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An emerging body of research on the effects of maternal nonstandard work suggests that young children's cognitive development may be negatively impacted. Additionally, evidence suggests that there may be varying patterns of child care utilization among mothers who work nonstandard schedules compared to those working standard schedules. Yet, to date, very little research has specifically examined the extent to which early learning environments help explain any associations between nonstandard work and child outcomes. To address this gap, the current study seeks to examine the relationship between maternal nonstandard work schedules and a salient aspect of the broader domain of academic readiness – preschool-aged children's early academic skills, as well as the potential mediating role of early learning environments (as experienced by children in child care and at home). Using nationally representative data from the Early Childhood Longitudinal Study – Birth Cohort (ECLS-B), a series of structural equation models were utilized to investigate the study aims.

Results showed that early care and education learning environments and home learning environments partially mediated the relationship between maternal nonstandard work schedules and children's early academic skills. That is, children of mothers working nonstandard hours scored lower on assessments of academic skills than children of mothers working standard hours, and this appears to be partially explained by their reduced access to child care and home environments that emphasize early learning. The results from this study indicate the importance of measuring contextual influences in

order to fully understand how maternal nonstandard work schedules are linked to children's early academic skills.

ASSESSING THE LINKS AMONG MATERNAL NONSTANDARD WORK SCHEDULES, EARLY LEARNING ENVIRONMENTS, AND CHILDREN'S EARLY ACADEMIC SKILLS

by

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To my family and friends for your unending support.

Many, many thanks.

APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

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CHAPTER I

INTRODUCTION

It is well established in the field of developmental science that the proximal and distal environments children experience at a young age have lasting effects on their later development. In contemporary U.S. society, child care -- defined as the provision of care and/or education services by nonparental caregivers in a range of settings -- serves as a focal environment for children aged birth to five (Rigby et al., 2007). In contrast to prior decades, a majority of children today spend substantial amounts of time in early care and education settings before school entry, often beginning in infancy. In 2002, approximately 10 million children under the age of five were in child care for an average of 32 hours per week. These trends have been largely shaped by the changing economic landscape, particularly for women. For example, in 1975, approximately 20 percent of mothers with children under the age of 6 held a paid job (Center for Economic and Policy Research, 2004). Three decades later, this number had more than tripled, to a rate of 64 % (U.S. Department of Health and Human Services, 2011). While young children with employed mothers spend roughly twice as much time in child care as those whose mothers are not employed, it is notable that children in the latter group still spend an average of 18 hours per week in a care setting (U.S. Census Bureau, 2008). These findings emphasize the important role that child care plays in the daily lives of many American families. Questions about the long-term effects of child care on children's later

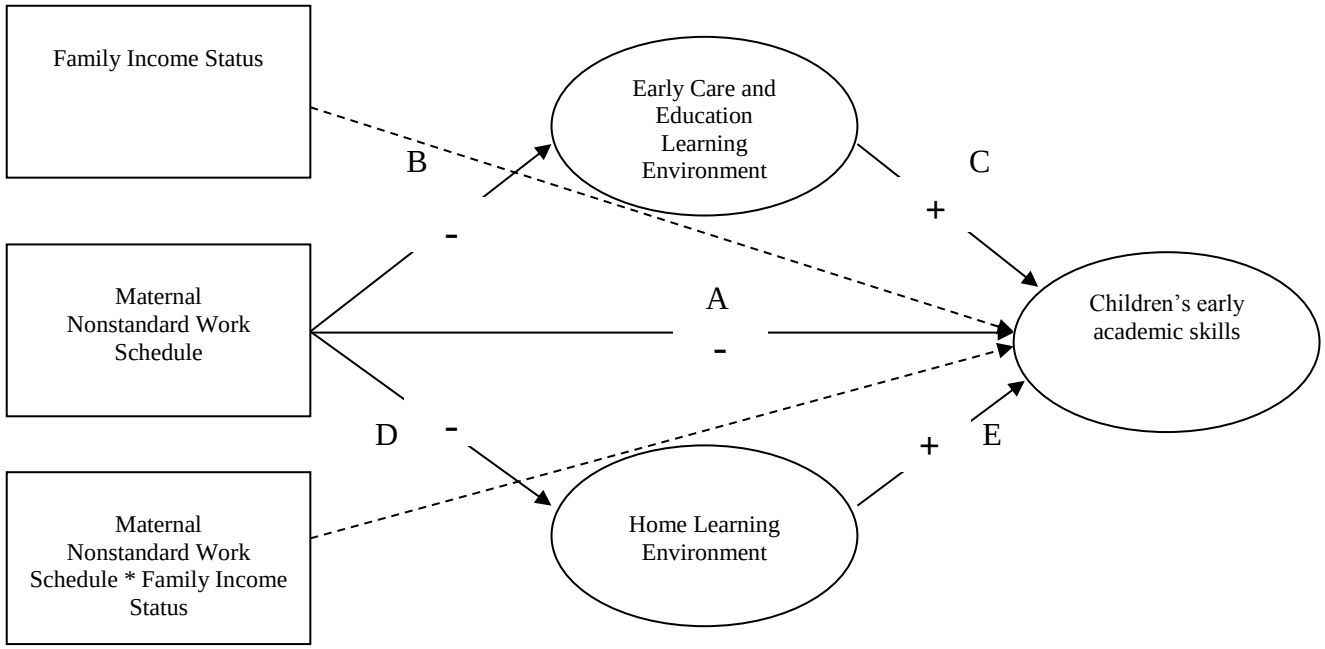
academic and social outcomes are of great interest to researchers, practitioners, and policymakers and have been the focus of considerable research in recent decades. Initial research on child care was driven by the increase in women's paid labor force participation. The original line of inquiry was whether time away from mothers would be harmful to children. Given no evidence that child care per se is positive or negative for children's development, more recent lines of inquiry have focused on the type and quality of care that children experience, and the extent to which different arrangements meet the needs of children and their families. One central focus of this literature has been parental employment (particularly maternal employment) and its role in shaping the child care decision of families with young children.

In recent years, societal-level changes in the timing and scheduling of work have created new demands for families, raising questions about the implications of nonstandard work schedules for children and family life. A small, emerging body of research on maternal nonstandard work suggests that there may be varying patterns of child care utilization among mothers who work nonstandard schedules compared to those working standard schedules, with higher incidences of parental care (e.g., maternal or paternal care) among two-parent families and relative care among single-parent families among those working nonstandard schedules. These decisions are often a complex negotiation of preferences, resources, and constraints. Indeed, studies have revealed that some parents choose to work nonstandard hours to acquire the best care arrangements for their children, but the majority find themselves working nonstandard schedules because their jobs require it (Presser & Cox, 1997). In addition, several studies indicate that the

timing and extent of maternal nonstandard work schedules is linked to lower levels of young children's cognitive well-being (Han, 2005). Yet, to date, very little research has specifically examined the extent to which early care and education experiences help explain any associations between nonstandard work and child outcomes.

The present study seeks to address existing gaps in the literature by providing a holistic examination of the relationships among these variables. Its specific purpose is to examine the linkages between maternal nonstandard work schedules, the learning environments preschool-children experience in child care settings and at home, and children's early academic skills at age four. As depicted in Figure 1, the study includes four aims: (a) to examine the relationship between maternal nonstandard work schedules and children's early academic skills, (b) to examine the extent to which early care and education learning environments serve as a mediator between maternal nonstandard work schedules and children's early academic skills, (c) to examine the extent to which home learning environments serve as a mediator between maternal nonstandard work schedules and children's early academic skills, and (d) to examine the extent to which family income status moderates the relationship between maternal nonstandard work schedules and children's early academic skills. Using nationally representative data from the Early Childhood Longitudinal Study – Birth Cohort (ECLS-B), a series of structural equation models were utilized to investigate the study aims.

Figure 1. Conceptual model depicting the hypothesized associations among maternal nonstandard work schedules, early care and education learning environments, home learning environments, and children's early academic skills: Family income status as a potential moderator.



CHAPTER II

THEORETICAL PERSPECTIVE

The current study on maternal nonstandard work schedules, early learning environments, and children's early academic skills is grounded in the family stress model. This perspective seeks to understand how the amount and type of stress experienced by the family system, as mediated by family resources and processes, shape their coping patterns and perceptions, as well as the ease of adaptation to both normative changes and nonnormative events (McCubbin & Patterson, 1983).There are several extensions of the family stress model that propose various mediating pathways through which family processes effect family adaptability. The current study builds on the original model and its recent extensions to focus on the challenges mothers face in balancing nonstandard work hours and the learning environments of young children.

The guiding framework for family stress theory is the Double ABCX model of family stress and adaptation. This model builds on Hill's (1949) model of family stress and crisis. Hill (1949) initially proposed the ABCX model consisting of precrisis variables, such that stressors (a), existing resources (b), and perception of stressors (c) each precede the onset of a 'crisis' (x). The Double ABCX model reconceptualizes the precrisis variables and adds postcrisis variables, such that a crisis producing event results

in a pile-up of demands and intervening factors that shape the course of adaptation (e.g. resources, coherence, and meaning).

According to the family stress perspective, the amount of stress that families face and its impact on family functioning is determined by the resources available. The stress associated with working a nonstandard schedule may be positive or negative for mothers of young children. Many parents prefer to share the care of their children between them, and working a nonstandard schedule may facilitate such a preference (Riley & Glass, 2002). Not all parents, however, may want or are able to share child care between them; especially single mothers. In fact, roughly two thirds of parents work nonstandard schedules out of necessity, rather than choice and would rather not work these times (Joshi & Bogen, 2007; Presser & Cox, 1997). Therefore, most mothers who work nonstandard schedules are charged with the complex task of arranging child care during times when care is often unavailable and/or unfavorable (Henly & Lambert, 2005; Presser, 1986). Many jobs that require nonstandard schedules generally pay low-wages and are low in complexity, which may add to the financial stress of mothers occupying such schedules. Whereas dual-earner couples and families with higher income levels are better equipped with resources and strategies to adequately adapt to pile-up, the stress associated with working a nonstandard schedule may be more severe among single parent and low-income families (Joshi & Bogen, 2007).

Family stress theory serves as a useful framework for the present study. In the sections below, four components of the Double ABCX model, pile-up, adaptive resources, perception and coherence, and adaptation, are explored and provide a

foundation to understand the potential influences on nonstandard work on family processes and child outcomes.

Pile-up (aA)

The first concept is pile-up, represented by the aA factor in the Double ABCX model. Pile-up refers to the accumulation of added stressors and strains occurring before or after the crisis-producing event (McCubbin & Patterson, 1983). The theory proposes that adverse economic conditions, in the form of low family income and negative financial occurrences, determine the degree of economic pressure experienced by the family. Low income represents a relatively stable or chronic domain of family hardship (Conger, 2000; Corcoran & Adams, 1997). In the current study, special attention is given to income status of families to account for the stress associated with economic disadvantage (i.e. acute financial stress) (Elder & Caspi, 1988). Because nonstandard schedules are often associated with lower wages, mothers occupying such schedules may have an especially difficult time securing optimal child care. McCubbin and Patterson (1983) contend that stress is not viewed as a short-term, distinct stimulus. Instead, it is a process of changing conditions that has a history and a future.

Adaptive Resources (bB)

The second concept is family adaptive resources, represented as the bB factor in the Double ABCX model. Family adaptive resources can be defined as the means that assist a family in preventing an event or transition from creating a crisis or disruption (Lavee et al., 1985; McCubbin & Patterson, 1983). Resources act as an intercept to the onset of crises (i.e. mediate pile-up and adaptation) (Lavee et al., 1985). For example,

“resources can either reduce the impact demands on the family and/or help the family adapt to the necessary change” (pg. 812, Lavee et al., 1985). One primary resource that has been identified in family stress theory is family adaptability (McCubbin & Patterson, 1983). Family adaptability is achieved when demands of one of three units – the individual family member, the family unit, and the community that the family unit is a part of – is met by the capabilities of another to ensure a simultaneous balance at two levels of interaction (McCubbin & Patterson, 1983). Other examples of family resources include personal resources (e.g. individual characteristics of family members), family system resources (e.g. traits of the family unit such as communication), and social support (e.g. reliable network that family draws from) (Lavee et al., 1985).

Child care is a fundamental demand of working mothers. Child care that is available, stable and satisfactory serves as an adaptive resource for families, especially for families where one or both parents work a nonstandard schedule (Han, 2005). In the current study, aspects of the home environment will also be included to account for resources that may promote children’s early academic skills. Examples of resources include books in the home and parent report of storytelling and engaging in play. These resources, in isolation or collectively, may serve as buffers to the negative effects of maternal nonstandard work hours. For example, resources in the home may compensate for less favorable child care that may be employed by mothers who work nonstandard hours. Similarly, more favorable early care and education settings may compensate for lack of resources at home which, in turn, may protect children’s early academic skills.

Perception and Coherence (cC)

The third concept of the family stress model is perception and coherence, represented by the cC factor in the Double ABCX model (Lavee et al., 1985; McCubbin & Patterson, 1983). Perception and coherence are often referred to as 'the definition' because they capture the meaning a family unit assigns to the seriousness of an experienced stressor (McCubbin & Patterson, 1983). Perception reflects the family unit's acceptance of a situation (i.e. crisis). Coherence is largely influenced by distal processes, such as the cumulative effect of experiences with the external environment. One example would be the hardships associated with living in poverty and working nonstandard hours. Proximal processes also influence coherence chiefly by the family's internal environment. An example would be a family that draws on its strengths in the midst of a crisis. It is important to note that the family's perception and coherence of a stressor is subjective (McCubbin & Patterson, 1983), which can have implications for the final component of the Double ABCX model – family adaptation. Because of this factor's subjective nature, it will be difficult to capture in the present study. However, perception and coherence will be implicit throughout the model and further evidenced by children's early academic skills. Essentially, coherence acts as a resource and another vehicle toward adaptability among the family unit.

Family Adaptation (xX)

Family adaptation, represented as the xX factor, refers to the outcome of the way a family responds to a crisis and pileup (Lavee et al., 1985). This last factor is a continuous variable, with maladaptation at the negative end and bonadaptation at the positive end of the continuum (Lavee et al., 1985). Examples of maladaptation include decline in family morale as well as of overall family well-being (Lavee et al., 1985). By contrast, bonadaptation would be the strengthening or preservation of the above family traits. Family adaptation is the central concept of the Double ABCX model and is chiefly influenced by the other components of the model (McCubbin & Patterson, 1983).

In the current study, children's early academic skills are used to measure levels of adaptation. There is growing evidence that the negative impact of economic disadvantage on children derives from economic influences on their parents and other caregivers (Conger et al., 2002; McLoyd, 1998).

In sum, family stress theory attempts to explain why families differ in their conceptualization of and responses to family transitions and the coping strategies used in navigating transitions (McCubbin & Patterson, 1983). The amount of resources a family has influences its adaptation to the stressors and strains. This can be a positive or negative relationship. The family stress perspective provides an extensive framework for understanding how families use resources and perceptions to navigate from pile-up to levels of adaptation. This framework highlights important potential mediating mechanisms linking maternal nonstandard work schedules and children's early academic skills.

CHAPTER III

REVIEW OF LITERATURE

The current review summarizes three relevant empirical literatures. First, recent studies of the relationship between nonstandard schedules and children's development are discussed. Second, it describes research linking early care and education environments to school readiness, highlighting the importance of particular types of settings for children's early academic skills. This section further offers evidence that features of child care settings, such as cognitively stimulating care, matter for young children. Third, it explores the ways in which maternal nonstandard schedules may influence children's access to early learning experiences in child care and at home. Last, the variations of these associations by low-income status are discussed.

Linking Nonstandard Schedules to Child Outcomes

As mentioned above, interest in the implications of maternal employment for young children originated with a concern about the negative developmental effects of time spent away from the mother as the primary caregiver and attachment figure. It is nearly impossible for mothers to engage in the labor force while simultaneously providing continuous care for young children, meaning that alternate arrangements with nonmaternal (often nonparental) caregivers must be made. When early studies of the overall effects of maternal employment and nonmaternal caregiving found few clear impacts (either positive or negative) on child development, research attention turned to a

more detailed exploration of the characteristics of mothers' employment and children's care environments. For example, previous studies examined the timing at which mothers return to the work force (Baydar & Brooks-Gunn, 1991; Han, Waldfogel, & Brooks-Gunn, 2001) and the intensity of their work efforts (e.g., part-time versus full-time employment) (Brooks-Gunn, Han, & Waldfogel, 2002; Hill, Waldfogel, Brooks-Gunn, Han, 2005). Several studies have found positive associations between maternal employment and children's cognitive development, with the caveat that intensive maternal employment in the first year of life may be associated with more negative child outcomes (Baydar & Brooks-Gunn, 1991; Han, Waldfogel, & Brooks-Gunn, 2001). Only recently have researchers begun to focus on timing and regularity of parents' work schedules and their possible effects on child well-being. Part of this interest has stemmed from significant changes in the U.S. labor market in recent decades.

The U.S. continues to transition to a service economy, which Presser terms the "24/7 economy." Accompanying the 24/7 economy is a great demand for service sector jobs, which are likely to demand nonstandard work hours. Approximately one fifth of workers in the U.S. occupy a nonstandard schedule, which is defined as instances in which at least half of a worker's hours fall outside of the 8am to 4pm range (McMenamin, 2007; Presser, 2003). Socially and economically disadvantaged segments of the population are most likely to work nonstandard schedules. For example, single parents, mothers with low levels of education, and minorities are disproportionately overrepresented in low-wage occupational sectors (Presser, 2003; Presser & Cox, 1997). More importantly, decisions around child care for this group are complex because care is

difficult to secure during nonstandard hours. Therefore, understanding the child care decisions of mothers who work nonstandard hours and how those decisions effect children's later development is vital.

Child Outcomes

The early works of Presser (1988) highlights the timing of employment as an essential feature of the workplace that has important implications for families. Since then, there has been a wealth of research on the timing of paid employment and its effects on family life. The dimension of parental work time that has garnered the most attention is how much time mothers devote to paid employment. Researchers are just beginning to examine the effects of nonstandard schedules on children's development. The findings are mixed and vary on a host of elements including child age, child gender, family income, and the focal outcome (i.e. cognitive, behavioral, or social/emotional development) (Han, 2005; Joshi & Bogen, 2007; Strazdins et al., 2006). Han (2005) revealed significant negative associations between maternal nonstandard work schedules and young children's cognitive development. Drawing from a large-scale longitudinal study, the sample consisted of children aged birth to 3 from higher income families. Joshi and Bogen (2007) found that maternal nonstandard schedules were associated with negative behavioral outcomes for young children aged 2 to 4 years old belonging to low-income families. Additionally, their findings revealed moderating influences of gender such that the negative effects of nonstandard schedules on externalizing behavior were higher for girls than for boys. Parents' evening shifts were associated with the lowest quartile of math scores in an examination of school-aged children from the National

Longitudinal Survey of Youth (Heymann, 2000). Phillips (2002), however, did not find an association between working the night shift and positive behavior or school engagement for children aged 6 years and older in low-income families. Similarly, Dunifon and colleagues (2005) found that nonstandard schedules did not affect changes in behavior among school-aged children. These incongruent findings suggest a more complex relationship between maternal nonstandard work schedules and child outcomes.

There are several possible mediating mechanisms linking mothers' nonstandard work schedules to children's development. For example, one potential pathway through which nonstandard schedules may lead to negative outcomes for children is through strained family functioning. Work in the evening, nights, and variable shifts can make it more difficult to maintain family routines and parent-child interactions that are important for children's development (Strazdins et al., 2006). Although nonstandard work schedules offer flexibility for many mothers, it is often accompanied by stress and disrupted family functioning (Perry-Jenkins et al., 2007; Joshi & Bogen, 2007). Nonstandard schedules are linked to irregular sleep patterns and lack of energy, particularly among night and rotating shift workers (Grosswald, 2003; Presser, 2003). These irregularities can lead to more irritable parent-child interactions and poor maternal mental health, which are both linked to less favorable child outcomes (Deater-Deckard, 2005). Moreover, parents report difficulties scheduling family activities (Presser, 2003). In a qualitative study, one mother described how family outings and gatherings were strained due to a nonstandard work schedule (La Valle et al., 2002). Instability in family routines has been linked to negative child outcomes such lower levels of school

achievement (Yoshikawa et al., 2003). These mediating mechanisms are important, not only to children's early academic skills, but to the overall well-being of families with mothers who work nonstandard schedules. The family stress perspective conceptualizes such mediating mechanisms as potential adaptive resources that may aid in the ability to manage the pile-up associated with working a nonstandard schedule. An important adaptive resource to consider in relation to children's early academic skills is the type of learning environments they experience. Specifically, the types of learning materials and activities available to children in care settings and at home are important resources that may protect children from the potential negative effects of maternal nonstandard work schedules. Central to the current study, the literature relevant to early care and education and home learning environments will be reviewed in more detail below.

Early Learning Environments as Predictors of Early School Success

Researchers have long sought to understand the factors that best predict the cognitive, social, emotional, and physical development of young children. In recent years, these aspects of development have been increasingly linked to the concept of school readiness. Broadly defined, school readiness refers to the salient dimensions of development that prepare young children for entry into school and later school success. Research has recently extended the concept of school readiness to encompass the contexts in which children live and the people with whom they interact (parents, siblings, caregivers, etc.). Early learning environments play a vital role in children's development, as a large number of children spend time in nonmaternal care (Capizano & Adams, 2000). Therefore, efforts to examine the contribution of early learning environments to

child outcomes derive from a general interest in environmental influences on development (Bronfenbrenner & Morris, 1998).

Driven by an increase of women entering the workforce, nonparental care of young children has become the norm in recent decades. Initially, this shift provoked controversy among researchers about the benefits and risks associated with nonparental child care. Early research focused on the timing and quantity of early care, suggesting that early onset and extensive care might yield adverse consequences for children's development. For example, Belsky (1986) warned that entry into child care during the first year of life could lead to attachment and withdrawal issues during preschool years. Other studies supported these early findings, suggesting that longer hours in care yield unfavorable outcomes (Vandell & Corasaniti, 1990). By contrast, other studies suggested that nonparental care per se did not negatively influence children's development (Thornburg et al., 1990). Instead, researchers argued that children in nonparental care exhibit the same social behaviors as children reared at home (Thornburg et al., 1990). To tease apart these mixed findings, more refined studies followed, which explored the type and characteristics of children's early learning environments.

Accumulating evidence suggests that cognitively stimulating early learning environments are vital for children's early academic skills and children in center-based early learning environments during the preschool years exhibit higher levels of cognitive functioning compared to children cared for at home (Brooks-Gunn et al., 2003; Burchinal, 1999; NICHD, 2002). When other types of early learning environments are explored (e.g. home-based care), children do not show the same increases in cognitive

development (NICHD, 2000). These differences in center- and home-based care are largely due to features of the environment. For example, researchers have identified several important elements of early learning environments as fundamental predictors of children's academic skills. Examples include language experiences, where children are provided with beneficial models of communication and provided ample reading and math activities (NICHD ECCRN, 2000). Other features of early learning environments, such as caregiver education and preparation, are also linked to children's early academic skills. Findings from several studies have shown that children attending early learning programs in which caregivers had more education and training performed better on a range of cognitive measures (Burchinal, 1999; NICHD, 2002). Learning environments rich in cognitively stimulating materials and activities and experienced caregivers are the primary mechanisms through which young children acquire emergent reading and math skills and become ready for school (Duncan et al., 2007).

Nonstandard Schedules and Early Learning Environments

Researchers are increasingly investigating the determinants of early learning environments of children whose parents are employed, namely children of working mothers (Chaudry, 2004). Mothers are charged with the task of selecting favorable early care and education learning environments while also managing home environments and other family demands. Understanding the role that these considerations play is vital, given the importance of the early learning environments on children's later development.

Much of the practical decision making around child care arrangements is guided by competing demands. Employment is a leading demand of mothers with young

children, as two thirds of working mothers have children in some form of nonparental care (U.S. Department of Labor, Bureau of Labor Statistics, 2009). Consequently, young children's early learning environments are largely influenced by parents' work schedules. A large majority of young children spend at least a portion of their time in nonparental care and are cared for in a variety of nonparental early care environments (Cappizano & Adams, 2000). These early learning environments range from informal care by kith and kin to formal care in center- and family-based settings, with center-based care becoming the predominant early learning environment by the time children are 3 years old or older (U.S. Department of Commerce, 1997). Understanding the determinants of the early learning environments of children whose mothers occupy nonstandard schedules is important because prior research has linked certain features of care to children's later cognitive development (e.g., NICHD ECCRN, 2002). Additionally, research suggests that the care arrangements of children whose mothers work nonstandard schedules may differ from those of children whose mothers work standard schedules. For example, results suggest higher use of informal care arrangements among parents who work nonstandard schedules, with a much higher occurrence of father care among married mothers and grandmother care among unmarried mothers (Folk & Yi, 1994; Han, 2004; Presser, 1986; Presser, 1988). Early work by Presser (1986, 1988) revealed that less than 15% of children with employed mothers were cared for by fathers; however this figure was 40% for children whose mothers worked nonstandard schedules. Presser's (1988) early work also revealed that nearly all fathers who were available to do so provided care for their young children when their wives worked a nonstandard schedule.

Parents working nonstandard schedules may need to rely on a variety of care arrangements beyond conventional center- or home-based settings, as the hours of center care may not align with nonstandard schedules. Several studies support these notions suggesting that mothers who work nonstandard schedules have difficulty arranging child care because formal child care is less available during these hours. Therefore, mothers often rely on informal care arrangements or patchworks of care (i.e. multiple care arrangements from friends, relatives or neighbors) which often equates to less reliable care (Henly & Lyons, 2000; Scott, London, & Hurst, 2005). By contrast, Morrissey (2008) found multiple care arrangements to be unrelated to nonstandard schedules of mothers. To address these conflicting findings, researchers must further question the causal direction of these associations. Parents may choose nonstandard schedules to accommodate their preference for using parental or relative care. Alternatively, nonstandard schedules may be employed because parents are unable to secure adequate or affordable care during standard hours (i.e. 8a.m. – 5p.m.). Given that nonstandard schedules are associated with lower wages, the latter arrangement is plausible.

Contextual Influences

The positive and negative effects of nonstandard work on children's development are largely driven by contextual influences. Young children spend most of their time split between some type of care arrangement (i.e. center-based care for preschool-aged children and public or private school for school-aged children) and home. In considering the effects of maternal nonstandard work schedules on children's development, it is important to emphasize the role that these settings play in explaining this link. A

considerable amount of research has explored how maternal employment, through early care and education settings and aspects of the home environment, indirectly affects children's early academic skills (Parcel & Menaghan, 1990). As illustrated above, an equally established literature has identified important features of the home environment, such as family structure, economic resources, and parental characteristics, as vital predictors of children's cognitive development. However, little attention has been paid to the impact of nonstandard schedules on the home *learning* environment – a vital feature of the home environment that is linked to children's early academic skills.

Home learning environment. Accumulating evidence suggests that there are key elements of the home environment that can profoundly shape children's cognitive development. Mothers' sensitivity and stimulation in the first years of life predict children's receptive language (Hann, Osofsky, & Culp, 1996), phonological awareness (Silven, Niemi, & Voeten, 2002), productive language (Hart & Risley, 1995), and story comprehension (Beals & DeTemple, 1993). Moreover, young children benefit from exposure to adult communication that is responsive, recurrent, varied and complex (Hart & Risley, 1995; Tamis-LeMonda et al., 2004; Weizman & Snow, 2001). The availability of learning materials in the home, such as the number of picture books, supports children's language and literacy skills (Payne et al., 1994), and familiarity with books relates to preschoolers' subsequent vocabulary and early reading abilities. Furthermore, early exposure to toys that promote counting (e.g., blocks) relates to children's early math ability. Early work by Parcel and Menaghan (1990) revealed that the home environment partially mediated the link between working conditions and children's verbal facility.

Similarly, Lleras (2008) found home environments of preschool-aged children to be poorer among single mothers who occupied nonstandard schedules (rotating shifts excluded). These findings present important evidence that the type of work schedule (i.e. shift and working conditions) employed by mothers has implications for the home environment. Although not always tested directly, the home learning environment is influenced by these conditions. As emphasized previously, the deleterious effects of working a nonstandard schedule (e.g. depression, irregular sleep patterns, and stress) is one way in which the home learning environment may be impacted. For example, researchers argue that the learning environments of the home are influenced through the quality of parent-child interactions, which are predictive of children's cognitive development in a number of ways. Parents working nonstandard schedules report fewer occasions of mealtime with children, for reading together, engaging in play, and for assisting with schoolwork (Fagan, 2001; Heymann & Earle, 2001). The inability to uphold a beneficial home learning environment may be due to lack of energy, economic resources, or interrupted daily routines – each are factors associated with working a nonstandard schedule.

Nonstandard Work and Early Learning Environments in the Context of Low-Income Status

Low-income families may be especially susceptible to the deleterious effects of maternal nonstandard work hours because they are likely to have fewer resources to help manage the demands specific to nonstandard shifts. Additionally, they may lack predictability and control over their schedules compared to more advantaged employees.

Low-income mothers most often view their nonstandard work schedules as a job requirement rather than a choice. When surveyed, close to 50% of this group listed nature of the job, fixed schedule by employer, and/or inability to secure another job as reasons for employing a nonstandard work schedule (Presser, 2003).

The combination of working a nonstandard schedule and receiving lower wages may be particularly problematic for dimensions of parenting and parental mental health (Mistry et al., 2002). The conditions of constrained economic resources among low-income families make it especially difficult to meet the demands of parenting roles. If mothers work nonstandard schedules as a provision of employment rather than a choice, they are likely to exhibit lower levels of job satisfaction, lower moods, and increasing parenting stress. Each of these outcomes of working nonstandard schedules can have serious implications for young children's development (Gassman-Pines, 2011; Strazdins et al., 2006). The pile-up and stress associated with nonstandard schedules may be especially severe for single mothers, as they may lack the necessary resources (i.e. financial and social) to juggle the demands of work and family (Edin & Lein, 1997). The stress and negative feelings associated working a nonstandard schedule may hinder positive parent-child interactions, as evidenced by insufficient sleep and lack of energy.

It is also important to note that nonstandard work schedules do not always have a universal negative impact on family processes. Some evidence points to potential benefits of nonstandard work for middle-income families. For example, in a study by Barnett and Gareis (2007) of 55 dual-earner families, 8-14 year old children of mothers working an evening shift as nurses rated their fathers as having greater awareness of their activities,

better parenting skills and more incidences of communication between father and child. In 376 dual-earner middle-class families, Davis, Crouter, and McHale (2006) also found higher levels of adolescent-reported closeness with mothers when their mothers worked nonstandard hours, compared to when they worked standard hours. These research findings suggest that the effect of nonstandard work schedules on children's development may differ by family socioeconomic characteristics. Additionally, the developmental periods (i.e. middle childhood and adolescence) of the above studies should be noted. Older children may be may be more autonomous and, therefore, lack the supervision needed by children of earlier developmental periods (i.e. early childhood); further highlighting the importance of understanding the potential effects of maternal nonstandard work on younger children's development.

To the extent that early learning environments matter for children's early academic skills, several studies have aimed to understand for whom it matters and under what circumstances it matters most. As a first step to exploring this relationship, many researchers have considered socioeconomic factors. Examining the socioeconomic factors that moderate the relationship between early learning environments and child outcomes is paramount, given that income is associated with the type of care that mothers secure for their children. Furthermore, children from low income families are often at risk for delays in language development, school readiness, and later school success. Children aged 3 to 5 from low-income families are less likely to identify letters of the alphabet, count to 20, or read/pretend to read compared to peers in families with more resources (Nord, Lennon, Liu, & Chandler, 2000). These early differences foreshadow disparities in

children's later academic achievement (Denton & West, 2002; Gershoff, 2003; Rodriguez et al., 2009). In a meta-analytic review, LaParo and Pianta (2000) revealed effect sizes of .49 and .51 for the association between children's cognitive development in preschool and kindergarten and their later school outcomes. These findings are consistent with other research which reveals that children's math and reading ability at kindergarten entry are linked to measures of academic skills through middle childhood and adolescence (Duncan et al., 2007). However, preschool-aged children from low-income families display considerable variation in their academic competencies. These findings warrant further investigations into the role of early learning environments in promoting children's academic skills.

Low-income is associated with fewer resources to facilitate optimal learning environments, which may contribute to lower levels of academic readiness. Center-based care appears to be particularly important for the academic trajectories of low-income children (Burchinal et al., 2000b; Burchinal & Cryer, 2000a; Magnuson et al., 2004). Center-based care (chiefly care that is cognitively stimulating) may act as a buffer for children from low-income families. For example, recent evidence suggest that children who experience a poor home and a favorable care setting exhibit more favorable cognitive outcomes (Bradley et al., 2011). Similarly, using a sample of low-income families, Votruba-Drzal and colleagues (2004) found that more favorable early care settings buffered the effects of less cognitive stimulation at home. These findings demonstrate that compensatory care (i.e. a high-quality care environment in the context

of a low resource home environment) can serve as a protective factor for children from disadvantaged backgrounds (Votruba-Drzal et al., 2004; Watamura et al., 2011).

The Current Study

Given the importance of early learning environments for young children's development, there are salient features of child care settings that matter more than others. Characteristics of early learning environments such as caregiver education level and warmth, adult – child ratios, and environmental factors (e.g., space and materials) can yield positive results for the well-being of young children. Additionally, the characteristics of the home learning environment are strongly predictive of children's school readiness and later success. There is increasing evidence to suggest that the combined effects of stimulation and support available to children at home and participation in early care and education programs determine levels of children's well-being. Specifically, a compensatory effect has been hypothesized such that more favorable early care and education learning environments compensate, or protect children from, adverse home learning environments. Similarly, positive home learning environments may protect children from unfavorable early care and education settings. The child care decisions and home learning environments of mothers who work nonstandard schedules are worth investigating, especially given recent findings which suggest that maternal nonstandard work schedules are harmful for children's development (Han, 2005; Joshi & Bogen, 2007). Furthermore, research indicates that the care decisions of this group are much more complex than their counterparts who work standard shifts primarily because optimal child care is often not available during

nonstandard hours. For many working mothers, work schedules dictate the type and amount of child care used. Findings suggest that mothers who work nonstandard schedules have lower levels of center-based care utilization (Han, 2004; Henly & Lyons, 2002). To the extent that maternal nonstandard schedules are related to less favorable care arrangements and poorer home learning environments, children may be at a disadvantage. The current study builds on these literatures by investigating the combined effects of the early care and education and home learning environments as mechanisms through which maternal nonstandard work schedules influence children's early academic skills.

CHAPTER IV

RESEARCH QUESTIONS AND HYPOTHESES

RQ1. What is the relationship between maternal nonstandard work schedules and children's early academic skills?

- H1.1 Maternal nonstandard work schedules will be negatively associated with children's early academic skills, such that children whose mothers work nonstandard schedules will score lower on measures of early academic skills than children whose mothers work standard schedules.
- H1.2 The type of nonstandard schedule will matter, such that preschool-age children of mothers who work night or rotating/split shifts will exhibit lower academic skill scores compared to mothers who work evening shifts.

RQ2. To what extent do the learning environments children experience in care settings and at home mediate the relationship between maternal nonstandard work schedules and children's early academic skills?

- H2.1 The negative association between maternal nonstandard work schedules and children's early academic skill will be partially mediated by the learning environment children experience in early care and education settings. Specifically, children whose mothers work nonstandard hours will be less likely than children of mothers working standard hours to experience educationally-

focused child care environments, which will in turn predict lower academic skill scores.

- H2.2 The negative association between maternal nonstandard work schedules and children's early academic skills will be partially mediated by the learning environment children experience at home. Specifically, children whose mothers work nonstandard hours will experience less educationally-focused home learning environments than those whose mothers work standard hours, which will in turn predict lower academic skill scores among the first group compared to the latter.

RQ3. What influence does family income status have on the associations among maternal nonstandard work, the early care and education learning environment, the home learning environment, and children's early academic skills?

- H3.1 The negative association between maternal nonstandard work schedules and ECE learning environments will be stronger for families with lower income levels and will contribute to fewer academic skills.
- H3.2 The negative association between maternal nonstandard work schedules and home learning environment will be stronger for families with lower income levels and will contribute to fewer academic skills.

CHAPTER V

METHODOLOGY

The purpose of the current study is to examine: (a) the relationship between maternal nonstandard work schedules and preschool-aged children's early academic skills, (b) the potential mediating role of early learning environments (as experienced by children in child care and home), and (c) the extent to which family income status influences this set of relationships.

Data from the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B) are used to investigate the current research questions. The ECLS-B is a prospective study of a large and diverse sample of approximately 14,000 children, followed from birth to school entry; this sample was drawn using birth certificate data to be representative of the full population of infants born in the United States in 2001. Some subpopulations were oversampled including Asian and Pacific Islander children, American Indian and Alaska Native children, Chinese children, twins, and low and very low birth weight children. Children whose mothers were younger than age 15 at the time of the focal child's birth were excluded from the initial sampling frame (Najarian et al., 2010). Data were collected at four time points after the birth of the focal child: 9 months (Wave 1), 2 years (Wave 2), approximately 4 years (Wave3), and at kindergarten entry (Wave 4). The current study relies primarily on data from the third wave of the study, though some covariates used in the analysis were assessed during the baseline interview at 9 months.

As part of each data collection, home visits were conducted that involved administering direct assessments with children and interviews with parents. Parent data were collected using a computer-assisted personal interview (CAPI) and a parent self-administered questionnaire (SAQ). Primary caregivers/respondents were asked questions regarding household structure, parental education and employment, child care decisions, community characteristics, income, and other sources of support available. The interview also gathered detailed information about the focal child, the primary caregiver, the home environment, parenting beliefs and practices, and characteristics of the family. The respondent had to be familiar about the child's care and education, be 15 years of age or older at the time of the child's birth, and be living in the household with the child. Approximately 95 percent of parent interviews were completed by the child's biological mother. Most of the parent interviews were conducted in English; however, a Spanish version of the CAPI instrument was implemented when required. Special provisions were made for families who spoke languages other than English or Spanish (i.e. a household member or professional translator were used). The response rate for the preschool parent interview (i.e. Wave 3) based on the sample successfully recruited to participate at 9 months was 88 percent (N=8900).

Early care and education providers were interviewed by telephone and a subsample of the children had their nonparental care and education arrangements directly observed.

Analysis Sample

The analysis for the current study includes a subsample of Wave 3 participants from the ECLS-B – namely children whose mothers were employed at Wave 3, who were in some form on nonparental care, and who had complete data on the outcome variables (i.e. direct assessments of preschool academic skills) (n=4900). The analysis therefore excludes the roughly 4, 000 children whose mothers were not employed at Wave 3.

Descriptive statistics for the analysis sample are summarized in Table 1. Mothers in this sample ranged in age from 19 to 69, with a mean age of 30.31 years (*SD* = 5.57). Approximately 44% of mothers indicated their child's race as non-Hispanic White, 16% as Black, 17% as Hispanic, 11% as Asian, 3% as American Indian, and 8% as multiracial. Sixty five percent (n = 3150) of mothers were married, while 30% reported being separated, divorced or never married. Seventy seven percent (n = 3350) of mothers reported working daytime shifts, 10% reported working evening shifts (n = 450), 4.5% reported working night shifts (n = 220), and 8.5% reported working rotating shifts (n = 400). Approximately 39% of families are classified as low-income, which is defined as living below 185% of the poverty threshold.

Sampling Weights

To help analysts arrive at nationally representative estimates, the ECLS-B dataset provides various sampling weights that adjust for the fact that different groups of children and families had different likelihoods of being included in the study. For example, as mentioned above, some groups of interest were sampled at a higher rate than would occur randomly in the population. Sampling weights help to "correct" for over- or under-

representation in sample selection. These weights also account for nonresponse among sample participants. That is, not all parents agreed to participate in the study, and some participated in one wave of data collection but not another. Those that chose not to participate may share characteristics that distinguish them from those included in the study. Weighting the data controls for this issue and also allows each child to be counted in a way that represents the population.

Several sets of weights are available in the ECLS-B dataset. Decisions about which weights to use depend on the specific study components being used in the analysis. In the current study, each research question used Wave 3 child assessment data as the outcome of interest. Children and mothers in the current study vary on their data available in the ECLS-B dataset. For example, almost all children in Wave 3 completed the child assessment, yet some children may be missing Early Care and Education Provider interview information because it was collected at random. To accurately reflect nationally representative population estimates, the population-based weight adjustment associated with the Wave 3 child assessment data (W3CO) was identified as being most appropriate for the current study.

Measures

Maternal Nonstandard Hours

Questions about the timing of work were asked of mothers who reported being employed at Wave 3. Mothers were asked, "*Which of the following best describes the hours you usually work at your main job*?" Six mutually-exclusive choices were provided: daytime (6:00 a.m.-6:00 p.m.), evening (2:00 p.m.-12:00 a.m.), night (9:00

p.m.-8:00a.m.), rotating (one that changes periodically from days to evenings or nights), split (one consisting of two distinct periods each day), and other (mothers were prompted to specify). A maternal nonstandard work schedule variable was created to indicate whether or not mothers worked a nonstandard schedule (coded as 1) or a standard schedule (coded as 0). Mothers were coded as having a nonstandard work schedule if they worked evenings, nights, rotating shifts, or split shifts; and were coded as having a standard working schedule if they reported working primarily a daytime shift. Additionally, three dummy variables (coded as 0/1) were created to indicate specific types of maternal nonstandard work schedules (evening shifts, night shifts, and rotating/split shifts).

Early Care and Education Learning Environments

To capture the extent to which children attended an education-focused early care setting, eight variables served as indicator variables to the latent construct, '*early care and education learning environments.*' These variables (described in detail below) come from both the parent interview as well as the Wave 3 Early Care and Education Provider (ECEP) questionnaire, which was developed specifically for the ECLS-B to make informed comparisons across different child care settings. The ECEP was a computer-assisted telephone interview (CATI) and was administered to the primary child care provider, as indicated by parents in the parent interview. ECEP interviews lasted 45 minutes for home-based and nonparental care providers, and 55 minutes for center-based care providers. The questionnaire captured information about the care setting, staff, and

services offered (e.g. the quality of the learning environment including learning materials, curricula and activities, and information about the caregiver's training and experiences).

Center-based care as primary arrangement. As part of the Wave 3 interview, parents were asked if they currently had any regular early care and education arrangements for their child, and if so, what types of settings these were (e.g. Head Start, center-based care, home-based care with a nonrelative, home-based care with a relative). If children spent time in multiple care arrangements, parents were asked to identify a primary care arrangement (i.e. the setting where the child spent the most time). The original variable was re-coded in the current study to capture whether children spent the most time in center-based care (coded as 1) or in home-based care, informal care, or no care (coded as 0).

Weekly hours in center-based care. Parents who indicated that their child attended some form of child care were then asked how many hours per week their child spent in their primary care setting. A continuous variable was created to reflect the amount of time children spent in center-based care (center-based care or Head Start). Children whose primary arrangement was home-based were assigned a "0" for this variable.

Frequency of literacy activities. Early care and education providers reported on the frequency of classroom literacy activities at Wave 3. Specifically, providers were asked, "How often do the children in your class/care do each of the following reading and language activities?" Response options consisted of *Never* (coded as 0), *About once a month or less* (coded as 1), *Two or three times a month* (coded as 2), *Once or twice a*

week (coded as 3), *Three or four times a week* (coded as 4), and *Everyday* (5). A mean score was created based on 11 reading and language activities. (M = 3.52, SD = .98).

Frequency of math activities. Information about the frequency of classroom math activities was obtained from early care and education providers at Wave 3. Specifically, providers were asked, "How often do the children in your class/care do each of the following math activities?" Response options consisted of *Never* (coded as 0), *About once a month or less* (coded as 1), *Two or three times a month* (coded as 2), *Once or twice a week* (coded as 3), *Three or four times a week* (coded as 4), and *Everyday* (5). A mean score was created based on 10 math activities (M = 3.13, SD = 1.2).

Caregiver education level. Early care and education providers were asked to indicate their level of education from among 22 categories. For the current analysis, some of the response options were collapsed in order to create a variable that encompasses six education levels: *Less than high school* (coded as 1), *High school diploma or equivalent* (coded as 2), *Some college, but no degree* (coded as 3), *Associate's degree* (coded as 4), *Bachelor's degree* (coded as 5), and *Graduate or professional degree* (coded as 6).

Specialized caregiver degree. Early care and education providers were asked to indicate whether or not they have a degree in early childhood education or a related field (other than a Child Development Association [CDA] credential). The analysis variable is coded such that 0 indicates no specialized degree and 1 indicates a specialized degree.

Number of books. Primary caregivers were asked to identify an approximate number of books available to children in the care setting. The original continuous

variable (which ranged from 0 to 900) was re-coded into quintile ranks (1 = 0-15, 2 = 16-30, 3 = 31-60, 4 = 61-100, 5 = 101 or more books).

Computer availability. Early care and education providers were asked if a computer was available for use among children. The analysis variable is coded such that 0 = n*o* and 1 = *yes*.

Home Learning Environment

The home learning environment was assessed using a subset of the Home Observation for Measurement of the Environment (HOME) inventory. The HOME was designed to assess the safeness of the physical environment, the provision of learning opportunities and cognitive stimulation, the sensitivity and responsiveness of the mother, and disciplinary styles enforced by mothers (Bradley, 1985; Bradley et al., 1988). In the current study, a latent variable, *home learning environment,* was constructed using seven indicators that broadly parallel those used to assess the early care and education learning environment.

Reading quantity. Parents were asked to indicate how many minutes per day the focal child was read to by an adult in the household. The original continuous variable was re-coded into quartile ranks (1 = 0-15 minutes, 2 = 16-25 minutes, 3 = 26-40 minutes, and 4 = 41 minutes or more).

Parent-child play with manipulatives. Mothers were asked to report how often they played together with the focal child using toys for building such as blocks, Lincoln logs, Tinkertoys, or Legos. The original variable was reverse coded so that higher values

reflected higher incidences of playtime (0 = not at all, 1 = rarely, 2 = a few times a month, 3 = a few times a week, 4 = about once a day, and 5 = more than once a day).

Number of books. Mothers were asked to identify an approximate number of books available to children in the home. The original continuous variable (which ranged from 0 to 900) was re-coded into quintile ranks (1 = 0-15, 2 = 16-30, 3 = 31-60, 4 = 61-100, 5 = 101 or more books). This re-coded variable is identical to the education-focused early care setting number of books variable.

Story time. Mothers were asked to report how often they engage in story telling with the focal child within the past week (1 = not at all, 2 = once or twice, 3 = three to six times, and 4 = everyday).

Library visits. Mothers were asked to indicate whether or not the child had visited a public library within the past month. The original variable was re-coded so that 0 = *no* and 1 = *yes*.

Computer use. Mothers were asked to indicate whether or not there was a computer in the home that the child uses. The original variable was reverse coded (0 = no; 1 = yes).

Children's Early Academic Skills

A latent variable for children's early academic skills was constructed using three indicators: early reading ability, early math ability, and color knowledge. Together, these assessments provide a detailed portrait of academic skills early in the life course.

Early reading ability. During the Wave 3 home visit, preschool-aged children's early reading skills were directly measured and administered by trained project personnel

using a test composed of 37 multiple choice items representing the following content areas: receptive letter recognition, expressive letter recognition, letter sounds, recognition of simple words, phonological awareness, knowledge of print conventions, and matching words. A three parameter (one parameter representing item difficulty, one parameter representing item sensitivity, and one parameter accounting for probability of choosing the correct choice by guessing) logistic item response theory (IRT) model was applied to all reading item responses from all children in the ECLS-B sample, and a composite reading score was then computed for each individual (α=.84) (for details see Najarian, Snow, Lennon & Kinsey, 2010).

Early math ability. The early math domains measured at Wave 3 are a subset of those measured in the kindergarten wave of the ECLS-B: number sense, geometry, counting, operations, and patterns. As with the reading ability measure, an IRT model was applied to all mathematic item responses from all children in the preschool wave. A composite math score was computed for each child (α=.89).

Color knowledge. To assess color knowledge at Wave 3, children were presented five bears and were asked to name the color of each (each correct answer receiving 2 points). If the child could not name the color of the bear during the initial attempt, the evaluator followed up with, "*Can you find the [blue] bear*?" (each correct answer receiving 1 point) (α=.82).

Family Income Status

Total household income at Wave 3 was compared to U.S. Census poverty thresholds for 2005, which vary by household size. For example, a household of four

with a household income of $36,946 was considered to be below 185 percent of the poverty threshold. Poverty status was coded as 1 (below poverty) and 2 (above poverty).

Covariates

Evidence suggests that nonstandard schedule occupancy is linked to a number of socioeconomic variables such as having a low income, low education level, single-parenthood status, and being a minority. Therefore, a number of covariates were included in the current study to better isolate the main and indirect effects. Child gender was coded such that 0 = *female* and 1 = *male*. Six dummy variables (coded as 0/1) were created to indicate race and ethnicity (White (non-Hispanic) (omitted), Black (non-Hispanic), Hispanic, Asian/Pacific Islander, American Indian/Alaskan Native, and Multiracial). Mother's age was coded such that 1 = 19 – 24, 2 = 25 – 30, 3 = 31 – 36, 4 = 37 – 42, and 5 = 43 or older. Mother's education was coded such that 1 = *Less than high school*, 2 = *High school or equivalent*, 3 = *Some college or equivalent*, 4= *BA or equivalent*, and 5 = *Beyond BA degree*. Mother's marital status was coded such that 1 = *Married* and 0 = *Unmarried* (omitted). Number of children was coded such that 1 = 1, 2 = 2, 3 = 3, and 4 = 4 children or more. Full-time status (coded as 0/1) indicates the number of hours per week mothers reported working (i.e. part-time = 34 hours or less per week and full-time = more than 35 hours per week). Child gender and child race were assessed at baseline. All other covariates were captured at Wave 3.

Plan of Analysis

Structural equation modeling (SEM) techniques were used to test the hypothesized associations between variables using LISREL 8.8 (Jöreskog & Sörbom,

2006). Structural equation modeling is appropriate for this study because it allows for modeling latent, or unobserved, variables and offers a number of benefits not available in OLS regression approaches. For example, parameter estimates based on latent factor scores are calculated with a consideration for measurement error associated with observed independent and dependent variables (Raykov & Marcoulides, 2006).

Model fit of the proposed structural equation models were evaluated by examining the chi-square statistic and three alternative fit indices. The chi-square statistic is a basic fit statistic that tests the difference between the hypothesized model and the sample covariance matrix. Smaller, nonsignificant chi-square values indicate that the hypothesized model is not significantly different from the data, thereby indicating a good fitting model; however, large sample sizes can artificially inflate chi-square, resulting in a significant chi-square value. Therefore, three alternative fit statistics will also be examined; the Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1993), the Comparative Fit Index (CFI; Bollen & Long, 1993), and the Standardized Root Mean Square Residual (SRMR; Hu & Bentler, 1999). Values at or below .10 for RMSEA, at or below .08 for SRMR, and above .90 for CFI indicate adequate model fit (Hu & Bentler, 1999). While goodness of fit indices are used to interpret model fit, other confounding factors should be taken into account when assessing the fit of structural models. For example, relatively high chi-square values and high sample sizes may suggest bad fit of the model to data. Additionally, not all of the variables were assured of having a multivariate normal distribution because a correlation matrix was analyzed rather than raw data (Joreskog and Sörbom, 1984). Model fit serves as an index of causal

inferences implied by theoretical and empirical support. Acceptable model fit consistent with one causal hypothesis is invariably rivaled by equally good fit of a model with a contrasting causal hypothesis. Thus, a model that fits poorly should not be interpreted as irrelevant. Instead, one should refer to modification indices, theory, empirical evidence, etc. to determine how to proceed with the model. Additionally, path coefficients should still be interpreted, as their relevance remains of importance regardless of model fit.

Several steps were utilized to test for mediation in the current study. A mediator refers to a variable that unearths the mechanism through which a predictor influences an outcome by establishing *how* or *why* an independent variable predicts a dependent variable (Baron & Kenny, 1986). In the current study, the independent variable was maternal nonstandard work schedules and the dependent variable was children's early academic skills. The two potential mediators were early care and education learning environments and home learning environments. SEM adopts a regression approach to test each potential mediator. A multiple mediation model was used to examine if both potential mediators jointly reduce the direct effect of maternal nonstandard work schedules and children's early academic skills and to better understand the unique contribution of each individual mediator when the other mediator is controlled for (Preacher & Hayes, 2008). Drawing from Baron and Kenny's (1986) approach, to test a mediator the first regression must show that the independent variable affects the mediator, the second that the independent variable affects the dependent variable, and the third that the mediator affects the dependent variable. For full multiple mediation, the fourth regression must show that after controlling for the mediators (early care and

education learning environments and home learning environment), the independent variable (maternal nonstandard work schedules) no longer significantly predicts the dependent variable (children's early academic skills). Partial mediation occurs if the effect of the predictor variable on the outcome variable is reduced, but still significant, when the mediators are controlled (Baron & Kenny, 1986). Mediation was also tested by using the Sobel (1982) test to examine the decrease of the effect of the predictor variable on the outcome variable, after accounting for the mediating variables. The Sobel (1982) test is a conservative approach to testing this reduction. The effect of the mediator is divided by its standard error and then compared to a standard normal distribution to test for significance (MacKinnon et al., 2002).

The moderating effect of family income status was also tested in the current study. A moderator is a variable that modifies the strength of a causal relationship. An interaction variable was created among maternal nonstandard work schedules and family income status. Moderation was tested by examining the overall fit of two models, one where the interaction variable was included in the main structural model, and one where the interaction variable was not included in the main structural model. A significant change in chi-square between the two models indicates that the associations between maternal nonstandard schedules, early care and education learning environments, home learning environment, and children's early academic skills vary as a function of the moderator.

CHAPTER VI

RESULTS

This section presents results from structural equation analyses that tested hypotheses related to (a) the direct effects of maternal nonstandard work schedules on children's early academic skills, (b) the role of early care and education learning environments as a mediator of the link between maternal nonstandard work schedules and children's cognitive development, (c) the role of home learning environment as a mediator of the link between maternal nonstandard work schedules and children's cognitive development, and (d) the role of poverty status as a moderator. Results begin with a description of preliminary analyses and are followed by the outcome of the structural models.

Model Building

Bivariate Pearson correlations were computed with key model and demographic variables (see Table 3). Correlations indicate the degree of relatedness among variables and can range from –1.0 to 1.0, with +/- .1 to .3 indicating a weak association, +/- .3 to .5 indicating a moderate association, and +/- .5 to 1.0 indicating a strong association (Cohen, 1988). Before testing the hypothesized associations between variables in SEM, the adequacy of measurement models for latent constructs must be determined (Kline, 2005). To do this, SEM takes a confirmatory factor analytic approach to determine (a) how well a measurement model fits the underlying data (as indicated by goodness-of-fit

indices), and (b) to what degree manifest indicators reflect an underlying latent construct (as indicated by the strength of factor loadings). Here, a basic measurement model was estimated in LISREL that included three latent factors (i.e. early care and education learning environment, home learning environment, and children's early academic skills) and their respective indicators as described in the measures section. This model provided poor fit to the data (χ^2 (70) = 3770.09, p = .00; CFI = .68; RMSEA = .14; SRMR = .13). Poor model fit implies that the hypothesized paths could be altered in a way that would provide better goodness of fit indices. One way to improve model fit is to examine modification indices provided in the output. Therefore, modification indices were examined to identify ways to possibly improve fit of the measurement model. Several of the indicators were identified as threats to overall model fit. Additionally, the factor loadings of the identified indicators were extremely low (i.e. below .09). In an attempt to improve model fit, the following indicators were removed from the measurement model – the fourth and sixth indicators of the first latent factor (ECE4 = primary caregiver education level and ECE6 = computer use), and the second and third indicators of the second latent factor (HLE2 = parent-child play with manipulatives and HLE3 = number of books). Dropping these indicators improved the model fit slightly (χ^2 (65) = 3436.70, p = .00; CFI = .79; RMSEA = .13; SRMR = .11) and resulted in a majority of the standardized factor loadings (analogous to standardized regression coefficients) being above .30, suggesting adequate internal consistency for each latent factor (see Figure 2). In sum, the three-factor measurement model is adequately specified for these data and

reflects three unique and internally consistent latent factors. To avoid further complications, the removed indicators were left out of the remaining structural models.

Structural Models

Direct effects of maternal nonstandard work schedules on children's early academic skills

According to family stress theory, the stress associated with working nonstandard schedules can compromise not only personal well-being, but the well-being of children. It was hypothesized that maternal nonstandard work schedules would be associated with lower levels of children's early academic skills, as indicated by lower color knowledge, reading, and math scores. To test this hypothesis, direct associations between maternal nonstandard work schedules (modeled as a manifest variable) and children's early academic skills were examined. This model provided moderate fit to the data (χ^2 (11) = 621.09, p = .00; CFI = .92; RMSEA = .14; SRMR = .08). As expected, maternal nonstandard work schedules were negatively associated with children's early academic skills (β = -0.05, SE = .06, p <.001). The following covariates were included in the present model, as well as in subsequent models: maternal age, maternal education, marital status, number of siblings, and full-time status. Maternal age was negatively associated with children's early academic skills (β = -0.18, SE = .01, p <.001). Maternal education and marital status were positively associated with children's early academic skills (β = 0.31, SE = .03, p <.001, and β = 0.11, SE = .09, p <.001, respectively). Full-time hours were also positively associated with children's early academic skills (β = 0.12, SE = .08, p <.001). Standardized regression coefficients for the direct association

between maternal nonstandard work schedules, children's early academic skills, and covariates are presented in Figure 4. Thus, the hypothesized negative association between maternal nonstandard work schedules and children's early academic skills was supported.

The mediating effects of early care and education learning environments and home learning environments

It was hypothesized that any observed direct associations between maternal nonstandard work schedules and children's early academic skills would be explained in part by the learning environments that children experience in early care and education settings and at home. Specifically, it was hypothesized that maternal nonstandard work schedules and early care and education learning environments would be negatively associated with one another; whereas early care and education learning environments would be positively related to children's cognitive development. Similarly, it was hypothesized that maternal nonstandard work schedules and home learning environments would be negatively associated with one another; whereas home learning environments would be positively related to children's cognitive development. In other words, early care and education and home learning environments were expected to partially mediate the direct association between maternal nonstandard work schedules and children's cognitive development. The model testing these associations fit the data poorly (χ_2 (142) = 9044.70, p = .00; CFI = .57; RMSEA = .14; SRMR = .11). Modification indices were examined in an effort to possibly improve model fit. The proposed modifications were not in line with the theory guiding the current study and, therefore, were not implemented. While methodological and empirical literatures place emphasis on indices

of fit, such emphasis often overshadows the importance of interpreting other aspects of the model (i.e. path coefficients and factor loadings). Moreover, what is being suggested as poor fit may not align with the theory that is guiding the proposed model. One plausible contributor of poor fit to the current model is the number of dichotomous and categorical indicators which may violate assumptions of multivariate normality (Tomarken & Waller, 2003). Additionally, although pairwise deletion was used prior to running the present model, more thorough techniques to account for missing data were not used due to the inability to impute raw data. Correcting for this issue may have resulted in stronger correlations among variables and more favorable indices of model fit in the present model.

Despite poor fit, tests for mediation were conducted. To test for mediation, an SEM approach requires a significant direct association between the independent and dependent variable, independent variable and mediator variable, and the mediator and dependent variable (Baron & Kenny, 1986; Holmbeck, 1997). These assumptions were met for the current study and, therefore, further analyses were pursued. Sobel tests were conducted to formally evaluate the extent to which the two pathways (i.e. early care and education learning environments and home learning environments) mediated the influence of maternal nonstandard schedules on children's early academic skills. There was empirical support for the hypothesis that the effect of maternal nonstandard work schedules on children's early academic skills was mediated by early care and education learning environments ($z = -3.23$, $p < .001$). Maternal nonstandard work schedules were negatively associated with early care and education learning environments ($\beta = -.06$, *SE* =

.04, $p < .05$). Early care and education learning environments were positively associated with preschool–aged children's cognitive development ($\beta = .46$, $SE = .16$, $p < .05$). There was also empirical support for the hypothesis that the effect of nonstandard maternal work schedules on children's early academic skills would be mediated by home learning environment ($z = -3.97$, $p < .001$). Maternal work schedules were negatively associated with the home learning environment ($\beta = -.16$, $SE = .01$ $p < .05$). Home learning environment was positively associated with children's early academic skills ($\beta = 1.08$, $SE = 11.64$, $p < 05$). The direct effect of maternal nonstandard work schedules on children's early academic skills remained significant once the mediators were included into the structural model and also changed in strength from negative to positive. Therefore, the hypothesis that early care and education learning environments and home learning environment would partially (rather than fully) mediate the relationship between maternal nonstandard work schedules and children's early academic skills was supported. Standardized regression coefficients are presented in Figure 4.

For ease of presentation, the covariates do not appear in the figure, but were included in analysis model. Maternal age was positively associated with early care and education learning environments as well as home learning environments ($\beta = 0.12$, $SE = .00$, $p <.001$, and $\beta = 0.33$, $SE = .00$, $p <.001$, respectively), yet negatively associated with children's early academic skills ($\beta = -0.21$, $SE = .12$, $p <.001$). Maternal education was negatively associated with early care and education learning environments ($\beta = -0.27$, $SE = .01$, $p <.001$) and children's early academic skills ($\beta = -0.23$, $SE = .60$, $p <.001$), yet positively associated with home learning environments ($\beta = 0.33$, $SE = .00$, p

<.001). Marital status was positively related to early care and education learning environments (β = 0.07, *SE* = .00, *p* <.001) and children's early academic skills (β = 0.08, *SE* = .70, *p* <.001). Marital status was not significantly associated with home learning environments β = -0.01, *SE* = .00, *p* = ns). Number of children was negatively associated with both learning environments (β = -0.25, *SE* = .02, *p* <.001, and β = -0.39, *SE* = .00, *p* <.001, respectively) and children's early academic skills (β = 0.24, *SE* = .70, *p* <.001). Mothers' full-time (versus part-time) employment hours were also negatively associated with both learning environments (β = -0.18, *SE* = .04, *p* <.001, and β = -0.29, *SE* = .01, *p* <.001, respectively) and positively associated with children's early academic skills (β = 0.52, *SE* = 1.4, *p* <.001).

The moderating effects of family income status

In the next set of analyses, I tested whether the structural model varied as a function of family income status. Drawing from recent extensions of family stress theory, it was hypothesized that family income status would influence the relationship among maternal nonstandard work schedules, learning environments, and children's early academic skills such that children of mothers working nonstandard schedules in the context of low family income would exhibit lower academic skill scores than children of mothers working nonstandard schedules in more advantaged circumstances. To test this hypothesis, an interaction variable among maternal work schedule and family income status was included in the second structural model. Specifically, children's early academic skills was regressed onto three manifest variables - maternal nonstandard work schedules, family income status, and maternal nonstandard work schedules*family

income status. This model provided a moderately reasonable fit to the data (χ^2 (168) = 2061.92, p = .00; CFI = .78; RMSEA = .06; SRMR = .06). The standardized path coefficients were slightly lower than those in the previous model and exhibited associations in the same direction as the previous model. The interaction variable (i.e. maternal nonstandard schedules*family income status) was positively associated with children's early academic skills (β = .06, *SE* = .20, p < .05). The path from family income status to children's early academic skills was not significant (β = -0.04, *SE* = .32, p = ns). At the same time, a chi-square difference test of this model compared to one without family income status and the interaction term was conducted to determine whether or not family income status served as a moderator. The change in chi-square statistic was not significant ($\Delta\chi^2$ = -6982.78, Δdf = 26, p = ns). Although the chi-square difference test was not significant, results provide some indication of moderation by family income status. Standardized regression coefficients are presented in Figure 5.

For ease of presentation, the covariates were not presented in Figure 5, but were included in the present model. Maternal age was positively associated with home learning environments (β = 0.30, *SE* = .00, p <.001), but not significantly associated with early care and education learning environments or children's early academic skills (β = -0.03, *SE* = .00, p = ns, and β = -0.08, *SE* = .00, p = ns, respectively). Maternal education was negatively associated with early care and education learning environments (β = -0.10, *SE* = .01, p <.001), yet positively associated with home learning environments (β = 0.40, *SE* = .00, p <.001). Maternal education was not significantly associated with children's early academic skills (β = -0.04, *SE* = .00, p = ns). Marital status was not significantly

associated with early care and education learning environments (β = 0.07, *SE* = .00, *p* = ns), yet positively associated with home learning environments (β = 0.10, *SE* = .01, *p* < .001). Marital status was not significantly associated with children's early academic skills (β = 0.05, *SE* = .00, *p* = ns). Number of children was negatively associated with both learning environments (β = -0.14, *SE* = .01, *p* <.001, and β = -0.19, *SE* = .00, *p* <.001, respectively). Number of children was not significantly associated with children's early academic skills (β = 0.00, *SE* = .00, *p* = ns). Full-time hours were negatively associated with both learning environments (β = -0.08, *SE* = .04, *p* <.001, and β = -0.21, *SE* = .01, *p* <.001, respectively). However, full-time hours were positively associated with children's early academic skills (β = 0.06, *SE* = .2, *p* < .001).

Type of nonstandard work schedule

The next structural model tested the extent to which the type of maternal nonstandard work schedule influences early care and education learning environments, home learning environments, and children's early academic skills. Specifically, evening, night, and rotating/split shifts were each treated as independent manifest variables with standard schedules as the omitted group. This model fit the data reasonably well (χ^2 (178) = 2119.33, *p* = .00; CFI = .78; RMSEA = .06; SRMR = .05). The results of this model provide evidence for the hypothesis that some types of nonstandard schedules are negatively associated with children's cognitive outcomes because they reduce children's access to educationally-focused learning environments in care settings and at home. Evening, night, and rotating/split shifts were negatively associated with early care and education learning environments (β = -.03, *SE* = .06, *p* < .05; β = -.11, *SE* = .09 *p* < .05;

and β = -.08, *SE* = .05, *p* < .05, respectively). Evening shifts and night shifts were negatively associated with home learning environments (β = -.21, *SE* = .01, p < .05, and β = -.16, *SE* = .02, *p* < .05, respectively). Yet, rotating/split shifts were positively associated with home learning environments (β = .11, *SE* = .01, *p* < .05). Early care and education learning environments and home learning environment were both positively associated with children's early academic skills (β = .42, *SE* = .29 *p* < .05; and β = .67, *SE* = 7.89, *p* < .05, respectively). Evening shifts were positively associated with children's early academic skills (β = .11, *SE* = .02, p < .05). Surprisingly, rotating/split shifts and night shifts, were also positively associated with children's early academic skills (β = .13, *SE* = .02, *p* < .05; and β = .08, *SE* = .02, p < .05). Overall, there was empirical support for the hypothesis that night and rotating/split shifts would be negatively associated with children's early academic skills. Standardized regression coefficients for all paths are presented in Figure 6.

For ease of presentation, the covariates are not shown in Figure 6, but were included in the present model. Maternal age was positively associated with home learning environments (β = 0.27, *SE* = .00, *p* <.001), but not significantly associated with early care and education learning environments or children's early academic skills (β = -0.00, *SE* = .00, *p* = ns, and β = -0.05, *SE* = .05, *p* = ns, respectively). Maternal education was negatively associated with early care and education learning environments (β = -0.10, *SE* = .01, *p* <.001), yet positively associated with home learning environments (β = 0.39, *SE* = .00, *p* < .001), and not significantly associated with children's early academic skills (β = -0.20, *SE* = .23, *p* = ns). Marital status was not significantly associated with early care

and education learning environments (β = -0.00, *SE* = .05, *p* = ns), yet positively associated with home learning environments (β = 0.08, *SE* = .01, *p* < .001). Marital status was not significantly associated with children's early academic skills (β = 0.71, *SE* = .53, *p* = ns). Number of children was negatively associated with early care and education and home learning environments (β = -0.14, *SE* = .01, *p* < .001, and β = -0.19, *SE* = .00, *p* < .001, respectively), but not significantly associated with children's early academic skills (β = 0.06, *SE* = .22, *p* = ns). Full-time hours were also negatively associated with early care and education and home learning environments (β = -0.08, *SE* = .04, *p* <.001, and β = -0.19, *SE* = .01, *p* < .001, respectively), yet positively associated with children's early academic skills (β = 0.24, *SE* = .06, *p* < .001).

CHAPTER VII

DISCUSSION

Since Presser (1986) pioneered the literature on nonstandard work, several studies have ensued exploring how family processes are impacted by such schedules. Much of the early work on nonstandard schedules was based on dual-earner families from primarily privileged backgrounds and focused on outcomes such as marital quality and parental mental health. Also, while recent lines of inquiry have included child well-being as the focal outcome, only a handful of studies have focused solely on young children and cognitive development (Han, 2005). Although researchers have called attention to the effects of maternal nonstandard work schedules on children's development, and have implied that this may have implications for family well-being, only recently have empirical studies given consideration to early learning environments as potential mediators of children's early academic skills. Substantial evidence exists linking children's early care and education and home learning environments with school readiness. When children are exposed to favorable learning environments, it can help them acquire skills that may ease their transition to school and serve as the foundation for their academic trajectory. To better understand the associations among maternal nonstandard work and children's cognitive outcomes, researchers are increasingly investigating the processes that influence the learning environments experienced by children. There is general consensus that mother's employment is an important

determining factor of children's early learning settings. The timing and regularity of work have been of particular interest to researchers in recent decades. Additionally, these settings may buffer the presence of negative home learning environments in predicting children's well-being. Yet, the ways in which maternal nonstandard work schedules are linked to these settings, a potentially important aspect of the work-family interface, have not been adequately addressed in prior studies.

The present study extends this line of research by combining two important literatures (i.e. early care and education and work-family). Further, to the author's knowledge, this is the first empirical effort to examine the combined effects of early care and education learning environments and the home learning environment as mediators of the relationship between maternal nonstandard work schedules and children's early academic skills. Informed by extensions of the family stress theoretical perspective, it was hypothesized that maternal nonstandard work schedules would be negatively associated with children's early academic skills, in part because such schedules reduce children's access to educationally-focused materials both in early care and education learning settings and the home learning environment. Drawing from family stress theory, adaptive resources are needed to manage the pile-up and stress associated with nonstandard work. Adaptive resources, such as cognitively stimulating learning environments, may be particularly important for children of mothers who occupy nonstandard schedules as they have the potential to increase children's early academic skills.

Family income status was hypothesized as a moderator of the associations between maternal nonstandard work schedules and children's early academic skills. Guided by extensions of family stress theory, mounting evidence suggest that the harmful effects of economic disadvantage on young children originates from mediating family processes. Specifically, hardship conditions associated with nonstandard work and lower income levels influence children's well-being through the strains they impose onto family functioning. The results from this study indicate the importance of measuring contextual influences in order to fully understand how maternal nonstandard work schedules are linked to children's early academic skills.

Included in this chapter is a discussion of the results as they relate to study hypotheses, an acknowledgement of study limitations, as well as suggestions for future research, presented in three sections. The first section revisits hypotheses about the direct, mediated, and moderated associations among maternal nonstandard work schedules, early care and education learning environments, home learning environments, poverty status, and children's early academic skills, and provides an interpretation of key findings in light of empirical and theoretical literatures. The second section discusses limitations of the study. The third section provides concluding thoughts and offers suggestions for future research.

The Direct Association Between Maternal Nonstandard Work Schedules and Children's Early Academic Skills

The influx of mothers with young children occupying evening, night, or rotating work shifts has sparked a great deal of interest among researchers interested in issues related to the impact of this social trend. A prominent question centers on how maternal nonstandard work schedules influence young children's well-being. Therefore, the first goal of the study was to test the direct association between maternal nonstandard work schedules and children's early academic skills. A negative association was hypothesized, such that maternal nonstandard work schedules would be associated with lower levels of children's early academic skills. As expected, there was a significant negative association between maternal nonstandard work-schedules and children's early academic skills. That is, children whose mothers work nonstandard schedules scored lower on standardized measures of early academic skills than those whose mothers worked primarily standard weekday hours. Although the strength of the association was relatively weak, these results suggest that maternal nonstandard work schedules may be harmful for young children's development. While other researchers have examined the link between maternal nonstandard work schedules and child well-being, the period of development examined is usually middle childhood or adolescence, and the outcome of interest has often been behavioral or socioemotional (Barnett & Gareis, 2007; Davis, Crouter & McHale, 2006; Han & Fox, 2011; Joshi & Bogen, 2007; Strazdins et al., 2006). The results of the current study are consistent with the few studies that have explored how maternal nonstandard work schedules are related to children's early academic skills (Han,

2005). These findings are particularly important, as early childhood is a vital period of development that sets the stage for children's future trajectories. Additionally, the outcome of focus in the current study (i.e. cognition) has been identified as one of the more important predictors of children's school readiness and later school success. These results build on earlier arguments that maternal employment may be detrimental for children's well-being and underscore the need to further explore the type of work shift employed, and the interconnections between work and family.

The Mediating Roles of Early Care and Education Learning Environments and Home Learning Environments

Extensions of the family stress theory have been used as a framework for understanding how maternal nonstandard work schedules influence family functioning. The theory posits that adaptive resources aid in buffering the effects of pile-up experienced by a family and can ultimately aid in preventing maladaptation. Early learning environments may serve as adaptive resources for young children whose mothers work nonstandard schedules. Children exposed to favorable early learning environments, despite the presence of maternal nonstandard schedules, are more likely to achieve bonadaptation (i.e. higher levels of early academic skills). On the other hand, in general, nonstandard schedules may make it less likely that young children experience educationally-focused early learning environments. This is primarily due to the limited amount of formal care, which is linked to favorable academic outcomes, available during nonstandard hours. This perspective informed the expectation of the current study that early care and education learning environments and home learning environments would

partially mediate the relationship between maternal nonstandard work schedules and children's early academic skills, suggesting that early learning environments are potential adaptive resources for mothers experiencing pile-up and stress associated with working nonstandard schedules.

In general, the study hypotheses were supported, suggesting that early care and education learning environments and home learning environments partially mediated the relationship between maternal nonstandard work schedules and children's early academic skills in this nationally representative sample of young American children. Maternal nonstandard work schedules were negatively associated with early care and education and home learning environments. That is, mothers who work nonstandard schedules used early care and education settings that provided fewer learning experiences than mothers working primarily standard schedules. This finding offers evidence that mothers who work nonstandard schedules may be lacking the adaptive resources needed to provide children with learning opportunities that promote cognitive development. This finding is especially imperative in light of findings from Han (2004), which revealed that, although maternal standard work schedules were linked to higher incidences of children enrolled in day care centers by age three, children whose mothers worked nonstandard hours had higher occurrences of father-care or care arrangements other than center-based care. Han's sample was more advantaged in terms of income and included a large number of dual-earner families. Thus, one advantage of the current study is the ability to examine these linkages for a broader sample and ask whether associations between work schedules and child academic skills vary by family income status. Additionally, the current study

looked beyond the type of care and included important features of early learning environments that promote optimal learning experiences for young children.

Consistent with prior research, maternal nonstandard work schedules were negatively associated with home learning environments (Heymann & Earle, 2001). It appears as if the parenting-related costs of nonstandard work schedules are largely direct. Previous work assessing the direct effects of maternal nonstandard work schedules and the overall home environment has taken conditions of work into account. Nonstandard work schedules are often characterized by conditions that are more common in less well-paid jobs. These jobs are low in complexity and are characterized by routinization, low autonomy, and heavy supervision. Theorists and researchers contend that these working conditions erode intellectual flexibility (Kohn and Schooler 1973, 1978) and exacerbate psychological distress among mothers (Kohn and Schooler 1982; Lennon 1987; Miller 1988). Consequently, the distress created by low occupational standing has obvious intergenerational consequences such that parents with higher levels of distress display less attentive, responsive, and stimulating parental behavior and provide less optimal child-rearing environments compared to mothers with higher paying jobs in occupations characterized by more complexity (Belsky, 1984; Menaghan, 1983). Adverse socioeconomic conditions may also produce psychological stress that influences parent-child interactions (Conger et al. 1984; Piotrkowski, Rapoport, and Rapoport 1987; Siegal 1984; Voydanoff, 1987). Following these arguments, the pile-up associated with working a nonstandard job may constrain a mother's ability to provide an adequate home learning environment.

The finding that early care and education learning environments and the home learning environment were positively associated with children's early academic skills speaks to the potential compensatory effect of multiple learning environments highlighted by Watamura (2011) and others in recent years. Essentially, early care and education and home learning environments are important contributors to children's development. Several empirical studies have illustrated the importance of child care and home environments for many aspects of children's well-being (e.g., Bronfrenbrenner & Morris, 1998; Moorehouse, 1991: NICHD ECCRN, 1997, 2004, 2005). It is well established that child care and home environments lacking in resources can have independent negative effects on child development, with particularly strong effects for home characteristics (NICHD ECCRN, 2002). Fewer studies have revealed significant combined effects of home and child care factors, and several have focused only on low-income populations (Votruba-Drzal, Coley, & Chase-Lansdale, 2004). In recent years, these research efforts have merged in an effort to examine the combined contextual influences of child care and home experiences (Watamura et al., 2011). Consistent with recent investigations, the current study supports hypotheses that suggest a compensatory environmental effect for children's development. Although maternal nonstandard work schedules were negatively linked to both learning environments, each setting was positively associated with children's early academic skills. Taken together, this pattern of findings suggests that early care and education learning environments, as captured by characteristics that promote favorable academic learning experiences, are worth considering in understanding the development of children whose mothers work nonstandard schedules.

Children growing up in homes that lack learning materials and resources, although vulnerable to the negative effects of maternal nonstandard work schedules, may be buffered by exposure to early care and education learning environments.

The Moderating Role of Family Income Status

Family stress theory and several empirical literatures informed the hypothesis that family income status would moderate the associations among maternal nonstandard work schedules, early care and education learning environments, home learning environments and children's early academic skills. Nonstandard work schedule occupancy is linked to low-income and economic hardship in general. These constraints may impose difficulties in securing and maintaining favorable early learning environments. For example, the low-income associated with nonstandard work might make it difficult for mothers to afford center-based care. Additionally, these mothers may lack the financial resources to uphold a favorable home learning environment (i.e. books, toys, and other learning materials). As a result, children's academic skills may be adversely affected.

Initial results from the chi-square difference test suggested that inclusion of the moderator variable in the current model was not significantly different from the previous structural model. Given that higher levels of family income status may serve as an adaptive resource for families negotiating the demands of nonstandard work, the insignificant chi-square difference test was surprising. It could be that maternal nonstandard work schedules are generally harmful for young children's development regardless of socioeconomic status. For example, Han (2005) revealed negative effects of maternal nonstandard work schedules on children's cognitive development among a

primarily high income sample. Further, although Han controlled for factors such as the home environment, maternal depression and sensitivity, and the type and quality of child care, negative effects still emerged. Studies of the effects of maternal nonstandard schedules on later developmental stages (i.e. middle childhood and adolescence) have revealed positive associations by income status (Barnett & Gareis, 2007; Davis, Crouter, & McHale, 2006). These differences underscore the importance of testing such effects in early childhood, as this developmental period appears to be particularly sensitive to maternal nonstandard work schedules. The current study used a limited measure of family income status (i.e. above or below 185% of the poverty line), which may not be the most meaningful way to capture the impact of income status on families' adaptation to nonstandard work schedules. Although the chi-square difference test was not significant, other indices suggested some indication of moderation. For example, the model fit the data reasonably well. Moreover, the interaction variable (i.e. maternal nonstandard work schedules*family income status) was positively associated with children's early academic skills. These findings suggest that nonstandard work may have a different association with children's early academic skills when family income status is taken into account. Additionally, these findings further highlight the importance of exploring the adaptive resources of mothers who work nonstandard schedules. These results suggests that children whose mothers work nonstandard work schedules are less likely to experience the types of learning environments that are linked to children's early academic skills and later development. After taking into account these negative effects, there exists a small positive association between nonstandard work schedule type and

children's early academic skills. Therefore, it is likely that other aspects of nonstandard schedules matter for the well-being of children and families. For example, although nonstandard work is generally linked to less favorable learning environments, such schedules might also offer families other benefits worth exploring. In sum, results indicated some support for the hypothesis that the observed associations among variables may vary as a function of family income status.

The Influence of the Type of Maternal Nonstandard Schedule

The literature on nonstandard work has only recently begun to tease apart the effects of the *type* of nonstandard shift employed. Empirical evidence suggests that night and rotating shifts are particularly harmful to family functioning. Specifically, the irregular sleep patterns, stress, depression, and disrupted family routines associated with these schedules may reduce the likelihood of consistent opportunities to nurture children's learning experiences at home (Heymann & Earle, 2001; Presser, 2003). The type of nonstandard shift also matters for children's early care and education experiences. The availability of center-based care is extremely limited during a night shift, whereas children may have opportunities to experience center-based care during evening or rotating shifts. To build on this literature, it was hypothesized that the type of nonstandard shift would matter, such that night and rotating/split shifts would be negatively associated with children's early academic skills. Because center-based care is harder to secure during night hours and because research suggest that less formal arrangements provide less cognitively stimulating environments, a negative association between early education and care learning environments was hypothesized. Further,

mothers who work night schedules are more likely to sleep during the day – limiting opportunities to provide a cognitively stimulating home environment. Therefore, a negative association between night shifts and home learning environments was also expected. Similarly, the irregularity associated with working rotating shifts may hinder a mother's ability to secure center-based care that is consistent and to provide regular home learning opportunities. In general, results supported this hypothesis. As expected, night and rotating shifts were negatively associated with children's early care and education learning environments. Evening shifts were also negatively associated with children's early care and education learning environments. These shifts may pose different barriers to securing favorable child care, compared to standard shifts. In fact, evidence from a qualitative study revealed that mothers often encountered greater difficulties in arranging child care and experienced unwanted income instability when their work schedules varied unexpectedly (Lowe & Weisner, 2004). Thus, the unpredictability associated with rotating shifts may lead to inconsistent care, or lower incidences of center-base care usage.

Although all three shifts were negatively related to early care and education learning environments, this setting may still serve as an adaptive resource to mothers. For example, night shifts had the strongest association with early care and education learning environments, whereas evening shifts had the weakest association. It could be that children whose mothers work evening shifts are more exposed to favorable early care and education learning environments, compared to children whose mothers work night and rotating/split shifts. Another plausible explanation for the stronger night shift effect is the

inability to afford care during daytime hours. Care arrangements must be secured during the night shift hours (particularly in the case of single mothers and mothers with fewer resources) and if all resources are funneled into overnight care then other forms of care may not be a viable option.

To the extent that evening, night, and rotating/split shifts prevent experiences in early care and education learning environments among preschool-aged children, the home learning environment is a setting that may buffer those effects (Rodriguez et al., 2011; Watamura et al., 2011). Results of the current study indicated that evening and night shifts were negatively associated with the home learning environment. Mothers who work evening shifts are usually not home for dinner or other evening activities. Therefore, opportunities to facilitate children's learning are missed, especially if children are in some form of nonparental care during the day. The finding that night shifts were negatively associated with home learning environments was not surprising. A substantial body of literature suggests that working the night shift takes a mental toll on employees (Goodman, et al., 2009). Specifically, higher levels of fatigue, job-related stress, and perceived work–family are associated with night shift work. Therefore, the fatigue and parental stress associated with working the night shift may prevent mothers from engaging in meaningful parent-child interactions, resulting in less favorable home learning environments. Consistent with prior research, rotating shifts were positively associated with home learning environments. Recent work by Lleras (2008) revealed a positive association between rotating shift occupancy and home learning environments of single mothers with preschool-aged children. Similarly, Han and Fox (2011) found that

children whose mothers worked rotating shifts had significantly higher reading and math scores. Moreover, mothers who employed rotating shifts tended to be more socioeconomically advantaged compared to mothers who had ever worked either evening or night shifts (Han & Fox, 2011). Thus, although rotating shifts can be stressful in the sense that mothers may not be able to plan being at home when they want or need to be (Henly & Lambert, 2005), there may be beneficial consequences for children. Perhaps mothers take advantage of opportunities to engage in activities that promote learning when rotating shifts do permit time with children.

Inclusion of Covariates

Empirical evidence suggests that several child and family characteristics account for some of the mixed findings regarding maternal nonstandard work schedules and children's development. As indicated by prior analyses, low-income, less educated, and single mothers are more likely to occupy nonstandard work schedules (Presser & Cox, 1997). Thus, a set of child, mother, and family characteristics were included in the final model. Specifically, maternal age, maternal education, marital status, number of children in the home, and full-time status were included as covariates in the current study. The present study did not find significant associations among child gender and race and children's early academic skills. These findings are consistent with the few studies that have assessed the effects of maternal nonstandard work schedules on young children's cognitive development (Han, 2005). Overall, maternal education was negatively associated with early care and education learning environments yet positively associated with home learning environments. This finding was surprising and inconsistent with prior

research. One plausible explanation for this finding has to do with socioeconomic status. Low-income children are increasingly attending child care settings that promote learning and academic readiness. Because income and education are highly correlated, this finding might be driven by mothers with lower education levels. Similarly, mothers with higher education levels (and likely higher incomes) may have the resources to stay at home with children.

Maternal age was generally positively associated with home learning environments. Maternal age and marital status were positively associated with early care and education learning environments in the first structural model, but not significantly related in any other models. Maternal age and marital status were positively associated with home learning environments in most of the structural models. Number of children was negatively associated with learning environments in most of the models. These associations may due in part to the financial hardships experienced by mothers (especially single mothers) and the depleted resources that result from increases in the number of children (Han, 2008; Lleras, 2008). Work hours were negatively associated with learning environments. However, the direct association between full-time work hours and children's early academic skills was positive in each of the models. The findings of the current study contradict more recent work that suggests longer maternal nonstandard work hours are associated with negative child outcomes (Grywacz et al., 2011). The results from the current study may be attributed to the lower work hours among mothers who work nonstandard shifts compared to mothers who work standard shifts (see Table 1). Further, this finding echoes early work by Presser suggesting that

part-time employment is highly correlated with working nonstandard hours (Presser, 1988).

Study Limitations

This study is among the first to explore the mediating pathways between maternal nonstandard work schedules, early care and education learning environments, home learning environments, and children's early academic skills. Although the results of the current study contribute meaningfully to the work-family and early care and education literatures and have the potential to inform policy, they need to be interpreted in light of their limitations.

The latent constructs for this study were informed by prior research examining contextual influences on children's development. The constructs were developed by the author to reflect dimensions of learning environments and cognition that are essential for children's development. Although the variables among each factor were significantly correlated, it does not eliminate the possibility of alternative latent constructs that might be better suited for the tested hypotheses. The use of secondary data restricts the ability to include measures that might capture more thorough aspects of learning environments. As mentioned earlier, several indicator variables were removed in preliminary analyses to improve the overall fit of the structural model (and subsequent models). Specifically, the fourth and sixth indicators of the first latent factor (ECE4 = primary caregiver education level and ECE6 = computer use), and the second and third indicators of the second latent factor (HLE2 = parent-child play with manipulatives and HLE3 = number of books) were eliminated. Although this step aided in improving model fit, it did not completely account

for the potential threat posed by remaining dichotomous indicators. That is, several dichotomous indicators remained in the model and may have served as threats to multivariate normality and overall fit of the structural models. Therefore, there may be a more optimal method for measuring the proposed latent constructs that does not include dichotomous indicators (e.g. indicators based solely on continuous variables).

An additional limitation is the cross-sectional nature of the current study, which limited the ability to account for prior and future effects of maternal nonstandard schedules on children's development. Recent longitudinal work by Han (2005; 2011) suggests that there may be cumulative and long-term effects associated with working nonstandard schedules. The inclusion of additional waves of data might have provided more insight regarding the timing of maternal nonstandard work schedules and its effects on later school success. To the extent that mothers worked a nonstandard schedule during each wave of data, the negative direct effects of maternal nonstandard work on children's early academic skills at Wave 3 might be better understood. Moreover, recent work by Han (2005) suggests that the timing of maternal nonstandard work matters for children's development, such that maternal nonstandard work during the first year of a child's life is particularly harmful.

Another limitation of the current study is the limited focus of early learning environments. The current study did not take into account other important features of the early care and education settings such as adult-child ratios, warmth and sensitivity levels, and quality ratings. These have all been identified as vital components of early care and education learning environments and important predictors of young children's school

readiness. Similarly, the measures of the home learning environment in the current study were limited.

The last limitation includes issues related to the measurement of nonstandard work. Mothers were asked about their primary work schedule, but were not asked if more than one work schedule was employed. Consequently, it is difficult to understand the complete effects of maternal nonstandard work schedules. Children whose mothers work multiple nonstandard schedules may be at greater risk than children whose mothers work one nonstandard or standard schedule. Additionally, researchers are beginning to conceptualize weekend work as a type of nonstandard work (Gassman-Pines, 2011). Weekend work may be related to family well-being in a different way compared to standard weekday shifts. For example, weekend shifts (conceptualized as nonstandard work) were not related to family outcomes in findings from a recent study by Gassman-Pines (2011).There is no way of knowing whether mothers who worked weekend schedules in the current study considered themselves as working a standard or nonstandard schedule.

Future Directions

Despite limitations, the results from the current study make an important contribution to the literature by focusing on the effects of maternal nonstandard work schedules for children's early academic skills. These findings augment the small amount of existing research on maternal nonstandard work schedules and child well-being. The results raise concerns about the effects of maternal nonstandard work and are consistent with a body of literature that points to beneficial effects of children's exposure to early

learning environments. If the negative relationship between maternal nonstandard work schedules (i.e. night and rotating/split shifts) and early care and education learning environments is due to the limited options of center-based child care at these nonstandard times, then providing a greater availability of formal care arrangements for children whose mothers work nonstandard hours is imperative. In recent years, many corporations have implemented on-site child care during nonstandard hours for their employees (U.S. Department of Labor, 1995). This is an initiative that should become more prevalent. From a policy perspective, it is critical to further explore how different early care and education settings may serve to protect children from low levels of stimulation at home. Caregivers and practitioners should be supportive and sensitive to the larger social and demographic influences of children's home learning environments. A policy initiative targeting the direct support of parents in their literacy- and math-promoting behaviors is a start. Future research in this area would also benefit from studies that address why mothers employ nonstandard schedules and how decisions about child care are made. These studies may serve to parse out the differential effects among nonstandard schedule types (i.e. evening, night, and rotating). Also, the effects of a mother's work schedule is contingent upon whether a spouse or caregiver is home, awake, and energized enough to take care of the child (for families with more than one adult in the household). That is, the effects of maternal nonstandard work schedules are likely to vary by both the type of shift and the patterns of both parents' work schedules. Therefore, work schedules of other adults in the household should be taken into account in future investigations (e.g. Han, 2004).

To address the limitation of the way that nonstandard work is measured, future research should consider the extent to which nonstandard work is voluntary. Factors such as spousal unemployment and job complexity might drive mothers to work nonstandard schedules that they may not have otherwise preferred. Qualitative studies have the potential to address this issue, as they may capture more thorough information about selection into nonstandard schedules not captured in quantitative surveys.

Consistent with previous work, the current study revealed that certain types of work schedules pose greater conflicts for families than others. When it comes to nonstandard work, maternal night schedules appear to be problematic, particularly when it comes to the likelihood of a favorable early care and education learning environment. Given that increases in maternal nonstandard schedule occupancy will warrant more overnight child care availability, measures of child care quality should become more sensitive to what night care entails. For example, children will likely be put to bed and then monitored as they sleep through the night. As a result, measures of quality in such settings would be different from conventional measures of quality and will capture aspects of quality such as safety and adequate sleep arrangements. Therefore, policy initiatives that address new measures of quality are needed to account for the growing number of children and families affected by maternal nonstandard schedules.

Results from the present study suggest that the intersection of maternal nonstandard work schedules with learning environments (an association that has been largely ignored in empirical literature) is linked to at least one aspect of school readiness, namely cognitive well-being. This study opens the door to a host of empirical questions

to be examined in future research related to the links between maternal nonstandard work schedules and young children's development, and provides some direction for the selection of relevant demographic, dependent, and moderating variables. Further research is needed to replicate findings from this study, as well as explore additional school-readiness outcomes.

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APPENDIX A

TABLES AND FIGURES

Table 1

Descriptive Statistics for Demographic Variables

	Standard (n = 3,731)		Nonstandard (n = 1,130)	
Variables	N[1]	Frequency (%) or *M(SD)*	N[1]	Frequency (%) or *M(SD)*
Child Sex				
Female	1850	49.5	550	50.3
Male	1900	50.5	550	49.7
Family Income Status				
Below 185% of poverty	1300	34.8	600	52.1
Above 185% of poverty	2450	65.2	550	47.9
Race				
White, non Hispanic	1700	44.9	450	40.4
Black	550	15.2	200	20.2
Hispanic	650	16.9	200	18.1
Asian, non Hispanic	450	11.8	100	7.3
Pacific Islander	50	0.5	0	0.5
American Indian, Alaskan Native	100	2.8	50	3.5
More than one race	300	7.7	100	10.0
Mother's Age				
19 - 24	350	10.0	200	17.8
25 - 30	900	25.0	350	32.7
31 - 36	1250	34.5	300	26.3
37 -42	850	23.4	200	17.7
43+	265	7.2	50	5.5
Mother's Education				
Less than High School	250	7.2	150	12.7
High School or Equivalent	850	22.7	350	29.2
Some college or equivalent	1200	32.2	400	37.1
BA degree or equivalent	700	19.4	150	12.7
Beyond BA degree	650	17.3	100	6.9

Marital Status				
Married	2500	67.2	650	57.9
Divorced	250	7.2	100	6.8
Never Married	650	17.5	300	27.3
Number of paid hours worked per week				
		37.2(24.6)		*32.8*(23.2)
Number of children in household				
1	800	21.5	200	19.6
2	1650	44.8	450	38.9
3	850	22.6	300	25.4
4+	150	3.4	50	5.1

[1] Per U.S. Department of Education privacy rules, N's are rounded to the nearest 50.

Table 2

Descriptive Statistics for Analysis Variables

Variables	N[1]	Frequency (%) or *M(SD)*
ECE Learning Environment		
Literacy Mean	3600	*3.52*(0.98)
Math Mean	3600	*3.13*(1.15)
Specialized Degree	2700	*.53*(.50)
Caregiver Education	3600	*3.75*(1.54)
Number of Books	3600	*3.06*(1.30)
Computer Use	3600	*.61*(.49)
Hours in Center Care	4850	*19.50*(16.89)
Primary Care Arrangement	4850	*1.51*(.66)
Home Learning Environment		
Minutes reading	4750	*2.15*(1.02)
Parent-child play	4850	*3.81*(1.28)
Number of books	4850	*2.92*(1.28)
Read books	4850	*3.07*(.85)
Tell stories	4850	*2.68*(.91)
Visit library	4850	*.40*(.49)
Computer use	4850	*.61*(.49)
Cognitive Development		
Color Knowledge	4850	*8.4*(2.50)
Reading	4850	*23.9*(9.31)
Math	4850	*27.88*(9.42)
Maternal Work Schedule		
Evening	500	9.8
Night	200	4.6
Rotating/Split	400	8.8
Standard	3700	76.8

[1] Per U.S. Department of Education privacy rules, N's are rounded to the nearest 50.

Table 3

Intercorrelations among Key Model Variables

	1	2	3	4	5	6	7	8	9	10	11	12
1. ECE1 - Literacy mean	1.00											
2. ECE2 - Math mean	0.82	1.00										
3. ECE3 - Specialized degree	0.22	0.09	1.00									
4. ECE4 - Caregiver educ.	0.33	0.26	0.70	1.00								
5. ECE5 - Number of books	0.15	0.10	0.30	0.20	1.00							
6. ECE6 - Computer use	0.15	0.16	0.25	0.15	0.36	1.00						
7. ECE7 - Hours in center care	0.52	0.53	0.08	0.39	0.20	0.10	1.00					
8. ECE8 - Type of care	0.60	0.50	0.39	0.61	0.28	0.16	0.70	1.00				
9. HLE1 - Minutes reading	-0.04	0.08	-0.23	-0.21	0.05	0.02	0.02	-0.12	1.00			
10. HLE2 - Parent-child play	-0.21	-0.16	-0.16	-0.39	0.10	-0.08	-0.20	-0.18	0.22	1.00		
11. HLE3 - Number of books	-0.01	-0.01	0.06	0.13	0.24	0.11	0.11	0.19	0.18	-0.14	1.00	
12. HLE4 - Read books	-0.03	-0.11	0.12	0.19	0.06	-0.10	-0.02	0.22	0.06	-0.14	0.48	1.00

Table 3 Continued

Intercorrelations among Key Model Variables

	1	2	3	4	5	6	7	8	9	10	11	12
13. HLE5 - Tell stories	0.09	0.07	0.32	0.19	0.30	0.10	0.09	0.29	-0.03	0.06	0.17	0.26
14. HLE6 - Visit library	0.09	0.09	0.16	0.14	-0.01	-0.18	-0.03	0.16	0.25	0.02	0.31	0.24
15. HLE7 - Computer use	0.11	0.17	0.12	-0.09	0.02	0.12	-0.04	0.00	0.07	0.05	0.15	0.12
16. CCD1 - Color score	0.32	0.27	0.14	0.23	0.10	0.07	0.11	0.18	0.08	-0.16	0.23	0.27
17. CCD2 - Reading score	0.41	0.26	0.20	0.18	-0.09	0.00	0.08	0.19	0.01	-0.13	0.09	0.22
18. CCD3 - Math score	0.33	0.19	0.19	0.16	-0.13	0.05	0.05	0.05	-0.02	-0.12	0.13	0.26
19. MNS*Pov	0.00	-0.24	0.18	-0.05	0.23	0.02	-0.19	-0.18	-0.07	-0.09	-0.17	0.04
20. MNS	-0.05	-0.28	0.18	-0.05	0.25	0.10	-0.23	0.13	-0.05	-0.04	-0.12	-0.03
21. Child gender	-0.13	-0.17	0.17	0.14	0.03	-0.08	-0.04	0.16	-0.06	0.16	-0.01	0.07
22. Child race – White	-0.14	-0.02	-0.19	-0.34	-0.01	0.08	-0.37	-0.32	0.24	0.12	0.32	0.13
23. Child race – Black	0.12	0.08	0.06	0.19	0.21	0.01	0.12	0.12	0.13	0.20	-0.10	-0.15
24. Child race - Hispanic	0.01	-0.04	0.12	0.14	-0.08	-0.01	0.30	0.18	-0.32	-0.17	-0.30	-0.08

Table 3 Continued

Intercorrelations among Key Model Variables

	1	2	3	4	5	6	7	8	9	10	11	12
25. Child race - Asian/Pac. Is.	0.02	-0.05	0.21	0.06	0.08	-0.05	-0.35	-0.12	0.01	0.02	-0.13	0.16
26. Child race - Amer. Ind.	-0.07	0.02	0.01	0.00	-0.20	-0.06	0.04	0.03	-0.10	-0.07	-0.06	0.11
27. Child race – Multiracial	0.15	0.03	0.04	0.24	-0.12	-0.18	0.23	0.30	-0.09	-0.22	0.06	-0.01
28. Mother's age	-0.06	-0.12	-0.08	-0.13	-0.10	-0.22	-0.17	-0.01	0.10	-0.08	0.06	0.27
29. Mother's education	-0.15	-0.15	0.02	0.07	-0.09	-0.29	-0.07	0.02	0.12	0.03	0.14	0.36
30. Marital status	0.01	-0.11	0.01	-0.13	-0.11	0.01	-0.06	-0.03	0.15	0.04	-0.04	0.21
31. Number of siblings	-0.24	-0.30	0.20	0.03	0.10	0.17	-0.22	0.00	-0.13	-0.08	-0.04	0.01
32. Part- vs. Full-time	-0.05	0.05	-0.27	-0.25	-0.08	-0.06	0.11	-0.13	0.06	0.24	-0.19	-0.21
33. Evening shift	-0.02	-0.17	0.18	0.10	0.35	0.12	-0.01	0.06	-0.17	-0.10	-0.14	-0.12
34. Night shift	-0.07	-0.05	-0.17	-0.35	0.03	0.12	-0.16	-0.32	0.20	0.38	-0.25	-0.34
35. Rotating/split shift	-0.02	-0.22	0.20	0.05	0.04	-0.03	-0.22	-0.13	-0.05	-0.19	0.09	0.24

Table 3 Continued

Intercorrelations among Key Model Variables

13	14	15	16	17	18	19	20	21	22	23	24
1.00											
-0.01	1.00										
0.23	0.18	1.00									
0.07	0.19	0.23	1.00								
0.10	0.22	0.26	0.58	1.00							
0.05	0.19	0.24	0.64	0.85	1.00						
-0.09	-0.04	-0.09	0.00	0.13	0.05	1.00					
-0.07	-0.07	-0.12	0.01	0.11	0.04	0.95	1.00				
-0.02	0.04	-0.19	0.10	-0.13	0.00	-0.01	0.00	1.00			
-0.07	0.19	0.13	0.06	0.02	0.09	-0.21	0.03	-0.07	1.00		
0.17	-0.20	-0.03	-0.11	-0.07	-0.19	0.13	-0.20	-0.06	-0.34	1.00	
0.08	-0.20	-0.12	-0.12	-0.10	-0.10	0.11	0.00	-0.01	-0.80	-0.15	1.00

Table 3 Continued

Intercorrelations among Key Model Variables

13	14	15	16	17	18	19	20	21	22	23	24
0.09	0.07	0.21	0.13	0.21	0.24	0.16	0.20	-0.05	0.04	-0.05	-0.14
-0.02	0.01	0.02	-0.05	0.04	0.04	0.00	0.18	-0.01	-0.07	-0.13	0.12
-0.29	0.22	-0.11	0.22	0.21	0.18	0.05	0.11	0.28	-0.30	-0.28	0.10
0.09	0.28	0.29	0.18	0.23	0.19	-0.03	0.20	0.03	0.19	-0.27	-0.19
-0.03	0.41	0.30	0.30	0.19	0.28	0.06	0.38	0.29	0.06	-0.15	-0.18
-0.09	0.13	0.11	0.16	0.16	0.24	0.10	0.27	0.16	0.12	-0.30	-0.06
0.08	-0.20	0.05	-0.17	-0.19	-0.14	0.04	-0.09	0.20	0.04	0.02	-0.11
0.00	-0.25	-0.11	-0.03	0.04	0.06	-0.28	0.26	-0.17	0.13	0.06	-0.04
0.04	-0.12	-0.26	-0.15	-0.03	-0.07	0.57	-0.13	0.13	-0.30	0.25	0.17
0.05	-0.16	-0.06	-0.20	-0.10	-0.08	0.28	0.02	-0.14	0.08	0.26	-0.12
-0.16	0.10	0.08	0.25	0.24	0.16	0.70	0.23	-0.04	-0.08	-0.11	0.03

Table 3 Continued

Intercorrelations among Key Model Variables

25	26	27	28	29	30	31	32	33	34	35
1.00										
-0.03	1.00									
-0.09	0.00	1.00								
0.12	-0.07	0.31	1.00							
0.18	0.11	0.38	0.59	1.00						
0.16	0.15	0.20	0.29	0.37	1.00					
0.14	0.09	0.05	0.26	0.17	0.05	1.00				
-0.14	-0.09	-0.27	-0.09	-0.36	-0.20	-0.17	1.00			
-0.09	0.01	0.04	-0.20	-0.12	-0.16	0.07	-0.21	1.00		
0.03	-0.14	-0.32	-0.16	-0.18	-0.12	-0.06	0.19	0.05	1.00	
0.29	0.02	0.21	0.10	0.18	0.19	0.06	-0.31	0.08	-0.20	1.00

Figure 2. Measurement model for latent factors (N=3050).

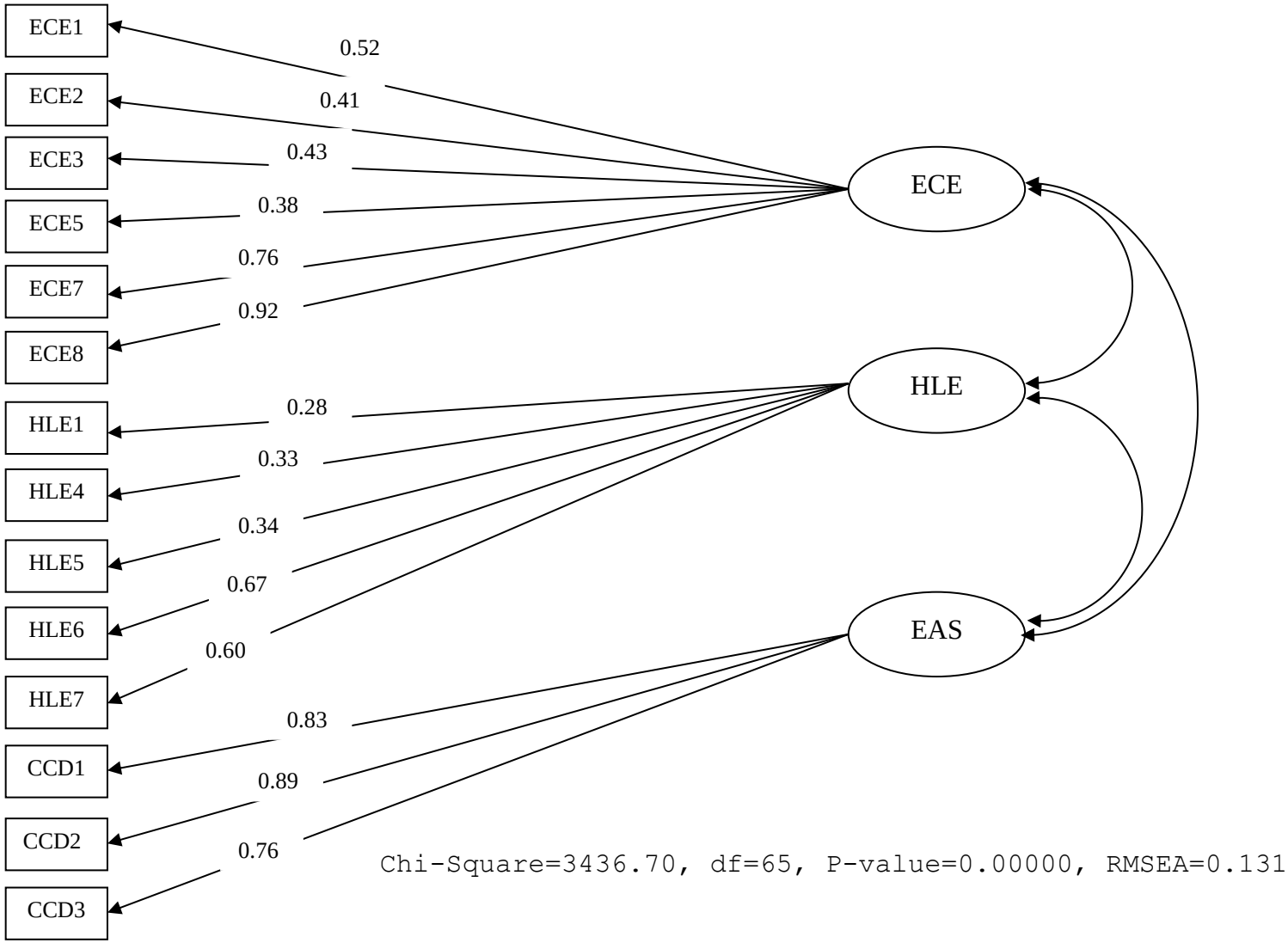
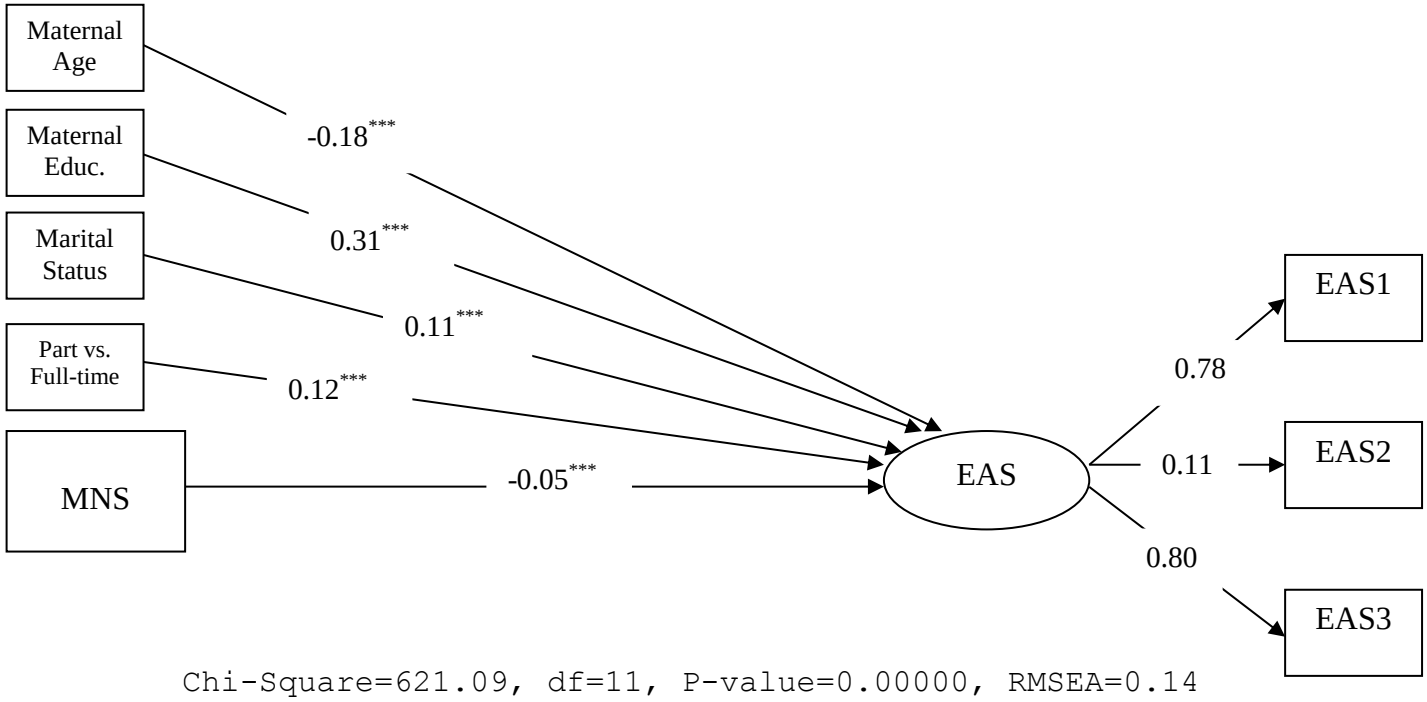


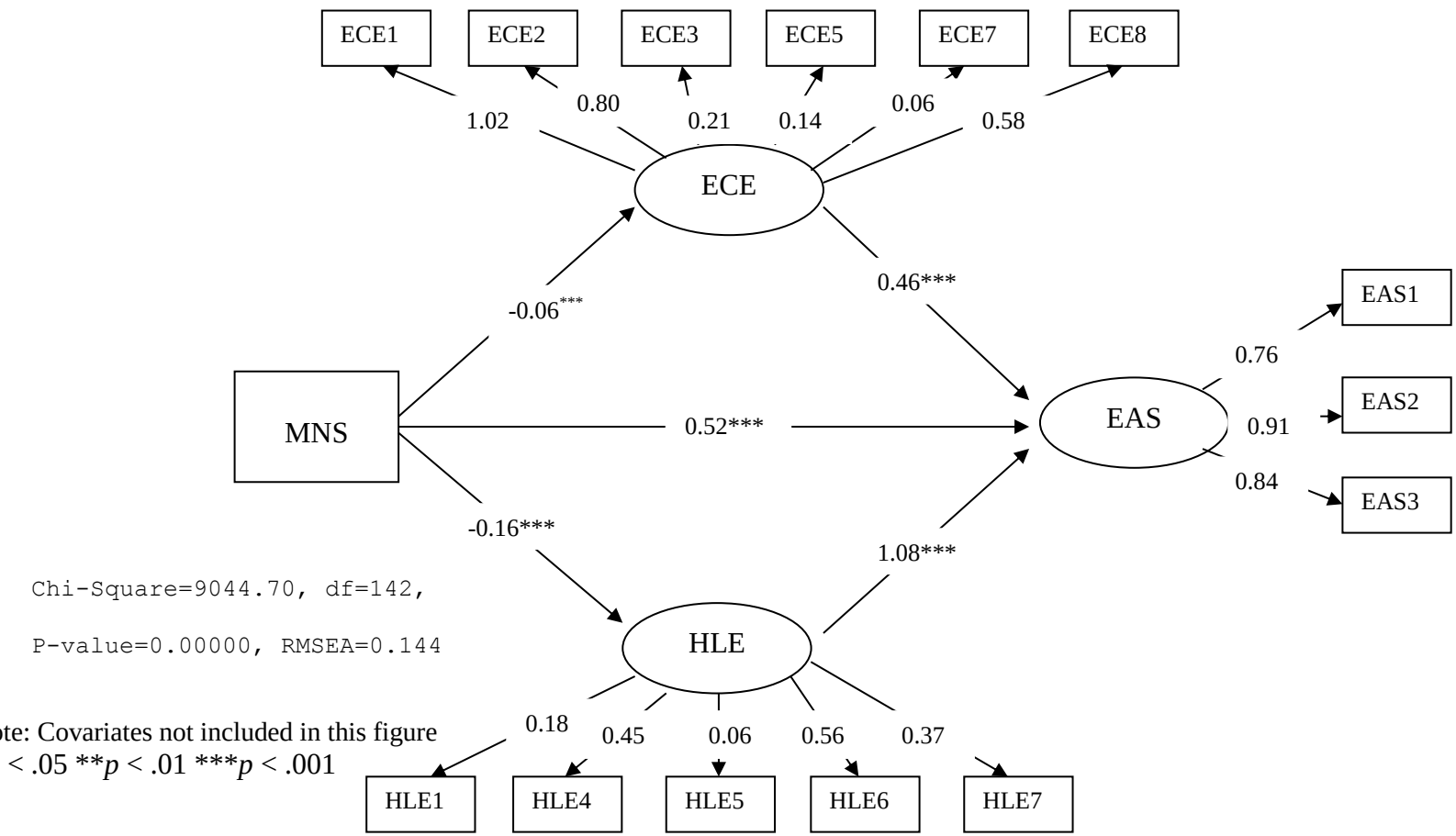
Figure 3. Standardized path coefficients for the direct association between maternal nonstandard work schedules and children's early academic skills (N=3050).



Note: Only significant paths shown here.

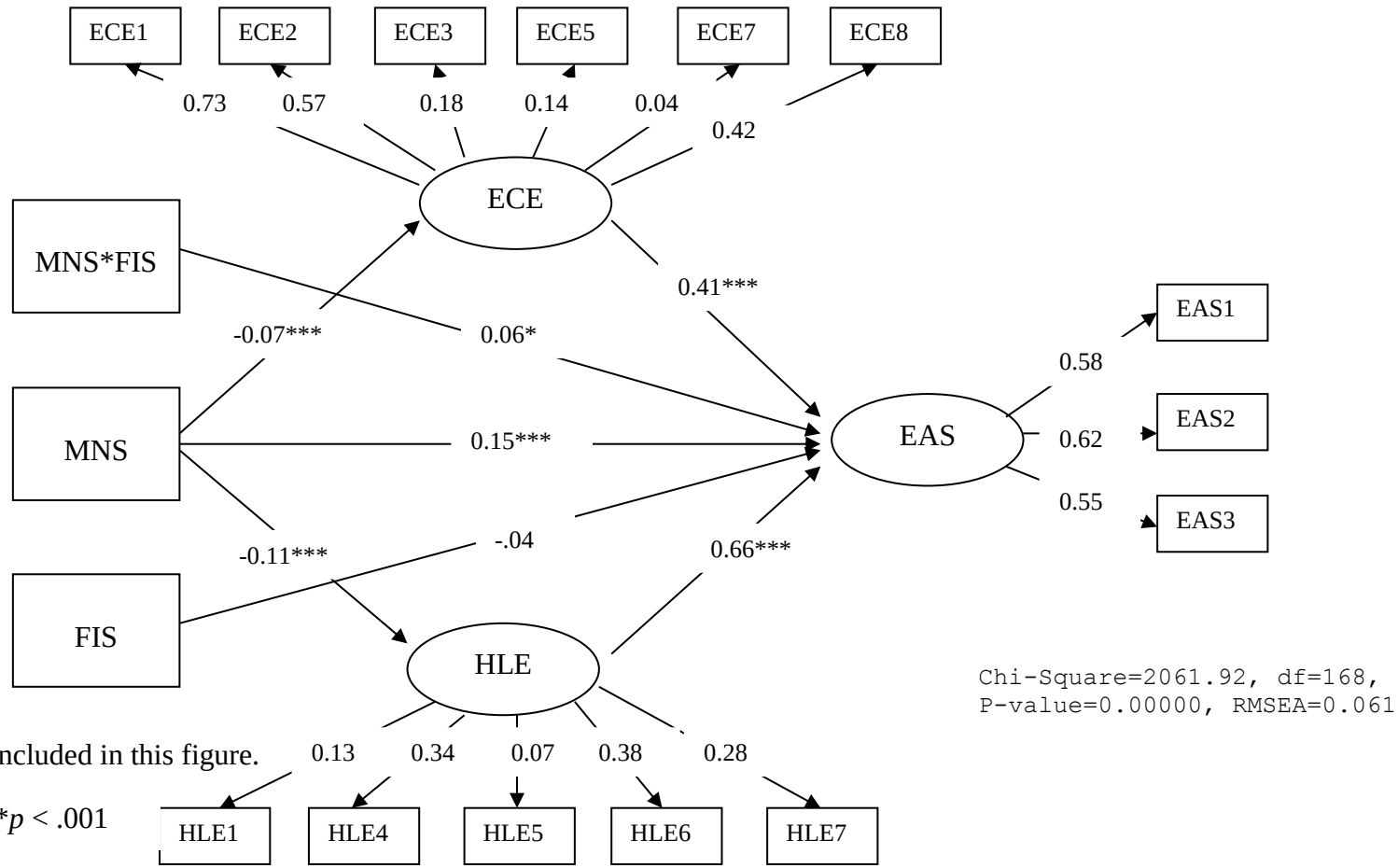
*$p < .05$ **$p < .01$ ***$p < .001$

Figure 4. Standardized path coefficients for the associations among maternal nonstandard work schedules, early care and education learning environments, home learning environments, and children's early academic skills (N=3050).



Note: Covariates not included in this figure
*p < .05 **p < .01 ***p < .001

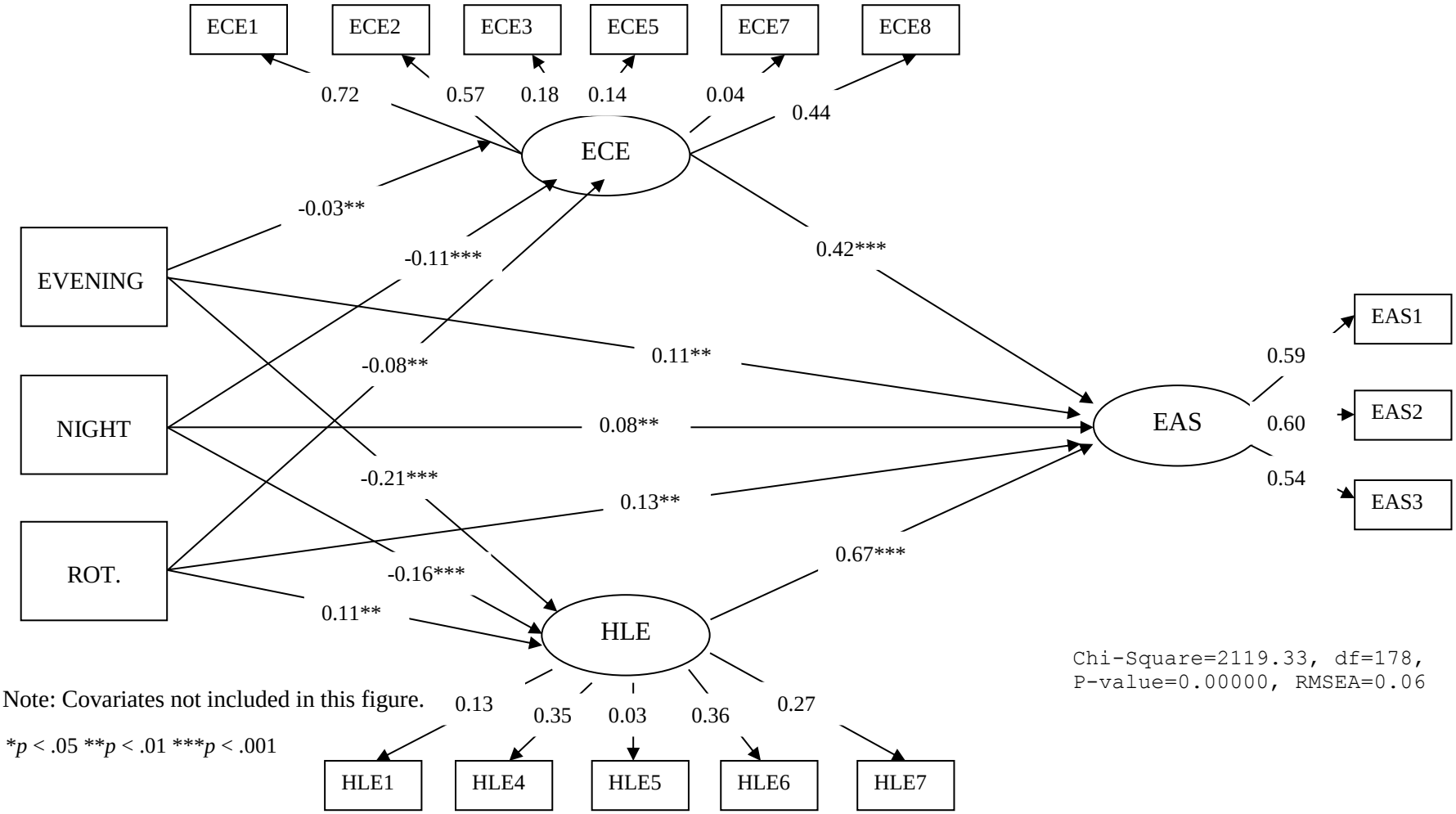
Figure 5. Standardized path coefficients for the associations among maternal nonstandard work schedules, early care and education learning environments, home learning environments, and children's early academic skills: Family income status as a moderator (N=3050).



Note: Covariates not included in this figure.

*$p < .05$ **$p < .01$ ***$p < .001$

Figure 6. Standardized path coefficients for the associations among maternal nonstandard work schedule types, early care and education learning environments, home learning environments, and children's early academic skills (N=3050).



Note: Covariates not included in this figure.

*$p < .05$ **$p < .01$ ***$p < .001$