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Parents' nonstandard work and child wellbeing: A critical review of the existing literature

by

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ABSTRACT

The rising prevalence of nonstandard work among parents in the era of the 24-hour/7-day economy in developed countries has raised a concern about its possible impacts on children's health and development. This paper provides a comprehensive and critical review of literature on this topic. To date researchers have examined (a) three developmental outcomes: mental health and behavioral problems, cognitive development, and childhood obesity; (b) family processes: parental time spent with children, parental monitoring, parent-child closeness, and the home environment and (c) other child outcomes: school engagement, extracurricular activities, and sleep patterns. Findings from research that used rigorous methodology show consistent associations between nonstandard work and poor child outcomes. This association is more pronounced in disadvantaged families and magnified when parents work nonstandard hours full-time. A similar association was found between nonstandard work and family processes. The paper discusses the strengths and limitations of existing research and directions for future research.

1. INTRODUCTION

Despite unprecedented economic growth and prosperity, many developed countries now face an increasing burden of poor health and developmental outcomes among children and youth (Li, McMurray and Stanley, 2008). Mental health and obesity in children and adolescents are two major concerns for parents, families, researchers and policy makers internationally. It is estimated that worldwide, between 10 per cent and 20 per cent of children have one or more mental health or behavioral problems (World Health Organisation, 2003). Problems with emotional, attentional, and social regulation in childhood impact widely on children's health and development and this impact persists throughout life (Maggi *et al.*, 2005; Shonkoff and Phillips, 2000). Child obesity has also increased in all developed countries (Speiser *et al.*, 2005). For example, in the US, the prevalence of overweight doubled among children between 6 to 11 years of age and tripled among 12 to 17 year olds from 1976/1980 to 1999/2000. Between 28 per cent and 31 per cent of adolescents 15 years of age are overweight, and 14-15 per cent are obese (Speiser *et al.*, 2005). One major consequence of rising child obesity is a significant increase in type 2 childhood diabetes over the last 20 years (Nestle, 2005).

Researchers have linked children's mental health and obesity with a wide range of family characteristics including family structure, socioeconomic status, and the mental health of parents. Limited research, however, has considered how parents' participation in market work, particularly nonstandard work, may be related to children's physical, mental and cognitive development. When researchers have addressed the association between parental work and child development, the focus has mainly been on maternal employment (Barnett, 2007; Brooks-Gunn, Han and Waldfogel, 2010; Goldberg, Prause, Lucas-Thompson and Himsel, 2008; Lucas-Thompson, Goldberg and Prause, 2010; Repetti, 2005; Waldfogel, 2007). Previous studies have paid attention to different dimensions of maternal employment, such as the timing at which mothers returned to the work force (Baydar and Brooks-Gunn, 1991; Han, Waldfogel and Brooks-Gunn, 2001) and part-time versus full-time employment (e.g., Brooks-Gunn, Han and Waldfogel, 2002; Han *et al.*, 2001; Hill, Waldfogel, Brooks-Gunn and Han, 2005). A dimension that has received limited attention is timing of parents' work, especially work scheduled outside the standard 9am to 5pm weekdays (nonstandard work schedules) and its possible impacts on child development. This is a significant gap

given that an increasing number of parents with young children are working nonstandard hours in developed economies (Presser, 2003). Whether these schedules exert an independent effect on children's development is therefore an important concern for economic, social and workplace policy.

Around the world, many societies are transitioning from industrial and post-industrial economies to service economies, which Presser (2003) calls the '24/7 economy'. Accompanying a 24/7 economy is a great demand for service-sector jobs, which are likely to demand nonstandard work hours. Given the increasing prevalence of both children's developmental problems and parents' nonstandard work schedules, it is important to examine existing evidence for the link between the two and assess the implications for policy and practice.

1.1 Definition and Prevalence of Nonstandard Work

The definition of nonstandard work varies across studies and countries but essentially refers to when the majority of hours worked are outside a typical Monday to Friday daytime schedule. According to Presser's definition, 'Nonstandard hours' or 'shift work' reflects the situation where at least half of worker's hours in their main job fall outside 8am and 4pm, Monday through Friday. 'Nonstandard days' include working on a Saturday and/or Sunday (Presser, 2003, pp. 14-15). Therefore, nonstandard work (combining nonstandard hours and nonstandard days) may include regular weekend work, evening and night shifts, rotating shifts (i.e., alternating between day, evening, or night shifts, but on a fixed schedule), split shifts, on call hours, or irregular hours.

In 1997, about 40 per cent of the American labour force aged 18 and over (43 per cent of men and 35 per cent of women) worked a nonstandard schedule in their main job, that is, a schedule other than a fixed day weekday five days or less per week. About eight per cent of American workers had a fixed evening schedule and about four per cent each had a fixed night, a rotating schedule or varying hours during the week (Presser, 2003, pp. 15-18). This labour market trend is also evident in other developed countries, although not as prevalent as in the United States. Approximately one-third of Canadian workers in 1995 (Akyeampong, 1997) and about 43 per cent of Australian workers from 2001 to 2004 regularly worked some form of nonstandard hours, including weekend work (Dockery, Li and Kendall, 2009). During 2005 there was considerable variation in nonstandard (non-day and weekend) hours worked across 12 European countries. The prevalence of employment outside day-time hours during the week ranged from about 15 per cent in Luxembourg to 30 per cent in the United Kingdom. The prevalence of weekend work ranged from 10 per cent of Swedish workers to 34 per cent of Italian workers (Presser, Gornick and Parashar, 2008). Socially and economically disadvantaged segments of the US population were most likely to work nonstandard schedules, such as those people in low-skilled occupations, the unmarried, those who are less well educated, and those who are black (Presser, 2003).

Nonstandard work is also prevalent when there are children in the family, mostly due to a greater uptake of nonstandard work when women become mothers. In 1997, one-third of dual-earner American families with at least one child under the age of five had at least one parent working nonstandard hours during the week, 60 per cent if weekends were included (Presser, 2003, pp. 64-65). Nonstandard work was even more prevalent in low-income and one-parent families. Sixty-eight percent of low-income dual-earner couples with children under five had at least one spouse working a nonstandard schedule. Forty-six percent of lone-

mothers with a child under the age of five worked a nonstandard schedule (Presser, 2003, pp. 61-68).

1.2 Reasons for Working Nonstandard Schedules

Whereas the increase in nonstandard work hours at the population level is associated with demands for greater flexibility from both employers and employees, around one-third of American mothers report childcare as the main reason for adopting a nonstandard work schedule (Presser, 2003, p. 20). Working in the evenings, at nights or on weekends has become an adaptive strategy for many families to manage their childcare needs, enabling 'split-shift' parenting (Presser, 2003) or 'tag-team' parenting (Hattery, 2001) to cover childcare needs not met by formal care, which may not be available or may be too costly. The term tag-team is used to describe the situation where parents work opposite shifts to ensure that at least one parent is available to provide care most of the time. Care of children by parents or relatives is significantly greater when mothers work nonstandard hours compared to standard hours (Barnett and Gareis, 2007; Han, 2004). In the US in 2004, fathers provided 40 per cent of childcare when mothers worked nonstandard hours compared to 15 per cent of childcare when mothers worked during the day (Han, 2004). Among single mothers, there is a high prevalence of grandparent care when they work at nonstandard times (Presser, 1986). The use of nonstandard schedules by parents, especially tag-team parenting in dual-earner families, may reflect the desire to retain parental time with children in addition to the necessity of employment (Connelly and Kimmel, 2011; Hattery, 2001; Wight, Raley and Bianchi, 2008). Therefore, the reason parents work nonstandard schedules, their work hour preferences, and the type of childcare they use are all important factors to consider when examining the impact of work schedules on children's wellbeing.

1.3 Bioecological Theory and Resource Conceptual Framework

Bronfenbrenner's ecological theory (1979) is helpful in linking parental work schedules with children's wellbeing. In particular, the bioecological theory conceives of child development as occurring within nested settings beginning with the developing person, the 'microsystem', and extending out to the immediate social settings of home, school and neighbourhood, the 'mesosystem', and settings that may have a direct and an indirect impact on the developing person through the 'exosystem', such as the parental workplace and the 'macrosystem', such as the wider society and culture. Renamed a bioecological theory, it has since been extended to highlight the importance of genetic and other physiological characteristics and the continuous reciprocal interaction that takes place between person and the environment (Bronfenbrenner, 2005).

Following Bronfenbrenner, Brooks-Gunn and her colleagues (Brooks-Gunn, Brown, Duncan and Anderson Moore, 1995) have operationalized the bioecological model in terms of familial and extra familial resources integrating both macro (e.g., economists, sociologists, and demographers) and micro perspectives (e.g., developmental and clinical psychologists and pediatricians). In broad terms, four categories of familial resources are thought to be critical for parenting and early socialization. These include income, time, human capital (e.g., parents' levels of formal schooling, together with special skills, training, and other characteristics), and psychological capital (e.g., mental health of the parents, the quality of their relationships, the psychological importance to them of factors such as education and work, and beliefs about the parental role in childrearing). Extra-familial resources include child care settings, schools, peer groups, community, and wider social contexts (Kendall and

Li, 2005). This resource conceptual framework has been increasingly used to guide research, public policy, and practice aimed at optimizing children's development (Zubrick, Williams, Silburn and Vimpani, 2000).

From the perspectives of the bioecological theory and the resource conceptual framework, parents' labour market involvement, including their work schedules, has important implications for their children's health and development. The parental workplace can be conceived as an important part of the 'exosystem' in which children grow and develop. Parents' labour force participation influences children's development through its impact on the familial resources, such as income, parental time available for children, and parental psychological capital, such as mental wellbeing and the quality of the marital relationship. Whereas full-time employment enables parents to bring more income home than no or part-time employment, it may negatively affect other domains of the family resources, such as reduced time available for children and the family and stress associated with juggling full-time work and family. Similarly, whereas working nonstandard work schedules, particularly night and evening shifts, may enable parents to spend time with children during daytime, such schedules can lead to fatigue and stress and hence reduce parents' physical and psychological capacity for providing quality parenting (Heymann, 2000). It is not only the quantity of each domain of these familial resources that is important but an optimal mix of them that would promote healthy child development.

1.4 Other Developmental Perspectives

A second and important consideration is whether the influence of parents' work scheduling on children depends on children's age or their developmental status and needs. Attachment, psychoanalytic, and family theorists have underscored the importance of the parent-child relationship in developing trust and a sense of self in children, and have drawn attention to the importance of age-related transitions in developmental capabilities (Parke and Buriel, 2006; Sroufe and Waters, 1977; Thompson, 2006). Parental work arrangements, nonstandard hours in particular, may have a differential impact on child development dependent on the child's age and developmental needs. Infants and toddlers require a large investment of time from a primary caregiver in meeting their physical needs and forming secure attachment. As toddlers, they require constant supervision and activities focused on language development, including reading time with their parents. Parents are invaluable in helping children to understand and express language, develop a variety of skills, and solve cognitive tasks (Bradley, 2002). Furthermore, parents aid in the development of children's emotional capacities, such as regulating emotions, dealing positively with frustration, and delaying gratification (Eisenberg and Valiente, 2002). Thus, it is in the early years that parental employment may compromise children's development due to lack of parental time with children (Brooks-Gunn *et al.*, 2010).

Parental nonstandard work may also exert an influence on children during middle-childhood and adolescent years. These later years mark a time of important changes related to school entry and transitions and developmental advances that establish children's sense of identity and their relationships with parents and peers (Eccles, 1999). Adolescence is an important developmental stage where young people begin engaging in risky health behaviors (e.g., smoking, drinking, and sexual activities). Thus, parental supervision and monitoring may be just as important during these late developmental stages as in early childhood. Parents in general tend to have better knowledge about children's whereabouts and daily life when children are in the middle-childhood years than when they are adolescents (Crouter and Head,

2002), reflecting the developmental path of child autonomy. It is likely that working nonstandard hours may further reduce parental knowledge of adolescent children's whereabouts and their daily life.

1.5 Mechanisms Linking Parental Nonstandard Work and Child Development

Several hypotheses have been suggested to explain negative relationships between maternal employment in general and child wellbeing. One theory has argued that working mothers may be more fatigued and less sensitive and responsive to their children, thus interfering with children's secure attachment (Berlin, Ziv, Amaya-Jackson and Greenberg, 2007). Scholars have also suggested that mothers who work might put their children in poorer quality care (Belsky, 2001) or might use harsher parenting tactics due to having less time and more stress or provide their children with lower quality home environments, and less cognitive stimulation e.g., talking to and playing with the child (Brooks-Gunn *et al.*, 2010). These hypothesized mechanisms may also underpin the association between not only mothers' but also fathers' nonstandard work schedules and children's development.

Child health and development is also linked to parents' health and wellbeing which in turn influences the quality of their home environment, especially in the early years (Brooks-Gunn *et al.*, 2010). Therefore, parental wellbeing is likely to be an important mechanism through which nonstandard hours may influence children's wellbeing. Parents' experiences at the workplace may cross over to the home by influencing their personal wellbeing, which in turn influences the relationship with their children (Bumpus, Crouter and McHale, 1999, 2006; Crouter, Bumpus, Maguire and McHale, 1999; Repetti and Wood, 1997; Schneider and Waite, 2005). The stress associated with nonstandard work may lead to less positive family dynamics such as more work-family conflict (Barnett, Gareis and Brennan, 2008; Davis, Goodman, Pirretti and Almeida, 2008; Hosking and Western, 2008; Liu, Wang, Keesler and Schneider, 2011; Staines and Pleck, 1983), marital instability, especially in association with night shifts (Davis *et al.*, 2008; Kalil, Ziol-Guest and Epstein, 2010; Presser, 2000, 2003; White and Keith, 1990), reduced time spent with children (Crouter and McHale, 2005), lower parental knowledge of children's whereabouts (Bumpus *et al.*, 1999, 2006), and lower quality home environments due to the carryover of parental job-related stress (Menaghan and Parcel, 1995). Importantly, as Fenwick and Tausig (2001) have suggested, family and health outcomes associated with nonstandard work may be as much about lack of schedule control as the timing of work itself.

A number of studies have shown negative associations between working nonstandard hours and the physical and mental health of workers, including working parents, although results are by no means unanimous. Nonstandard hours, especially regular night shifts and rotating shifts, disturb the body's circadian rhythms, alter physiological functions and potentially lead to chronic health conditions, anxiety, neurotic disorders and depression, and chronic sleep deprivation and fatigue (Barnett, 2007; Totterdell, 2005; Ulker, 2006). Working evening or night shifts (but not rotating shifts) was associated with greater depressive symptoms among mothers and fathers (Perry-Jenkins, Goldberg, Pierce and Sayer, 2007).

These consequences raise a concern that parental nonstandard work may have a negative impact not only on children's mental health but also on their cognitive development. Based on the bioecological theory and resources framework, pressure on parental time due to combined employment, housework and childcare demands, parental stress, particularly maternal depressive symptoms (Hoffman and Youngblade, 1999; NICHD ECCRN, 1999),

and fatigue may reduce parents' capacity to provide adequate cognitive stimulation in the home, such as less frequent reading to the child, engaging in fewer developmental activities, and less time assisting with homework. Another important factor is exposure to centre-based care (a child's 'mesosystem'), which is associated with better cognitive outcomes for children, and most children who attend centre-based childcare have parents working standard hours (NICHD ECCRN, 2002). It is possible that the lack or reduced exposure to center-based care is a mechanism through which nonstandard work is associated with poor cognitive development in children. Another potential mechanism to consider is parents' job quality. Parcel and Menaghan (1994) illustrated how children's cognitive development benefited from maternal cognitive stimulation due to aspects of maternal job quality, such as autonomy and high complexity. Nonstandard work is more prevalent in the service-sector and often involves jobs with low levels of complexity and autonomy.

We know little about whether or not parental nonstandard work is associated with weight gain in children. On the one hand, nonstandard shifts may provide parents (particularly the mothers) more time during the day to prepare meals and thus fewer families eat out or use convenience food. On the other hand, lack of time, fatigue and stress associated with nonstandard hours can lead to greater reliance on convenience food, more travel by cars, and more time spent by children in front of the TV and in other sedentary activities (Anderson and Butcher, 2006; Banwell, Hinde, Dixon and Sibthorpe, 2005; Jabs and Devine, 2006).

To summarize, the rising prevalence of nonstandard work in the era of the 24-hour/7-day economy in developed countries has raised a concern about possible impacts of this economic trend on children's health and development. To date, there is a limited understanding about these impacts. Parental nonstandard work may have a significant impact on several domains of child development through multiple mechanisms. This impact is likely to vary by the developmental ages and needs of children. In light of the theoretical perspectives described above, this paper reviews studies that have examined the links between parental nonstandard work and child developmental outcomes and family processes (that influence these outcomes), assesses the evidence from this research and provides directions for future research.

Due to the fact that there is a great deal of diversity in the focus and methodological aspects of the relatively small number of studies identified for this review, such as a wide range of outcome variables under investigation, the way nonstandard work was measured, the representativeness of the data, and sample size, it would be difficult to conduct a systematic review with meta analysis. Instead a comprehensive and critical review of the extant published literature was undertaken.

1.6 Search Method

This review included peer-reviewed journal articles and books on the link between parental nonstandard work and mental, physical and cognitive dimensions of child development, and family processes that determine these outcomes. The search was restricted to the literature from English-language sources in developed countries from 1980 to April 2011. Papers that investigated the impact of nonstandard work on adults but not children, or papers that only focused on the prevalence and distribution of nonstandard work were not included. Studies of children with at least one parent serving in the military or having a fly-in/fly-out work arrangement were also excluded. The major search engines used were ProQuest, Web of Knowledge, Science Direct, PsycINFO, PubMed and OVID Medline, Informaworld and

Google. The key words used included ‘nonstandard work’, ‘shift work’, ‘nonstandard schedules’, ‘nonstandard hours’, ‘parental employment’, ‘parental work’, ‘work schedules’, ‘child’, ‘adolescent’ or ‘adolescence’, ‘development’, ‘health’, ‘wellbeing’ and ‘child outcomes’. We also used the reference lists of the identified articles and the web pages of some authors and professional associations to extend the search.

The review is structured according to the type of child outcomes examined in the studies. First we review studies that examined the association between nonstandard work and three major developmental outcomes, namely mental health and behavioral problems, cognitive abilities, and childhood obesity. Second, we provide a review of studies that investigated the relationship between nonstandard work and four indicators of family processes or proximal determinants of child wellbeing: Parental time spent with children, parental monitoring, parent-child closeness, and the home environment. These family processes were also examined by many of the reviewed studies as underlying mechanisms linking parental nonstandard work with the three major developmental outcomes. Two studies that examined child mental health behavioural problems also investigated school-engagement and extra curriculum activities and one study examined sleep duration. These outcomes were also included in the review but only briefly discussed as more distal indicators of child wellbeing.

2. RESULTS

We employed four methodological criteria to present and evaluate the findings of the studies reviewed: (1) sample size and representativeness, (2) study design, (3) examination of mediating and moderating factors, (4) analytical methods to address selection bias and adequate control for key confounders. The most important issue is the extent to which studies have adjusted for potential selection bias. That is, can the observed associations between parental work schedules and child outcomes be attributed to other unobserved or omitted factors associated with the likelihood of participation in nonstandard work *and* having poor child outcomes? Comprehensively dealing with selection bias entails adjusting for major known confounders using longitudinal data and analytical techniques such as the Ordinary Least Square (OLS) regression method with adequate controls, fixed effects modeling, or propensity score matching. Another important issue is the examination of mediating factors using advanced methods such as Structural Equation Modelling (SEM).

Therefore, in presenting the findings below, more weight is given to studies that have been published in peer-reviewed journals, have samples that are representative of a population or a subpopulation, use a longitudinal design, control for important confounders, and address potential selection bias. We consider a minimum set of key socioeconomic confounders to be family structure, the number of parental work hours, and at least one indicator of family socioeconomic status (e.g., family income, parental education, and occupation). Another important confounding factor to consider is the type of non-parental care in studies focusing on preschool-aged children and before- and/or after-school activities for school-aged children. The adjustment for confounders is critical as it allows researchers to rule out the possibility that the observed association between nonstandard work and child outcomes is due to other factors, as such low parental education and low family income, which are known predictors of both working nonstandard hours and poor child outcomes. In addition, a minimum set of relevant demographic factors that need to be controlled for in the analysis include child gender, child age, number of children in the household, and parental age. Ideally, in families with co-resident parents, information from both parents should be included.

Further, we highlight research that helps us better understand how nonstandard work is associated with child outcomes: What are the causal mechanisms, and in what contexts are these relationships most likely to occur (i.e., the mediating and moderating factors)? Applying the bioecological theory, the resource conceptual framework and other developmental perspectives, we consider the following mediating variables important: Quality of the home environment, quality of parent-child relationships, parenting practices, parental mental health, and time spent with children. Regarding moderators, we consider child's gender and age, family structure, family income, parental occupation and the number of work hours important. Studies that address the mediating factors inform us about how (mechanisms) parental nonstandard work is associated with child developmental outcomes, whereas those that examine moderators can shed light on whether the effect of nonstandard work differs by individual and familial characteristics.

2.1 An Overview of the Results

Twenty-seven studies that met the inclusion criteria were identified through electronic and other searches (Table 1), including 26 peer-reviewed journal articles and one book.

[See Table 1]

Twenty-one studies were based on a US sample, one study used an Australian sample (Dockery *et al.*, 2009), two analyzed a Canadian sample (Strazdins, Clements, Korda, Broom and D'Souza, 2006; Strazdins, Korda, Lim, Broom and D'Souza, 2004), there was one from the UK (Barton, Aldridge and Smith, 1998), and there was one each from the Netherlands (Mills and Täht, 2010) and Croatia (Radosevic-Vidacek and Koscec, 2004). Of the 27 studies reviewed, 16 were cross-sectional and 11 were longitudinal in their study design. Several studies were based on the National Longitudinal Study of Youth – Child Supplement (NLSY-CS), a cohort that presently overrepresents children who were born to younger mothers and thus tended to have lower education and income (Chase-Lansdale, Mott, Brooks-Gunn and Phillips, 1991). On the other hand, four studies were based on data from the National Institute of Child Health and Human Development Study of Early Child Care (NICHD SECC), which underrepresent children from disadvantaged families. Three studies sampled low-income families only; six sampled dual-earner families and one selected welfare lone-mothers only (Dunifon, Kalil and Bajracharya, 2005). The age of the children across these studies ranged from birth to 20 years of age. Fifteen of the studies examined both parents' nonstandard work, 10 focused only on the mother's nonstandard work and one study included primarily mothers, with one study examining the father's work schedule only (Barton *et al.*, 1998).

Mental health and behavioral problems were the most common type of child outcome examined. Specifically, 15 studies examined mental health or behavioral problems as one of the outcomes; two studies focused on cognitive development, and two studies examined children's body weight as the outcome (Miller and Han 2008; Morrissey, Dunifon and Kalil, 2011). Seven studies specifically focused on one or more aspects of family processes such as parent-child interactions, parenting and parental monitoring or quality of the home environment as the outcome, although 11 other studies also considered these factors as mediators in the relationship between nonstandard work and major developmental outcomes. Three examined school engagement and involvement in extracurricular activities, and one studied sleep patterns (Radosevic-Vidacek and Koscec, 2004). Some studies examined more than one of these outcomes.

2.2 Child Mental Health and Behavioral Outcomes

Because the bulk of existing research has examined child mental health and behavioral outcomes, this section is divided into three sub-sections that report the main effects in respect to the association between parental nonstandard work and child mental health and behaviour by child age, then the factors that moderate, and the factors that mediate this association.

2.2.1 Main Effects

Preschool Children. Evidence from cross-sectional (Strazdins et al., 2006, 2004) and longitudinal studies (Daniel, Grzywacz, Leerkes, Tucker and Han, 2009; Rosenbaum and Morrett, 2009) to date is consistent and suggests that young children in dual-earner families with at least one parent working nonstandard hours have more behavioral problems than those with no parent working nonstandard hours. The magnitude of the association with child behavior was similar for mothers' and fathers' nonstandard schedules (Strazdins et al., 2006, 2004). For example, two to four year old Canadian children were more likely to have social and emotional difficulties when their mother ($\beta = 0.20, p < .01$), father ($\beta = 0.25, p < .01$) or both parents ($\beta = 0.22, p < .01$) worked nonstandard hours compared to children of both parents working standard hours (Strazdins et al., 2006).

There is also evidence to suggest that exposure to parental nonstandard work is particularly detrimental in the child's first year of life. Rosenbaum and Morrett (2009) found that two year old infants had more mother-rated regulatory problems (excessive fussiness, sleeping problems and distractibility, as measured by the Infant/Toddler Symptoms Checklist scale) if at least one parent worked a nonstandard schedule when they were nine months old, compared to infants whose parents worked standard hours. Further, the authors reported the strongest negative association with children's regulatory problems when mothers or fathers worked an evening or a night shift while their partner worked during the day. The analysis adjusted for type of child care. Daniel and colleagues (2009), using the OLS method and Achenbach's Child Behavior Checklist for infants (CBCL 2/3) and controlling for a large number of confounders (not child care), found that in dual-earner families where mothers began working full-time (35 hrs+) with nonstandard hours in the child's first year, children had higher levels of externalizing behaviour at age two and three than children of mothers working standard hours. Children in these families also had higher levels of internalizing at age two. In contrast, there was no significant association with child behaviour if their mother began working nonstandard hours after the child's first birthday.

In a small cross-sectional study of 206 two to four year old children from low-income working families, Joshi and Bogen (2007) found that children of mothers who usually worked a nonstandard schedule had more mother-reported internalizing and externalizing problems, and a reduction in positive behaviors than children of mothers working standard hours. The study did not adjust for the quality and type of child care. Gassman-Pines (2011) analysed a sample of 724 person-daily surveys from 61 low-income mothers who were working outside the home and whose preschool-aged children attended one Head Start centre in a large American north-eastern city. The author reported a consistent, negative association between mother's work hours during night time and child behaviour: For each additional hour of night time work there was a decrease of 0.06 of a standard deviation in positive child behavior that day.

School Children and Adolescents. There is some evidence from longitudinal studies that the number of years of parental nonstandard work had a direct negative association with child mental health. Using a child fixed-effects model and adjusting for the use of non-parental care, Han (2008) found that behavioral problems among four to 10 year old children as measured by the Behavioral Problems Index (BPI) increased with the number of years that mothers had worked a nonstandard schedule. Similarly, using SEM methods, Han and Miller (2009) found that the number of years of maternal night shifts and paternal evening shifts was significantly associated with higher risks of depression in children aged 13 or 14 than children whose parents did not work such shifts. These results highlight the importance of studying the child's cumulative exposure to parental nonstandard work over time. Based on a sample of low-income families (primarily single mothers), Hsueh and Yoshikawa (2007) found that five to 16 year old children whose primary caregiver worked variable hours had more teacher-reported externalizing behaviours but fewer parent-reported internalizing behaviours than children whose caregivers did not work such hours.

In contrast, Dunifon and colleagues (2005) reported no significant association of parental nonstandard work with behavioral problems in 372 children aged five to 15. The study was based on data from four waves of the Women's Employment Study (WES), a longitudinal study of a sample of women drawn from the cash assistance rolls in an urban Michigan county in February 1997. Dunifon and colleagues included a rich set of mediating factors in the model, but the authors did not examine the association between nonstandard work and child behavioral outcomes without mediating factors in the model. It is unclear whether or not a statistically significant association would have existed with the exclusion of the mediators.

2.2.2 Moderating Factors

In this section we summarise findings in respect to a number of important factors moderating the association between parental nonstandard work and children's behavioral and mental health outcomes, including child gender, family structure, SES, and parental occupation and work hours.

Child gender. Whereas the majority of the studies adjusted for child gender in their analyses, few specifically examined child gender as a moderating factor. Understanding the extent to which the association between parental work schedules and child mental health and behavioural problems might vary by child gender is important, given the different developmental needs of boys and girls (Shonkoff and Phillips, 2000). Boys have higher levels of activity but are less able to regulate attention and control impulses than girls (Else-Quest, Hyde, Goldsmith and Van Hulle, 2006). They also show higher levels of direct aggression, associated with externalising behavior, poorer peer relations and lower pro-social behavior than girls (Card, Sawalini, Stucky and Little, 2008; Keating and Hertzman, 1999). Therefore, boys may react to parents' nonstandard work differently than girls.

The evidence, however, is far from conclusive for such gender differences. Using the US NLSY-CS data (N = 4200), Han, Miller, and Waldfogel (2010) found that adolescent boys were more likely than girls to engage in risky behavior due to cumulative exposure to mothers' night shifts. In contrast, Joshi and Bogen (2007) found mother-reported externalizing behaviour (standardized CBCL scale) in low-income families was more common among two to four year old girls than boys when their mother worked nonstandard hours. Barton and colleagues (1998) found that daughters (aged eight to 11) with semi-skilled

fathers working evening shifts had lower self-esteem and more depressive symptoms compared to daughters of day-working fathers, while no comparable results were found for sons. These two studies, however, were based on small local samples (around 200 in each) and the study by Barton *et al.* did not control for any confounders.

Family structure. Children of lone-mothers tended to have more problems associated with their parent's nonstandard work than those living in two-parent families. Han (2008) found that the number of years mothers worked a non-day shift was associated with more mother-reported behavioural problems in four to 10 year old US children who lived in single-mother families than in those living in two-parent families. In an earlier cross-sectional study, Han and Waldfogel (2007) reported that compared to working standard schedules, US single mothers working a rotating shift was associated with a greater likelihood their 10-14 year old children had ever engaged in criminal behavior or had school-related trouble. The same associations were not present among children in two-parent families, nor for any other type of nonstandard work. Similarly, in Australian lone-parent families, Dockery *et al.* (2009) found a negative link between parental (mostly mother's) nonstandard hours and adolescent-reported mental health in lone-parent families only.

Family socioeconomic status (SES). The few studies that tested for the specific moderating effect of household income or other measures of family SES on the relationship between parental work schedules and child mental health showed a consistently stronger association in low-SES families than in middle- or high-SES families. In the Canadian sample of two to 11 year olds, the positive association between having a mother or both parents working a nonstandard schedule and child emotional and behavioral problems was greater among families with the lowest SES quartile, compared to their middle- and high-SES counterparts (Strazdins *et al.*, 2006; 2004). It is interesting to note that the association between father's nonstandard work and child outcomes did not vary by SES in this Canadian sample. Furthermore, longitudinal studies that have examined the moderating effects of family income indicate that behavioural problems among four to 10 year olds associated with extended exposure to maternal nonstandard hours (Han, 2008) are amplified for low-income families compared to middle- or high-income families.

Parental occupation and work hours. Han (2008) found a stronger relationship between the number of years a mother had worked nonstandard shifts and the poorer behavioural outcomes of four to 10 year old children when the mother worked in cashier or service occupations compared to other occupation types. Whereas the majority of the studies on child mental health and behavioural problems controlled for total work hours, few examined the extent to which this factor might modify the link between nonstandard work and child developmental outcomes. The number of years mothers or fathers worked full-time nonstandard shifts was also associated with poorer behavioural outcomes in these children, compared to part-time nonstandard hours (Han, 2008). Among older teenagers in lone-parent families in Australia, the negative association of nonstandard work with their children's mental health was also magnified with more hours of nonstandard work (Dockery *et al.*, 2009).

2.2.3 Mediating Factors

Based on the bioecological theory, the resources conceptual framework and other developmental theories discussed in the introduction of this review, we expect parental nonstandard work to be associated with increased risk for behavioural problems via increased

levels of stress in parents, lack of or reduced time spent with children, fatigue, and reduced parenting quality, such as less sensitivity and responsiveness.

Daniel and colleagues (2009) reported that the positive association between maternal full-time nonstandard work in the first year and children's externalizing behavior at 24 months was partly mediated by higher maternal depressive symptoms at 15 months (from $\beta = 2.44$ to $\beta = 1.92$). In this particular study the authors conducted and reported the Sobel test statistic ($z' = 2.12, p < .05$), a formal statistical test of the mediation effect. The study, however, lacked data on father's work schedules, father involvement or the use of non-parental care. Including such data, Rosenbaum and Morrett (2009) found that the negative association of having at least one parent working a non-day shift with behavioural problems in two year olds was partly explained by limited father-child time, more frequent marital arguments, less frequent shared dinners, poorer parental self-rated health and father's depression. There was a 27 per cent change in the beta coefficient (from 0.11 to 0.08) when the mediating factors were included in the model. In the study by Strazdins and colleagues (2006) of Canadian children aged two to 11 in dual-earner families, the level of social and emotional difficulties of children with a father, mother or both parents working nonstandard hours was partly mediated by parental (mostly mothers) depressive symptoms and ineffective parenting: Reduction in β was 31 per cent, 42 per cent and 48 per cent respectively. Mediation effects were stronger in low-SES families (reduction in β was 58 per cent, 50 per cent and 65 per cent respectively) than in their high-SES counterparts, particularly in respect to father's nonstandard hours.

Han and colleagues (2007, 2009, 2010) conducted a series of studies of young adolescents from the NLSY-CS providing robust evidence that the link between parental work schedules and mental health is mediated by parent-child relationships (e.g., spending time together, maternal closeness) and the home environment. In a longitudinal analysis of 13-14 year olds in the NLSY-CS sample, Han and Miller (2009) discovered that the number of years a mother had worked a night shift, and the number of years which fathers had worked an evening shift since the child's birth led to a less supportive home environment and reduced parental closeness, which in turn contributed to adolescent-reported depression. Han *et al.* (2010) found the number of years mothers had worked a night shift was also linked to adolescent smoking, drinking and drug use due to reduced time spent with children and poorer parental supervision and monitoring. The authors also reported that the number of years mothers had worked a night shift was linked to adolescent delinquency, sexual activity and drinking via a reduced quality of the home environment. Furthermore, there was a direct link between maternal night shift and increased smoking and drinking if the mother had spent more than two-thirds of her time as a sole parent. In contrast, Han *et al.* (2010) found that irregular shifts were more likely to be associated with greater parental knowledge of child's whereabouts, which in turn reduced risks for adolescent risky behavior. These results highlight the importance of investigating the effect of different nonstandard work types on child mental health. The authors speculated that families with parents working irregular shifts were generally of higher SES in this particular NLSY sample, and therefore may have had greater flexibility in work scheduling.

2.3 Child Cognitive Development

Only two studies have assessed cognitive outcomes in respect to parental work schedules. In a US sample, Han (2005) found that children of mothers who worked nonstandard hours in their first year of life had poorer cognitive outcomes two to three years later, although results

varied by dimensions of cognitive performance, timing and length of exposure to such schedules. Specifically, children had lower scores on the Mental Development Index (MDI) at 24 months and 36 months, lower scores on the Reynell Verbal Comprehension scale at 36 months, and lower scores on the Reynell Expressive Language scale at 36 months if their mother had begun nonstandard work in their first year and continued to the time of the cognitive development assessment. Furthermore, children had significantly lower verbal comprehension and expressive language skills at 36 months if their mother had worked a nonstandard schedule in the first and second years of life but not the third year. The author suggested that these associations might be mediated by low levels of mother's sensitivity, reduced quality of the home environment, reduced quality of child care, and less use of centre care (Han, 2005). The lack of adequate parental time spent with children in cognitive tasks and activities may be another reason. Using data from the NLSY, Heymann (2000) found a higher representation of school-age children with poorer educational outcomes in mathematics, vocabulary and reading if parents also worked evenings or nights. As commonly voiced by parents in the qualitative component of Heymann's study, lack of childcare options and inflexible work schedules limited their opportunities to help with their children's education, even when problems became evident.

2.4 Childhood Obesity

Only two studies have examined the relationships between parental nonstandard work and children's body mass index (BMI). One found that the BMI of 13-14 year old children increased significantly if mothers worked either a few (< four years) or many years (10 or more years) of nonstandard schedules (Miller and Han, 2008). Family income was an important moderating factor; the adverse relationship between nonstandard hours and children's weight was stronger among the 'near poor' (i.e., families in the second quartile of family income, a level of income where families could not qualify for a number of public assistance programs yet tend to have substandard living). The associations remained significant after adjusting for mother's and partner's work hours across the years, the frequency of children's television viewing and shared meals between children and parents. Morissey, Dunifon, and Kalil (2011) analyzed longitudinal data from the NICHD SECCYD and used within-child fixed-effect models. They found no significant association between maternal nonstandard work and child BMI amongst 990 school children aged eight to 12. Notably, the NICHD SECCYD sample is not nationally representative, with 80 per cent of the children living in two-parent families and more than 75 per cent from higher-income families. It is plausible that the lack of association between nonstandard work and child BMI results from the fact that the families in this sample were better able to meet the challenges for balancing work and family than disadvantaged families.

2.5 Family Processes

Parental nonstandard work may have direct associations with the quality of parent-child relationships or the child's 'microsystem', and their immediate home environment. From both the bioecological theory and the resource conceptual framework and based on empirical findings reviewed thus far, parent-child relationship and the home environment are important mechanisms in linking parental nonstandard work with children's developmental outcomes. Below we review studies that examine them as outcome variables, but not as mediating factors for the association between parental nonstandard work and child developmental outcomes which we have already covered above. These studies can be grouped into four main areas: (1) time spent with children (e.g., actual time or parental involvement); (2) parental

monitoring (e.g., having a parent home after school, parental knowledge of child's whereabouts); (3) parent-child closeness (e.g., attendance by parents at important events, child perceptions about adequacy of time and closeness); and (4) quality of the home environment (e.g., maternal sensitivity, frequency of shared meals, and scores on the Home Observation and the Measurement of the Environment [HOME] scale, a scale measuring parental involvement, responsiveness, enrichment opportunities, and the physical environment).

2.5.1 Time Spent With Children

Whereas some studies have reported that mothers and fathers working nonstandard hours spend about the same amount or more total time with their children than parents who mostly work during the day (Dockery *et al.*, 2009; Wight, Raley and Bianchi, 2008), parents working nonstandard hours spend less time with children in *developmentally important activities*. For example, parents working nonstandard hours were less likely to read to their children, to participate in their child's education-related activities, and to help with homework, compared to those working standard hours (Wight *et al.*, 2008). In addition, Rosenbaum and Morrett (2009) found in bivariate analysis that when either one or both parents worked a nonstandard shift, fathers provided more care for their infants but spent less time in cognitively stimulating activities, such as reading books and telling stories. Rapoport and Le Bourdais (2011) analysed cross-sectional time use data from two Canadian General Social Surveys (1992 and 1998, N = 5,554 parents) using various statistical modelling approaches to control for selection bias. They found that parents working daytime or night time schedules spent significantly less time with children than non-working parents, but parents working evening hours spent the least amount of time with their children for leisure and social activities. For single mothers, work time resulted in a similar reduction in time with children regardless of when those hours were worked. Connelly and Kimmel (2011) found that mothers working nonstandard shifts provided less care-giving (as a primary activity measured in time diaries) to their children when they earned lower wages, whereas there were no differences in mother's care-giving time by wage when she worked standard hours.

In a small sample of low-income mothers with pre-school children, Gassman-Pines (2011) found that the number of hours low-income mothers worked at night time was associated with significantly fewer cognitively stimulating activities.

Whereas not all of these studies were able to pay attention to the compensatory role played by the child's other parent or caregiver, a small but detailed study of 55 US dual-earner families reported that fathers of children whose mothers worked as nurses on an evening shift spent twice as much time directly involved with their children aged eight to 14 than if their mother worked during the day (Barnett and Gareis, 2007). But it is unclear if the time was spent on cognitive developing activities.

In contrast, in a sample of 376 adolescents (aged 10-14) in dual-earner and mostly white middle-class families, Davis and colleagues (2006) found no association between mother's or father's work schedules and adolescent reported parental involvement (time spent in joint activities with that parent), although this study adjusted for only a limited number of confounders in the multivariate analysis.

2.5.2 Parental Monitoring

School-aged children are more likely to have a parent at home between 3-6 pm if the mother works a night shift but less likely if the mother or father works an evening shift, compared to children of parents working during the day (Wight *et al.*, 2008). In OLS models controlling for key confounders, Han and Waldfogel (2007) showed that, compared to children of mothers working standard hours in two-parent families, a higher proportion of 10-14 year old children of mothers working nights, rotating shifts or irregular shifts had an adult present when they returned home from school. The same association was mirrored when fathers in two-parent families worked nights or irregular hours, but to a lesser extent. Notably, however, single mothers were significantly less likely to know of their child's whereabouts when they worked rotating shifts compared to mothers working daytime hours (Han and Waldfogel, 2007). In contrast, focusing on a small sample of white US middle-class dual-earner families, Davis, Crouter, and McHale (2006) reported reduced levels of father's knowledge of their adolescent's whereabouts, activities and companions, when fathers worked a nonstandard schedule compared to when they work standard hours.

2.5.3 Parent-Child Closeness

It is unclear if parental nonstandard work may increase or decrease parent-child closeness. On the one hand, if parental nonstandard work involves flexible work schedules that allow parents to attend children's school and outside school activities, then parental nonstandard work may increase parent-child closeness. On the other hand, if parental nonstandard work means being not at home during evening and/or night hours when children need parental attention and assistance the most, then nonstandard work may decrease parent-child closeness.

Han and Waldfogel (2007) reported that 10-14 year old children of mothers or fathers in two-parent families working a regular evening shift were more likely to report that their time with that parent was insufficient, compared to children of parents working daytime hours. Further, children of mothers working nights were more likely to report that their mother often missed important events ($OR = 1.88, p < .01$) and they also felt less close to their mothers ($\beta = -0.15, p < .05$). Fathers working evenings or nights were more likely to often miss important events but children did not feel any less close to their father.

In contrast, two studies that were based on small samples of a specific sub-population tend to find a beneficial association between nonstandard work and parent-child closeness. In the study by Barnett and Gareis (2007), eight to 14 year old children of mothers working an evening shift rated their father as having greater awareness of their activities, better parenting skills and they themselves were more likely to disclose information to their fathers. In middle-class families, Davis *et al.* (2006) also found higher levels of adolescent-reported intimacy with their mothers when their mothers worked nonstandard hours, compared to when they worked standard hours.

2.5.4 Quality of the Home Environment

Stress and fatigue associated with evening and night shifts may adversely affect parenting, such as less responsiveness and sensitivity towards children. Using the longitudinal data from the NICHD SECC and propensity score matching, Grzywacz and co-authors (2011) examined maternal sensitivity (constructed from video-taped observations of semi-structured

free play sessions) and the home environment (the Infant/Toddler and the Early Childhood version of the Home Observation). The findings show consistent evidence that mothers who worked a nonstandard schedule full-time during the first year of the child's life had poorer maternal sensitivity at 24 and 36 months compared to those working nonstandard hours part-time or those working standard hours. Given the sophisticated analytical approach and measurements of the key variables in the study, these findings suggest that full-time maternal nonstandard employment in the child's first year may impair parenting practices that promote child development. Consistent with these findings and based on a small sample of low-income mothers, Gassman-Pines (2011) reported that the number of night time hours was associated with a higher level of harsh and withdrawn interactions with their children.

Examining two-parent families of five to 10 year olds, Heymann and Earle (2001) found an 11 per cent reduction in the HOME scores when mothers worked evenings and an 8 per cent decrease in HOME scores when fathers worked evenings. The association of having at least one parent working an evening shift was stronger for poor families than for non-poor families. Based on the study by Grzywacz *et al.* (2011), maternal full-time nonstandard work in the child's first year of life was also associated with lower scores for the home environment at age 36 months, but with marginal statistical significance ($p < .20$). With the exception of night shifts, nonstandard work is associated with fewer shared family dinners (Han and Waldfogel, 2007; Wight *et al.*, 2008).

2.6 Other Outcomes

Previous studies have also examined parental nonstandard work and child's school engagement as shown in Table 1 (Han, 2006; Hsueh and Yoshikawa, 2007), involvement in extracurricular activities (Han, 2006), and sleep patterns (Radosevic-Vidacek and Koscec, 2004). These studies found that children tend to have lower levels of school engagement, attend fewer extracurricular activities, and have shorter sleep when their parents work at nonstandard hours. The studies provided no information, however, about the mechanisms that might underpin this association and whether there were gender or age differences. Whereas parents working nonstandard hours (e.g., evenings or night time) are available during daytime when outside school activities take place (3pm-6pm), they may not be energized to take their children to such activities or they may lack time to do so due to competing demands of housework, such as preparing meals before they go to work in the evening. It is possible that disrupted family processes or child mental health and behavioral problems associated with nonstandard work as shown in this review may affect the child's sleep and school engagement. These plausible explanations need to be substantiated in future research. There is a need for more theoretical development and empirical research in this area and the conceptual framework offered by Vincent and Neis (2011) in their review essay on parental work schedules and child academic achievement is useful for future research to build on and extend.

3. DISCUSSION

Guided by Bronfenbrenner's bioecological theory, Brooks-Gunn and colleagues' resource conceptual framework, and other developmental perspectives, this review examined the research findings regarding the associations between parents' nonstandard work and three child developmental outcomes (mental health/behavioral problems, cognitive development, and obesity) and family processes that mediate these associations, such as parental time spent with children, parent-child relationship, parental monitoring, and home environment.

3.1 Main Findings

Overall, the studies that were based on large and/or representative samples, that used rigorous methods and analytical approaches, and that controlled for key confounders generally reported a statistically significant negative association between nonstandard work and the three child developmental outcomes. Based on the results from analyses of longitudinal data, the most consistent associations were reported among preschool-age children for both cognitive and mental health/behavioral problems, and among adolescents for risk-taking behaviors. These findings suggest that parental nonstandard work matters for both early and later developmental stages but in different domains of developmental outcomes.

Consistent with the bioecological theory and resources framework, there is evidence that the negative associations between nonstandard work and child mental health and behavioral problems are partly mediated through maternal depressive symptoms, low quality parenting, reduced child-parent interaction and closeness, and a less supportive home environment. We ought to be cautious, however, about maternal depressive symptoms being a mediating factor, as in almost all studies among young children (age zero to 10), child mental health and behavioral problems were measured with mother-reported ratings (e.g., CBCL, BPI), which are likely to be influenced by mothers' mental health itself.

Based on studies using robust methodology, there is also clear evidence that the association between parents' nonstandard work and child outcomes is more pronounced in families from low-SES backgrounds, as indicated by low-income, single-parenthood, and low occupational status. The association is also magnified when parents work nonstandard hours on a full-time basis compared to working these hours on a part-time basis. No consistent result was found regarding whether the association between parental nonstandard work and child developmental outcomes varies by child gender. Although longitudinal studies show that the associations between nonstandard work and risk-taking behaviors tend to be stronger for boys than for girls (Han *et al.*, 2010), the overall findings, are inconclusive at best.

The findings regarding the moderating factors suggest that the relationship between parental work patterns and children's wellbeing is invariably complex and depends on a number of contextual factors that influence familial resources. In some families, nonstandard work schedules present parents with advantages and challenges, while in others there are only challenges. This is a key finding and signals a new direction for future research that ought to consider a wider range of familial and child characteristics as potential moderating factors in examining the impact of nonstandard work on child development.

With regard to family processes, again the findings from high quality studies suggest that overall parental nonstandard work is linked with poorer outcomes. The majority of the studies reported nonstandard work was associated with less time for developmentally important activities, despite that two studies show that parents spend more or equal overall time with children when they work nonstandard hours. Whereas parents are more likely to be present at home when their children return from school when they work nights or rotating shifts compared to when they work standard schedules, there is generally a lower level of parent-child closeness in families where one or both parents work nonstandard hours, when longitudinal data were analyzed. These findings suggest that it is not so much the quantity of time spent with children that differentiates parents working nonstandard hours from those working standard schedules. Rather it is the quality of parental time, such as time spent with children in developmentally stimulating activities, where the difference lies.

Findings from a few studies that were based on small samples of white middle-class dual-earner families tend to deviate from these general patterns. These studies often reported either no significant association between nonstandard work and child outcomes or results that were conflicting with the findings from the majority of the studies. It is possible that in families with more resources, such as middle-class dual-earner families, parents were not confronted with the same challenges for balancing work and family as were disadvantaged families. This explanation is consistent with the finding regarding the moderating factors that the adverse effect of nonstandard work is more pronounced in low-SES families.

3.2 Strengths and Limitations of Reviewed Studies

The robustness of the evidence provided by this review depends on the methodological strength of the studies which we have reviewed. The majority of them were based on large samples representative of a total population or a subpopulation, controlled for main confounders, and examined moderating and mediating factors, thus providing in-depth information about the link between nonstandard work and child developmental outcomes. There were, however, a number of limitations. We discuss them in detail below.

3.2.1 Cross-Sectional Data

Due to the nature of the topic, experimental data were not a possibility and thus a causal relationship between parental nonstandard work and children's developmental outcomes is difficult to establish. Furthermore, 16 out of the 27 studies were based on cross-sectional data, thus precluding any inferences about nonstandard work being a causal factor for child developmental outcomes and raising a concern about reverse causality. For example, it is possible that parents arrange their work schedules as a way of managing children with more behavioral problems. The measurement of work schedules at one point in time does not provide information about how long children have been exposed to these work patterns and the changes that may have occurred over time.

Use of longitudinal data would reveal whether or not, or to what extent the disadvantage or benefits associated with nonstandard work found in some groups at one time point persist over time. For instance, parents working nonstandard schedules seem to shield care giving time from their work demands through tag-team parenting as observed in some cross-sectional studies (Hattery, 2001; Mills and Täht, 2010); one downside is reduced time spent with the spouse or reduced time for their own wellbeing. Studies have shown a negative association between night shifts and marital instability (Davis *et al.*, 2008; Kalil *et al.*, 2010; Presser, 2000, 2003), although it is not clear if the association only holds true for families *with* children (Presser, 2000, 2003) or in couples *without* children (Kalil *et al.*, 2010). This association also depends on marital duration, gender of the parent, and age of the child. For example, Davis and colleagues suggest (2008) that the night shift work of fathers with young children (age zero to 6) may have a particularly strong, negative effect on marital instability. In turn, there is a negative association between marital instability and child development (Amato, 2005). It is important to ask: Would this downside negatively impact on children through weakened marital stability and family cohesion in the long run? Only by analysing longitudinal data will we be able to address this question. Longitudinal studies to date have begun to consider both the onset and duration of children's exposure to parent's nonstandard hours and we need to do both (e.g., Han and Miller, 2009; Han, Miller and Waldfogel, 2010).

3.2.2 Effect Size

Few studies reported or discussed the effect size with most relying on a p-value to detect differences. Better reporting and more detailed discussion of effect sizes will aid interpretation of the practical significance of study findings in the future.

It is equally important to not only discuss the link between parental work schedules and children's wellbeing from the point of view of statistical significance, but more attention should also be paid to the practical importance. In other words, the magnitude of the effects of parental work schedules should be conveyed to practitioners, policy-makers, as well as the public in an effective way. It is inadequate to simply report that parental work schedules are significantly negatively associated with children's cognitive outcomes. What does that association mean in more concrete terms? For example, is a reduction of 0.5 points in cognitive performance scores large enough to have a significant negative impact on school achievement? Better reporting and more detailed discussion of effect sizes will aid interpretation of the practical significance of study findings in the future.

3.2.3 Less Information about Father's Work Schedules

Ten studies did not examine the role of fathers' work schedules and one study mainly focused on mothers' work hours primarily due to lack of data. With an increasing emphasis on paternal involvement in children's development, the field will benefit from giving equal consideration to the work schedules of both mothers and fathers, and in particular, joint work schedules in dual-earner families. Indeed the evidence from the studies that examined both mothers' and fathers' nonstandard work suggests that both mothers' and fathers' nonstandard work matters. Whereas maternal work schedules (and particularly night shifts) appear to be more strongly linked to child wellbeing, the type of schedule each parent works has differential but significant associations with child outcomes, especially when considering the cumulative exposure to nonstandard work children experience over time. Maternal night shifts and paternal evening shifts had the most consistent negative associations with child mental health.

Furthermore, fathers' involvement in childcare and household labour when mothers work nonstandard hours deserves much greater attention. We acknowledge that most of the existing large datasets do not have as detailed information on fathers as on mothers. We call for future data collection efforts to overcome this common limitation.

3.2.4 Lack of Data on Child Care and Choice of Nonstandard Work

Most studies lacked information about the childcare or before- and after-school arrangements available to parents working nonstandard hours. Important aspects of childcare are: Who takes care of the children when parents work nonstandard hours; whether this is formal care, family and friends or the other parent, and; whether the before- and after-school hours are supervised and what kind of activities are carried out. The impact of parental work schedules on children may also depend on the availability, affordability and quality of care arrangements. For example, formal care for children is rarely available outside standard business hours and weekdays. Children whose mothers work nonstandard hours are more likely to be cared for by fathers in two-parent families or by other relatives or non-relatives in a single-mother family (Han, 2005). When both formal and informal supports are absent, parents working nonstandard hours may have great difficulties in juggling work and family

demands. This is particularly an important issue for single-parent families and a plausible explanation for the findings from this review that the adverse association between nonstandard work and child outcomes is stronger in single-parent families.

Closely tied to childcare is the issue of whether or not parents choose to work nonstandard hours or have job flexibility which allows them to meet family and child care needs. These issues were not considered in the majority of previous studies. According to Presser (2003, p. 20), about a third of American married mothers whose youngest child was under the age of five who worked nonstandard hours in 1997 chose such schedules to facilitate childcare. In this way childcare costs can be avoided and fathers have a greater opportunity to participate in parenting. Nonstandard work may present advantages to both-parent families where parents are able to choose work schedules to meet their child care needs and to enable fathers' greater participation in parenting (Barnett and Gareis, 2007). Indeed, some parents choose to work nonstandard hours as a way of spending more total parental time with their children (Hattery, 2001). Working mothers with some flexible schedules tend to spend more time in direct child care but less time in shared leisure activities (Rapoport and Bourdais, 2011). It is unclear, however, if nonstandard work with flexible schedules benefits child development. It is important for future research to take this issue into consideration. The recent welfare reform in the US, however, has seen a great number of low-income single mothers move into poor-quality jobs that require nonstandard schedules and often involve non-flexible work arrangements.

3.2.5 Reliance on Parent-Reported Measures of Child Behavioral Outcomes

The majority of the reviewed studies relied on parental (mostly mother) reports of child behavioural measures. Mothers may be biased either downward or upward in their assessment of their children's wellbeing, particularly when maternal mental health is a concern (e.g., Sawyer, Streiner and Baghurst, 1998). This potential bias was illustrated in the study by Hsueh and Yoshikawa (2007). The authors have shown that more child behavioral problems as reported by the teacher were associated with parental nonstandard work, but there was no such an association when the parent-reported measures of child behaviours were examined. Furthermore, there may be differences between mothers and fathers in reporting child behavioral outcomes, depending on their own relationship with the child. Several of the studies involving older children utilised child-reported data and there may be more scope in the future for studies to employ self-reported measures of behavioral outcomes in younger children.

3.3 Future Directions

Parental work is an important social determinant of child health and wellbeing especially in the era of changing economic dynamics and an increasingly globalised economy. In particular, occupations that require employees to work nonstandard hours, such as in the service sector, are predicted to account for proportionally high job growth in the future (Presser, 2003). Therefore, the impact of the hours of parental work on children's developmental outcomes warrants further and more vigorous inquiry. Future research needs greater guidance by a theoretical framework for child health and development that recognises broader societal and community influences and the characteristics of parents and the child at different developmental stages. Below we discuss a number of issues for future research to consider.

3.3.1 Links between Nonstandard Work and a Broader Range of Developmental Outcomes

Most studies to date have focused on behavioral and mental health outcomes with only three examining children's cognitive development, two on obesity, and fewer on school engagement, extracurricular activities, and sleep patterns. Much more research is needed to enhance our knowledge about the relationship between parental nonstandard work and child cognitive outcomes, particularly academic achievement in school-age children. Further research is also needed not only to examine the link between nonstandard work and child obesity but also to investigate whether and how proximal factors, such as nutrition and physical activity, may also be influenced by nonstandard work. Based on the resource framework, we would expect nonstandard work to exert an influence on these developmental outcomes through the pathways of reduced time available for the family as a whole and reduced psychological capital (parental mental health and the quality of the relationships between parents themselves and with children). It is also plausible that these various developmental outcomes are interrelated contemporaneously or longitudinally. With the use of more advanced modelling, it will be possible to examine the developmental outcomes of children who are exposed to parental nonstandard work over time to determine if early behavioral and cognitive development leads to mental health problems and risk-taking behavior in teenagers, more so than children whose parents work standard daytime work hours. The field will also benefit from more research addressing the important issue of whether or not the association between parental nonstandard work and early child development will persist or dissipate over time.

3.3.2 Better Specification of Nonstandard Work

The findings of some of the reviewed studies have shown that on the one hand it was the night shifts that were associated with poor cognitive and behavioral outcomes among young children, and higher level of depression and more risky behaviors among adolescents. On the other hand, two studies reported that irregular or variable shifts were associated with reduced adolescent risk-taking behaviors (e.g., smoking, drinking, and using drugs) via improved parental knowledge of their child's whereabouts (Han and Waldfogel, 2007; Han *et al.*, 2010). We note, however, that the data (NLSY) used in these studies suggested that parents who reported having irregular shifts tended to choose such schedules and/or have some control over the time when they worked. Rotating and irregular shifts would have less predictable effects on parental time at home, which might make it harder for families to plan and attend events together. These shifts, however, can be beneficial to children if they are employee-initiated rather than required by employers (Henly, Shaefer and Waxman, 2006). These findings highlight the importance of distinguishing between the evening, night, rotating, irregular or weekend work of mothers and fathers and again take into account whether parents choose these shifts in future research.

Often researchers have collapsed different types of nonstandard shifts into one single category due to inadequate sample sizes in each group. As other authors have stated, such an analytic strategy limits our understanding about which schedules influence child development and family processes (Barnett, 2007; Presser, 2003). Further, no studies have considered the location of nonstandard work (at home vs outside home) and its potential benefit or detriment to child wellbeing. Parents working nonstandard work hours at home may be able to adjust hours to suit their family needs. Rapoport and Bourdais (2011) have shown that working at

home in general is associated with more time devoted to household chores for mothers and more time for social activities and family meals for fathers. Future research needs to investigate if nonstandard work at home is different from that outside home. Better specification of nonstandard hours also requires a focus on the family as the unit of analysis, considering joint work scheduling patterns in dual-earner families. The degree to which the shifts of parents in dual-earner families overlap also has important implications for parental relationships, the division of household labour and parental participation in children's activities (Barnett, 2007; Staines and Pleck, 1983).

Further, it is important to view the impact of parental nonstandard work on children within a broader labour market context by bringing non-employment into the analysis. The majority of the studies only focused on working parents, and only a few studies included non-working parents in the analysis as a comparison group. The relative advantage or disadvantage of nonstandard work for children and families compared to no employment has significant policy implications, particularly given an increasing polarization of work in some developed economies such as Australia (Dawkins, Gregg and Scutella, 2005) and the UK (Graham, 2001), with more households where both parents are employed and more households where no parent works.

3.3.3 Attention to a Wider Range of Moderating and Mediating Factors

It is pleasing to see that 21 of the 27 studies examined a range of moderating or mediating factors that were likely to play a role in the association between nonstandard work and child development and family processes. However, there was a lack of information on the child's temperament, parental marital satisfaction, levels of actual and perceived social support, and parents' job quality. These factors have been shown to influence child development (Brooks-Gunn *et al.*, 2010; Parcel and Menaghan, 1994; Strazdins, Shipley, Clements, Obrien and Broom, 2010). Strazdins and colleagues (2010) reveal that when parents hold poor-quality jobs their children show more emotional and behavioural difficulties, independent of income, parent education, family structure, and work hours. The job quality is defined as job control, flexibility, perceived security, and access to paid family-related leave (Strazdins, Broom and Shipley, 2007). Similarly, the hypothesis by Menaghan and Parcel (1995) about the carryover from the parents' type of work to the home environment suggests that job characteristics and job quality associated with certain types of nonstandard work may be an important confounder or moderator. It is critical that future research adequately examines the role these factors may play in mediating or moderating or confounding the relationship between nonstandard work and various domains of child development.

Further, whereas most of the reviewed studies adjusted for family structure and SES as confounders, relatively few examined how the relationship between nonstandard hours and child outcomes differ by such contextual factors. There are multiple, interacting levels of influence on child development, and when we fail to take into account interactions by analysing main effects only, we often only observe relatively small (although statistically significant) direct or sometimes null associations between parental nonstandard work and outcomes for children and their families. Analytically, it is important to design studies that allow for the better identification of relevant moderating effects in the population, such as those based on SES (Goldberg *et al.*, 2008; Repetti, 2005) and other characteristics of the family and the child. Families are complex and diverse with different capacities for adapting and responding to the pressures of work and the challenges of combining work and family when children are in the home. It is vitally important for future research and intervention to

identify and target subgroups of children at risk, particularly those who have low levels of multiple developmental resources (e.g., parental SES, parental time, psychological and physical health).

3.3.4 Extra-Familial Resources and Broader Social Context

Because school-aged children and adolescents are increasingly exposed to larger environmental influences than young children, it is likely that the pathways between parental work schedules and children's wellbeing are influenced by other factors than those examined to date (namely intra-familial factors). None of the reviewed studies examined indicators of broader influence outside the home, such as peer groups, the neighbourhood, school, child care settings, and community in either mitigating or magnifying the negative association of parental nonstandard work on child development. Others have noted the lack of attention to the role of community resources (such as the accessibility and cost of childcare facilities for young children, school, before- and after-school care for school age children, and public transportation) in the relationship between the number and distribution of parents' work hours and child health and wellbeing (Barnett, 2007). Such community resources may play a role in parents' decisions about the timing and duration of work but they may also moderate the relationship between nonstandard hours and children's developmental outcomes.

3.3.5 More Sophisticated Analytical Approaches

Causality and selection bias have always been a concern in social science research. Increasingly more studies use longitudinal datasets to handle the temporal issues in linking parental work schedules with children's wellbeing.

Longitudinal data, however, do not always enable researchers to conclusively answer the fundamental question of causality. In the absence of experimental data, some of the existing studies have used more sophisticated statistical approaches to address this issue. For example, Han (2008) used a child fixed-effects model to tackle the issue of unobserved heterogeneity. Other studies used propensity score matching (Han *et al.*, 2010; Grzywacz *et al.*, 2011) and switching regression models (Rapoport and Le Bourdais, 2011; Connelly and Kimmel, 2011) to address selection bias and causality. These statistical tools allow researchers to compare outcomes for children of parents who worked nonstandard schedules (the treatment groups) and the children of parents who did not work such schedules (the control group) but had a similar predicted propensity to do so. In this way, these two groups are comparable so we can minimize the possibility that the observed association between nonstandard work and child outcomes is attributable to selection bias (see discussion in Hill, 2008). With more longitudinal data and more sophisticated statistical techniques becoming available, it will be important for future studies to take up the challenge of tackling the issue of causality.

Finally, we are fully aware of the complexity of the ways in which parental market work affects children's health and development. In spite of the best efforts made by the scholars to capture such complexity, the existing research may still barely do justice to the challenges and difficulties confronted to working parents and their children. The use of mixed methods may better enable researchers to grasp the everyday experiences of today's families and how these experiences interact with parental labour market involvement to influence children's development. Only then will research and policy be able to do justice to the complex relationship between parental nonstandard work and children's health and development.

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Table 1 - Summary of existing studies on relationships between parental nonstandard work schedules and children's wellbeing

<i>Author</i>	<i>Sample^a</i>	<i>Age</i>	<i>Definition of nonstandard work</i>	<i>Child outcome^b</i>	<i>Type^c</i>	<i>Confounders and covariates (C)/ Moderators (Mo)/Mediators (Me)^d</i>	<i>Analysis^e</i>	<i>Main result^f</i>
Mental health and behavioural problems (including other outcomes)								
Barton et al. (1998)	UK: (n=190 children of employed fathers – manual/semi-skilled workers).	8-11 years	Father: Shift or day.	i) Self-perception profile for children (SPPC) ii) Children's Depression Inventory (CDI) <i>Child-reported.</i>	CS	(C) Age (Mo) Child gender	MAN OVA	- Interaction effect
Strazdins et al. (2004)	Canada: NLSCY 1996-97 (n=4433 DE families, 6361 children)	2-11 years	Mother/father/both nonstandard (any incl. weekends) vs. both standard	i) at least one emotional or behavioural difficulty (14%) <i>PCG-reported.</i>	CS	(C) = KEY, child care use (Mo) Child age (2-4/ 5-11), socioeconomic status (SES)	LOGR	- Interaction effects
Dunifon et al. (2005)	US: WES, LI women (n= 372) from cash assistance rolls in urban Michigan County, 1997	5-15 years	Mother mostly nonstandard i.e., evening (at 1 wave, at 2+ waves) vs. mostly standard	Behavioural problems (BPI) at wave 4: i) internalizing ii) externalizing iii) positive behaviour <i>Mother-reported.</i>	L	(C) = KEY, mother race & marital status; mother's self-rated health, mental health, learning disability, stress, domestic violence (Mo) Child age & gender, no of other adults in house	OLS	= (i,ii,iii)
Strazdins et al. (2006)	Canada: NLSCY 1996-1997 (n=4306 DE families, 6156 children)	2-11 years	Mother or father or both nonstandard (any incl. weekends) vs. both standard	i) social & emotional wellbeing derived from CBCL (M=0, SD=1). <i>PCG-reported.</i>	CS	(C) = KEY, child care use (Mo) Child age (2-4/5-11), SES (Me) Family functioning, parental depressive symptoms, hostile or ineffective parenting	OLS	- Interaction effects
Han (2006)	US: NSAF, children of working mothers (n=20,823 in 1997; n=21,730 in 1999)	6-17 years	Mother: Nonstandard (6am-6pm) vs. standard	i) behavioural problems (CBCL selected items). ii) extra-curricular activities iii) school engagement <i>MKA-(mostly mother) reported.</i>	CS	(C) = KEY, mother's race/ethnicity, no. of other adults, childcare type (Mo) Child age (6-11/12-17), marital status and work hours, family poverty and welfare status, parenting stress and mental health.	OLS	=/ (i,ii,iii) Interaction effects
Joshi & Bogen (2007)	US: 1999, 206 LI children from Welfare, Children & Families: A	2-4 years	Mother: Nonstandard (all types including weekend) vs. standard	Behavioural problems, CBCL (M=0, SD=1): i) internalizing ii) externalizing iii) positive behaviour.	CS	(C) = KEY, maternal race, other adults in house, city, birthweight or preterm; mother's depressive symptoms & social support. (Mo) Child gender, family	OLS	- (i,ii,iii) Interaction effects

Three City Study			<i>Mother-reported.</i>		composition. (Me) Parenting stress.			
Hsueh & Yoshikawa (2007)	US: LI from Milwaukee, Wisconsin New Hope Project 1994-1995 (n=486 parents/ 529 children with valid data)	5-16 years	PCG (mother): Nonstandard (at least 50% hours outside 8am-4pm, incl. weekend) vs. standard; fixed or variable schedule – at 2-year follow up	Behavioural problems @ 2-year (age 5-12) & 5-year (age 6-16) follow up based on BPI: i) internalizing ii) externalizing iii) school engagement iv) school performance. <i>Teacher and parent-reported.</i>	L	(C) = KEY, parental race, access to car (Me) Parental stress, perceived time pressure, regularity of family mealtime.	OLS	=/+ (i) =-/ (ii,iii,iv)
Han & Waldfogel (2007)	US: NLSY-CS, 8 waves 1988-2002 (n=12,207)	10-14 years	Mother & father: 6 category: Standard (8am-6pm), Evening (2pm-12), night (9pm-8am), rotating, irregular	Risk-taking behaviour: i) substance abuse (0/1) ii) delinquency (0/1) (disobedience, criminal behaviour, school trouble) <i>Child-reported.</i>	CS	(C) = KEY, marital status, birthweight, cognitive ability (Mo) Family type. (Me) Parental monitoring, child-parent closeness.	SEM	= (i) -/= (ii) Interaction effects
Han (2008)	US: NLSY-CS children born 1982-1991 of mothers who had ever worked (n=12,207)	4-10 years	Mother & father: Nonstandard (6pm – 6am) vs. standard (no. of years)	i) behavioural problems (BPI): Total score <i>Mother reported.</i>	L	(Mo) Years lived with couple or sole parent, average family income, mother's occupation – no. of years, work hours.	FEM	- Interaction effects
Dockery et al. (2009)	Australia: HILDA waves 1-4, 2001-2004 (unbalanced panel– 3429 observations/ 1691 youth/ 1197 households).	15-20 years	Mother & father: Nonstandard (all types including weekend) vs. standard	i) Mental health: SF36 mental component score (M=50, SD=10). <i>Child-reported</i>	CS	(C) = KEY except parental age; Aboriginality, English language, long-term disability. (Mo) Family structure, work hours (Me) Time with children, parental mental health.	OLS	- Interaction effects
Han & Miller (2009)	US: NSLY-CS Five cohorts of children born 1982-1991 (n=4,200).	13-14 years	Mother & father: Standard (6am-6pm), evening (2pm-midnight), night (9pm-8am), irregular. Measured as number of years.	i) Adolescent Depression Scale @ age 13-14 <i>Child-reported</i>	L	(C) = KEY, child race/ethnicity, birthweight, smoking or drinking in pregnancy (Me) Time with parents, parent-adolescent relationship, monitoring, HOME score, frequency of meals/TV	SEM	- Indirect
Daniel et	US: NICHD-	6-36	Mother:	Behavioural problems	L	(C) = KEY, mother's ethnicity,	OLS	-

al. (2009)	SECC (n=1364 children living in DE families). Children born in 1991.	mnths	Began nonstandard work (evening, night or variable) in 1 st year, after 1 st year vs. only standard	(CBCL) @ 24 & 36 months: i) internalizing T-score ii) externalizing T-score <i>Mother-reported.</i>		weeks of maternity leave, job flexibility, marital status, residential location (Mo) Child temperament. (Me) Maternal depression and sensitivity.		(i,ii) Interaction effects
Rosenbaum & Morett (2009)	US: ECLSBC (n=1,650). Children born in 2001.	9-24 mnths	Couple: a) At least one works nonstandard b) 6-cat variable - day (6am-6pm)/ evening (2pm-midnight)/night (9pm-8am)/ rotating/split/other	i) Behavioural problems (Infant Toddler Symptom Checklist) @ 24 months <i>Mother-reported.</i>	L	(C) = KEY, maternal race/ethnicity, foreign birth, preterm, birthweight, childcare type, job characteristics (Mo) Parent gender. (Me) Father-child interaction, marital quality, frequency of shared dinners, parental self-rated health, depression.	OLS	- Interaction effects
Han et al. (2010)	US: NLSY-CS Five cohorts of children born 1982-1991 (n=4200)	13-14 years	Mother and father: a) No. of years parent worked nonstandard hours (birth to age 11/12) b) No. of years worked evening (2pm-midnight), night (9pm-8am) or other nonstandard type	Risky Behaviours @ age 13-14 <i>Child reported.</i> i) ever smoked ii) ever drunk alcohol use iii) ever used illicit drugs use iv) no. of delinquent behaviours v) ever had sex	L	(C) = KEY, Child race/ ethnicity, marital status, birthweight, smoking & alcohol consumption during pregnancy (Me) <i>Child reported</i> – time together, maternal closeness, paternal closeness, parental knowledge, HOME score. (Mo) Child gender, developmental stage, income, maternal occupation, family structure.	SEM PSM	-/+/= Indirect Interaction effects
Gassman-Pines (2011)	US: Children of LI working mothers who attended preschool at four Head Start Centres (N=61 mothers, 724 person-days)	Pre school age	Mother: Based on daily diaries - night (6pm-6am) or weekend vs. daytime (8am-6pm), (number of hours of each)	Child behaviour i) externalizing (4 items from IOWA/Conners Scale ii) internalizing (5 items from Preschool Behaviour Questionnaire iii) positive behaviour (4 items from Positive Child Bids for Attention Scale) iv) mother child interactions – 5 subscales v) maternal mood	CS	(C) =KEY, race/ethnicity, marital status, teenage parent, living with grandparent; other daily level covariates e.g., whether child was sick that day, care for by father, or another family member	MLM	Night = (i,ii) - (iii) - (iv,v) Weekend = (all)

Cognitive Development and school outcomes (see also Han, 2006; Hsueh & Yoshikawa, 2007)

Han (2005)	US: NICHD - SECC (n=900 children whose mothers had worked in the first 3 years). Children born in 1991.	0-3 years	Mother: Nonstandard (combined evening 3pm-midnight/ night (11pm-7am)/ variable hours) vs. standard. Measured onset and duration	Cognitive abilities: i) Bayley Mental Development Index (MDI) @ 15 months ii) Bayley MDI @ 24 months iii) Bracken School Readiness @ 24 months iv) Reynell Verbal comprehension @ 24 months v) Reynell Expressive language @ 36 months <i>Mother- reported.</i>	L	(C) =KEY, Maternal race, marital status, maternal cognitive ability, depression at one month (Me) Amount of maternal employment, maternal depression, home environment, mother's sensitivity, childcare type and quality.	OLS	-/= (i) = (ii) +/- (iii) -/= (iv,v)	
Heymann (2000)	US: NLSY-CS 1990-1996 (n=4689 working parents).	School aged	Parents: Evening Night	i) mathematical ability ii) vocabulary iii) reading iv) repeating a year at school v) suspension from school	CS	(C) =Child gender, parental education, marital status, work hours, family income.	OLS	- (i,ii,iii, iv,v)	
Obesity									
Miller & Han (2008)	US: NLSY-CS Five cohorts of children born 1982-1991 (n=2,353 children of mothers who ever worked).	13-14 years	Mother: Nonstandard (evening 2pm-midnight/night 9pm-8am/split/ other) vs. standard (6am-6pm). No. of years.	Body Mass Index i) continuous ii) risk of overweight (cutoff > 85 th percentile) <i>Child-reported.</i>	L	(C) = KEY, child race/ ethnicity, marital status, LBW, frequency of TV watching, share dinners; mother's BMI (Mo) Family income, whether child had ever lived with a single mother.	OLS LOGR	- (i,ii) Interaction effects	
Morrissey, Dunifon & Kalil (2011)	US: NICHD SECC (n=990 children in 3 rd , 5 th and 6 th grades - complete data for at least 2 grades). Born in 1991.	8-12 years	Mother: Nonstandard (7pm-8am) vs. standard (Number of data points from 3 months to 2 nd grade – max 19)	Body Mass Index i) age and gender standardised BMI	L	(C) = KEY, child ethnicity, birthweight, marital status, child grade (Me) = TV time, physical activity, HOME environment, parental supervision and engagement, mother depression	REM FEM	=	
Family processes									
Heymann & Earle (2001)	US: NLSY-CS, 1990 (n=1,133 children in two-	5-10 years	Mother and father: Evening work (schedule includes	i) HOME environment (scale measuring parental involvement, responsiveness,	CS	(C) = KEY except child and parental age, child race (Mo) Parental gender, poverty	FEM	- Interaction	

	parent families).		7.30-9.30pm) vs. daytime work	enrichment opportunities and physical environment. <i>Parent and interviewer rated.</i>		status.		effects
Davis et al. (2006)	US: (n= 376 DE mostly white middle class families). Year not given.	10-14 years	Mother and father: Shift in primary job was nonstandard (evening 3-11pm/night 11pm-7am/rotating/routine travel/other) vs. standard (8am-6pm)	Parent-adolescent relationships i) parental involvement ii) relationship intimacy iii) relationship conflict iv) parental knowledge <i>Child-reported.</i>	CS	(C) Child gender and age, Parental education. (Mo) Marital conflict, child gender, parent gender	MLM	= (i) +/- (ii) -/+ (iii) + (iv) Interaction effects
Barnett & Gareis (2007)	US: 2002-2004 (n=55 DE families with children in which mother was a registered nurse).	8-14 years	Mother: Regular evening shift vs. regular day shift	i) parental time with children. ii) parental knowledge. iii) parenting skills. iv) child behaviour v) child risk taking <i>Parent & child-reported.</i>	CS	(C) Child gender and age (Me) Parental time, knowledge and skills	ANOVA	+ (i,ii,iii) = (iv,v)
Wight et al. (2008)	US: TUS 2002-2004 (n= 2027 mothers/ 2054 fathers, employed aged 18-64 years).	With child <18 years	Mother & father. Day (8am-4pm), evening (4pm-midnight) or night (midnight-8am) – at least half of time on diary day	Parental time with children i) any time ii) time alone iii) primary care iv) routine care v) engaged care vi) home 3-6pm <i>Parent- reported.</i>	CS	(C) = KEY except child gender & family structure; marital status, summertime, number of activities.	OLS LOGR	+/ (i,ii) = (iii,v) -/+/ (iv) -/+ (v)
Rapoport & Le Bourdais (2008)	Canada: TUS (mothers and fathers with children <18 in household, 2- and 1-parent families, n=2,728 in 1992 & n= 2,826 in 1998)	With child <18 years	Mother and father. Number of minutes worked day (6am-6pm) evening (6pm-10pm), & night (10pm-6am)	Parental time with children i) Total ii) Domestic work iii) Direct childcare iv) Social activities v) Meals at home vi) Leisure <i>Parent- reported.</i>	CS	(C) = parental age, education level, number and age of children, born in Canada, region, interviewed on Saturday/Sunday, partner's work schedule and time with children, sometimes worked from home, has flexible schedule, usually works rotating shift, occupation.	FILML ESM	- (evenings compared to days or nights, especially iv and vi)
<i>Note. Variables used in switching part of regression differed.</i>								
Connelly & Kimmel	US: TUS 2003-2006 (n=2171	With child	Mother & Father: Nonstandard	Primary childcare activity including travel and time	CS	(C) = parent education, age, marital status, race/ethnicity,	FILML ESM	= (i)

(2011)	mothers/ 2045 fathers, employed aged 18-64 years).	<13 years	(50% or more paid work hours outside 8am and 4pm in week days) v standard	organising childcare: i) Bivariate (BV) association: mothers ii) BV association: fathers iii) multivariate(MV)/ interactions: mothers iv) MV/interaction: fathers		location, number of children by age, presence of other adult, wage, spousal wage if married, work hours, predicted cost of childcare		+ (ii) + (iii) + (iv)	
Grzywacz et al. (2011)	US: NICHD-SECC Phase 1, 1991-1994 (n=968 mothers and children with complete data)	6-36 mnths	Mother: Schedule at year 1: nonstandard FT or PT, standard FT or PT, not working (comparison = NSFT v other categories)	i) maternal sensitivity @ 15,24 and 36 months – ii) HOME score @ 15 and 36 months. Independent observation	L	Selection variables: -Social selection (e.g. maternal age, pre-birth occupation, self-reported reason for working) -Self-selection (e.g. mother's happiness at birth of child, parenting beliefs)	PSM OLS	- (i) 24 & 36 months = (ii)	
Child sleep patterns									
Radosevic -Vidacek & Koscec (2004)	Croatia: (n=2,363 students with 2 parents employed 2001-02)	11-18 years	Couple: Both day, one nonstandard, both nonstandard	Sleep patterns: i) usual bedtime ii) usual waketime iii) sleep duration	CS	(C) & (Mo) Child gender and type of school (elementary or high).	MANOV A	-/= (i,ii,iii) Interaction effects	

Note. ^aUK=United Kingdom; US=United States; LI=low income; DE=dual earner; NSAF=National Survey of American Families; NLSCY=National Longitudinal Study of Children and Youth; WES=Women's Employment Study; NLSY-CS=National Longitudinal Study of Youth – Child Supplement; HILDA=Household, Income and Labour Dynamics of Australia; NICHD-SECC=National Institute of Child Health and Human Development Study of Early Child Care; ECLSBC=Early Childhood Longitudinal Survey Birth Cohort; TUS= Time Use Survey

^bBPI=Behavioural Problems Index; CBCL=Child Behaviour Checklist; SF36=Short Form 36; M=mean; SD=standard deviation; MKA=Most Knowledgeable Adult; PCG=Primary Caregiver; HOME = Home Observation Measurement of the Environment

^cL=longitudinal; CS=cross-sectional.

^dKEY = key sociodemographic confounders included in the analysis i.e., child gender, child age (or developmental stage), number of children in household (or presence of siblings/birth order), family structure (couple/lone, presence of a non-biological parent), parental age (at least of mother), parental work hours (at least of mother, and at least FT/PT status), and at least one indicator of socioeconomic status such as parental education, occupation, and family income.

^eMANOVA=multivariate analysis of variance; OLS=ordinary least squares regression; LOGR=logistic regression; FEM=fixed effects model; REM=random effects model; SEM=structural equation modelling; PSM=propensity score matching; MLM=multilevel modelling; FILML= Full Information Maximum Likelihood; ESM=endogenous switching model

^fMain result: nonstandard work has a detrimental (-), beneficial (+) or neutral (=) statistically significant association with child developmental outcomes in the most completely adjusted models. Results match those against outcomes numbered in the Outcomes column. This summary column excludes large effect sizes that do not reach statistical significance, possibly due to lack of statistical power.