suggested that the effect of working night

or rotating shift on both physical and psychological health may be stronger. Despite this, due to small sample size, previous studies measured nonstandard work schedules as whether the respondent worked during the day versus not. Thus, all types of nonstandard work schedules were included in the same category. The sufficient sample size in each parents' work schedule in this study will allow me to estimate the differences across the effects of different types of nonstandard work schedules on child development compared to when both parents work standard schedule.

(4) Consideration of additional mediators.

Han (2005a) also suggested that other factors might be important and could mediate the relationship between nonstandard work schedules and child development, such as father involvement. Due to data limitation, Han did not include any information from the father as controls. The analyses were based solely on maternal reports and child care characteristics. In this study, I include variables that might mediate the relationship, such as father's involvement. I am also including paternal characteristics in my analyses, such as father's depression and father's age. ECLS-B is rich because it has information on nonresident father also.

RESEARCH QUESTIONS?

In this study, I addressed three main questions: a) Do nonstandard work schedules have negative consequences for child's mental development between 9-24 months?, b) Do these associations exist, even after controlling for parental, child, and work characteristics?, and c) If so, what are the mechanisms by which it matters? Do parental involvement, and depression mediate the relationship?

METHOD

Data

The few studies that have looked at the relationship between nonstandard work schedules and child development has some data limitations. Most studies are based on either cross-sectional data or small, non-representative sample. The studies that have a large sample size focus mainly on dual-earner families or use information from mothers only. I use data from the Early Childhood Longitudinal Study Birth Cohort Study (2001-2003). ECLS-B is a nationally representative sample of children born in 2001. The total sample is over 10,000 children. The children participating in this study come from diverse backgrounds with various socioeconomic and racial/ethnic backgrounds with oversamples of minority children. This dataset has a national longitudinal sample of children and data are collected from the same children over time. Children's cognitive, socio-emotional and physical development are assessed on the same children over time. This dataset is unique because not only it has a longitudinal design, but it also includes information from both spouses' work schedule. This available and rich longitudinal data will allow me to not only to explore the "cumulative" effects of nonstandard work schedules on child's mental gains between 9-24 months, but also look at this relationship across different family structure. All predictors are measured when children are 9 months old.

Dependent Variable

The dependent variable is children's cognitive development, which is measured by scale mental gains. Mental scores are measured with Bayley Short Form-Research Edition (BSF-R). The BSF-R assesses children's cognitive development. The BSF-R is a reduced item of the

original BSID-II, which is considered to be one of the best measures in assessing early child development for infants 1-42 months old (National Center for Education Statistics, 2001). Some of the mental skills covered are how well the child explores objects, explores purposefully, babbles, early problem solving, and uses words (3-11, ECLS-B manual). Mental gains is measured by subtracting the mental score at 9 months from mental score at 2 years.

Independent Variable

The main independent variable is parental work schedules. Both father and mother are asked "Which of the following best describes the hours you usually work at your main job?" Both mothers and fathers answer whether they work daytime, or evening, night, rotating, split or other schedule. I named "rotating, split or other work schedule" as "other" category. I created couple-level measure by dividing it into six categories: a) both spouses working standard hours (day time), b) mother working standard hours and husband working other (rotating, split, or other), c) mother working standard hours and dad working evening or night shifts, d) husband working standard hours and mother working other, e) husband working standard hours and mother working evening or night shift, f) either spouse working other or evening/night shift, and g) both spouses working other or evening/night shift.

Intervening Variables

In order to estimate the question, what are the mechanisms which parental nonstandard work schedule matters children's mental development, I include mother's and father's depression, mother's and father's involvement with the child.

Control variables

To isolate the effect of parental work schedules on child's mental gains, the multivariate analyses need to control for the following variables. First is a) child's initial mental score. Other control variables are b) mother and father's work hours, c) child's birth weight status (1=normal birth weight, 0=moderately low birth weight or very low birth weight), d) whether the child has any disabilities (0=no, 1=yes). Child's disabilities include blindness, difficulty seeing, difficulty hearing, cleft lip or palate, heart defect, failure to thrive, problem with mobility, problem using arms or hands, down syndrome, turner's syndrome, other special need. Some other controls are e) race –whether the child is White (reference category), Black, Hispanic, Asian or other race (1=yes, 0=no for each); f) age of mother and father, g) gender of the child (1=male, 0=female), h) the number of siblings the child has (0=no child, 5=five siblings and more), i) child's exact age in months at both 9 and 24 month interview, j) a quintile measure of socioeconomic status (1=lowest, 5=highest), k) type of child care- whether the child has no nonparental care (reference category), relative care, nonrelative care, center-based care (1=yes, 0=no for each).

Analytical Strategy

I began by first estimating the bivariate relationship between parental nonstandard work schedules and child's mental gains. The bivariate associations show that children, who live in households where one spouse works other schedule (split, rotating or other schedule) and the other works evening or night schedules, gain around 4.7 points less in mental scores between 9-24 months ($p<.000$). I also find that children, who live in households where mothers work standard and dads work evening or night hours, gain around 3 points less in mental scores

between 9-24 months ($p<.01$). Lastly, children, who live in households where dads work standard hours and mums work evening or night hours, gain around 2 points less in mental scores between 9-24 months ($p<.05$).

In the second model, I then added all the control variables to isolate the effect. My goal here is to test whether the effect of shift hours on child's mental gains changes after the controls are added. The second model shows that the effects remain the same once the controls are added with reduced coefficient sizes. Children, who live in households where one spouse works other schedule (split, rotating or other schedule) and the other works evening or night schedules, gain around 2.8 points less in mental scores between 9-24 months ($p<.01$). I also find that children, who live in households where mothers work standard and dads work evening or night hours, gain around 3 points less in mental scores between 9-24 months ($p<.000$). Lastly, children, who live in households where dads work standard hours and mums work evening or night hours do not have significant effect on the mental gains.

Lastly, I added two intervening variables simultaneously to the model to test the mediating effects of parental involvement and parental depression. First, I added mother and father depression and found that despite only mother' depression has a significant and negative effect on child's mental gains and working different nonstandard hours increases mother's and father's depression, parental depression does not mediate the effect of shift hours on child's mental gains. The coefficient sizes and significance levels remain the same.

Then, I included parental involvement to test the mediating effects. Both maternal and paternal involvement do not seem to mediate the effect of shift hours on child's mental gains. The coefficient sizes and significance levels remain the same.

Conclusion/ Discussion

Results suggest that working nonstandard hours is detrimental for child's mental gains between 9-24 months. According to the results, children suffer worst in terms of mental gains when one spouse works split, rotating or other hours and the other spouse works evening or night hours. Both spouses working nonstandard and different work schedules have the worst negative effect for child's mental gains. An interesting finding is that when both spouses work irregular but same nonstandard work schedule (such as both spouses working split, rotating or other hours or when both spouses working evening or night hours) does not have any significant effect on child's mental gains. Our results show that when one spouse works standard hours and the other spouse works evening or night hours, children still gain less in mental scores between 9-24 months. Overall, this has many implications in terms of policy making. More and more jobs require longer and irregular hours of employment. Most employers work irregular, especially evening or night shifts. This causes stress for parents for need to balance between child care and work. Finding child care is problematic for employers if they work irregular hours. Relatives or non relatives might be arranged to take care of the children during this time. Results suggest however that good quality center care is the only type of care that has significant effects for child's development. Overall, better quality center care should be available for employers with small children. Surprisingly, parental involvement and depression do not mediate the effect. Future research should focus on other possible mechanisms as to how the influence of shift schedule operates.