

Investigating Child Care as a Protective Factor for Children of Adolescent Mothers<sup>1</sup>

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### Abstract

This dissertation investigated patterns of child care use over time, associations between early child care participation and child outcomes in early childhood, and possible mechanisms by which child care may foster positive development, using a randomized controlled-trial evaluation of a voluntary statewide home visiting family support program for first-time young parents. Participants were 704 mothers and their children ( $M_{age} = 12$  months-6 years) enrolled in the evaluation study. Findings revealed three main patterns of child care use over time: (1) low early child care use; (2) organized group care plus grandparent care; and (3) organized group care only. Compared to organized group care alone, organized group care plus grandparent care was associated with higher school readiness in children as well as lower parenting stress. Parenting stress did not mediate the association between child care and children's school readiness. These findings have important program and policy implications highlighting the benefits of grandparent care in conjunction with organized group care, the importance of creating a multigenerational approach to early education, and of promoting high quality and increased access to child care for children living in challenging contexts.

*Keywords:* child care, early education, child development, adolescent mothers, psychosocial risk, mechanisms, transactional-ecological model of development

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Table of Contents

Abstract ..... ii

Acknowledgements..... iii

Introduction ..... 1

CHAPTER ONE: LITERATURE REVIEW ..... 4

    The Landscape of Child Care and Early Education in the United States:  
    Historical Context ..... 4

        The Origins of Child Care in the United States ..... 4

        The Earliest Child Care Programs ..... 5

        Federal Involvement and the Expansion of Child Care Services ..... 6

        The Growing Demand for Child Care..... 8

        The Current State of Child Care in the United States ..... 9

        Summary and Rationale for Present Study.....14

    Child Care Utilization and Children’s Developmental Functioning.....16

        Model Early Childhood Programs and Children’s Development.....17

        Community-Based Child Care and Children’s Development .....23

            Child care and child development in nationally representative samples.....23

            Child care and child development for children living in challenging  
            contexts.....25

        Grandparent Care and Children’s Development.....27

        Summary and Rationale for Present Study.....29

    Mechanisms Underlying the Association Between Child Care and Development  
    .....31

        Theoretical Framework .....31

        Research Related to the Direct and Indirect Benefits of Child Care .....35

        Summary and Rationale for Present Study.....38

    Present Study .....40

        Research Questions and Hypotheses.....42

CHAPTER TWO: METHOD.....45

    Participants and Procedure .....45

    Measures.....47

        Child care utilization. ....47

        Child executive function (EF) measures. ....48

            Corsi block-tapping task. ....48

            Digit Span (DS) task.....49

Head-Toes-Knees-Shoulders (HTKS) task.....	50
Bracken School Readiness Assessment.....	51
Parenting Stress Index Short Form (PSI-SF).....	52
Analytic Strategy.....	53
CHAPTER THREE: RESULTS.....	58
Preliminary Analyses .....	58
Research Question 1a: Extent and Type of Nonparental Child Care Used.....	58
Research Question 1b: Patterns of Child Care Participation Across Time .....	59
Research Question 2: Relations Between Child Care and Child Outcomes ....	64
Research Question 3: Mechanisms by Which Child Care Fosters Development .....	65
CHAPTER FOUR: DISCUSSION.....	69
Extent and Type of Child Care Utilization.....	71
Patterns of Child Care Use .....	74
Relations Between Child Care Classes and Children’s Development .....	77
Possible Mechanisms by Which Child Care May Foster School Readiness....	84
Additional Study Limitations .....	87
Research, Program, and Policy Implications.....	88
References .....	93
Table 1.....	113
Table 2.....	114
Table 3.....	116
Table 4.....	117
Table 5.....	118
Table 6.....	119
Figure 1 .....	120
Figure 2 .....	121
Figure 3 .....	122
Figure 4 .....	123
Figure 5 .....	124

## List of Tables

Table 1. Overview of Research Questions and Analytic Strategies

Table 2. Sample Descriptive Information

Table 3. Types of Child Care Used (10 or more hours per week)

Table 4. Extent of Child Care Used (10 or more hours per week)

Table 5. Model Fit Statistics for Longitudinal Latent Class Analysis

(LLCA)/Repeated Measures Latent Class Analysis (RMLCA) for a Model  
With One, Two, Three, and Four Classes

Table 6. Means, Standard Errors, and Mean Comparison of Covariates by Class

## List of Figures

- Figure 1. A transactional-ecological framework of individual-context relations:  
Child care and developmental outcomes.
- Figure 2. Conceptual model illustrating the proposed mediation model in which parenting stress is hypothesized to mediate the association between child care use and children's school readiness (accounting for prior levels of the mediator and outcome variables).
- Figure 3. Model estimated probabilities for a three-class solution.
- Figure 4. Class-specific means of Bracken School Readiness Scores for a three-class model.
- Figure 5. Mediation model: Child care (i.e., organized group care, organized group care plus grandparent care) and school readiness through parenting stress.

## Introduction

Human development is a product of complex interrelations between individuals and the multiple contexts in which they are embedded (e.g., Lerner, 2006; Sameroff, 2009). Accordingly, children's early experiences within the environments they navigate lay the foundation for development throughout the life span (e.g., Shonkoff, 2000). Children in the United States spend a considerable amount of time in child care settings. Every week, nearly 11 million children younger than age five spend over 35 hours per week in nonparental child care. Of these children, three million partake in multiple child care arrangements (Child Care Aware of America, 2016). As a substantial number of children continue to be placed in nonparental child care, it has become increasingly important to further investigate the types of child care that families are using over time, the influence of children's early experiences in these settings on their development, and the direct and indirect pathways that may account for these associations.

Previous research that has focused on children with psychosocial risk factors (e.g., poverty and low income, violence exposure, maternal depression) has often taken a deficit approach to understanding development. However, the consideration of contextual assets that may promote positive child and family development despite exposure to adverse conditions is important in order to optimize development and gain a stronger understanding of developmental functioning in at-risk populations. Research investigating the impact of early child care on development suggests that for children with psychosocial risk factors, nonparental

child care can promote positive development and serve as a barrier against risks that adversely influence development.

Although a substantial number of studies have investigated the impact of child care on the development of children from low-income families, there is a dearth of research focused specifically on children of adolescent mothers, a group also at risk for challenging economic, educational, and psychosocial trajectories. Furthermore, few studies have investigated the mechanisms by which child care may foster positive development. Given the limited research in these areas, this dissertation aimed to investigate patterns of child care use from infancy to early childhood, associations between child care participation and socioemotional and cognitive functioning in early childhood (at approximately six years of age), and possible mechanisms by which child care fosters positive development using a randomized controlled-trial evaluation of a child maltreatment prevention program for adolescent parents.

In the first chapter of this dissertation, I present an empirical and theoretical framework for the present study in order to provide context and rationale for the dissertation. Specifically, I discuss the current landscape of child care and early education, present research investigating associations between child care utilization and children's developmental functioning, and consider the potential mechanisms underlying the relations between child care and children's development. Detailed rationale for the present study is presented after each section. The chapter ends with a discussion of the overall purpose of the dissertation as well as the related research questions and corresponding hypotheses. In the chapters following, I describe the

research design and methodology of the dissertation as well as the analytic strategy for the present study. The dissertation results are then reported, and a discussion of the findings is provided. The dissertation concludes with the consideration of the research, program, and policy implications of the current work.

## CHAPTER ONE: LITERATURE REVIEW

### **The Landscape of Child Care and Early Education in the United States:**

#### **Historical Context**

Child care settings serve as one of the most common contexts for early development in the United States. In a typical week, it is estimated that over 60% of the 20 million children under the age of five are in at least one nonparental child care arrangement (Mamedova, Redford, & Zukerberg, 2013; U.S. Census Bureau, 2013). These children spend an average of 36 hours a week in child care settings, with one quarter of children participating in multiple child care arrangements (Child Care Aware of America, 2016). These figures demonstrate the widespread use of nonparental child care and underscore the high demand for child care and early education in this country. In fact, the demand for child care has increased significantly over the past quarter century due in part to the steep rise in women's workforce participation and the increased reliance on two-parent incomes (e.g., Blank, 1997; U.S. Census Bureau, 2013). As a result, the current state of child care and early education is changing, but it also reflects the early child care systems that were in place in the nineteenth and twentieth centuries.

#### **The Origins of Child Care in the United States**

The history of child care and early education in the United States is complex, yet it provides an important frame of reference for understanding the current landscape of child care and early education in this country. The purpose of child care has shifted substantially over time and the past two centuries have produced disparate and fluctuating child care systems. Moreover, the populations

served by child care programs have differed depending on contextual, economic, and political changes, and an assortment of inconsistent funding sources have played a role in sustaining these care systems.

### **The Earliest Child Care Programs**

The earliest forms of nonparental child care emerged in the mid-nineteenth century and targeted select populations, beginning with low-income and immigrant children during the Day Nursery Movement followed by middle and upper-middle class families during the nursery school movement (e.g., Cohen, 1996; Michel, 2011). In the midst of rapid industrialization and growing numbers of immigrants, the number of wage-earning women rose substantially (e.g., Durst, 2005). Day nurseries allowed women to work outside of the home while continuing to raise children. Additionally, these care settings aimed to keep children safe, keep families together, and assimilate immigrant children into American culture (e.g., Cohen, 1996; Durst, 2005, Kamerman & Gatenio-Gabel, 2007; Wrigley, 1989). Private funders and small parent fees were the primary funding sources of day nurseries in addition to occasional monetary support from states (e.g., Cohen, 1996).

Following day nurseries, the nursery school movement developed in the early twentieth century but served a higher-income population who were interested in placing their children in early educational environments (e.g., Cohen, 1996; Michel, 2011). In contrast to day nurseries, the nursery school movement focused on fostering positive physical and social-emotional development in children. Thus, these arrangements were not solely care settings but were considered contexts for early education and foundations for future success. Moreover, contrary to day

nurseries, which functioned from a combination of outside funding and modest payments from parents, parent fees were the primary support for these services (e.g., Cohen, 1996; Wrigley, 1989).

### **Federal Involvement and the Expansion of Child Care Services**

Federal funding for child care in this country has often resulted from the necessity for parental workforce participation (e.g., Cohen, 1996). For example, the first instance of federal funding for child care stemmed from the provision of government-paid jobs for unemployed parents in the 1930s, during the Great Depression (e.g., Cohen, 1996; Lamb, Sternberg, Hwang, & Broberg, 1992). In response to the rampant unemployment of the time, the emergency nursery school program was temporarily instituted to facilitate parental job attainment and to provide supports for children amidst difficult economic and social circumstances (e.g., Lamb, Sternberg, Hwang, & Broberg, 1992). Although child care services were only offered to families who were receiving federal aid, these families were diverse and fairly representative of the general population, given the large number of families that were impacted by the economic crisis (e.g., Cohen, 1996).

Federal funds for child care were provided again during World War II in order to facilitate women's essential workforce participation (e.g., Riley, 1994; Tuttle, 1995). In 1940, Congress passed the Lanham Act and opened child care facilities in communities with war-related industries, to enable women to work in those jobs (Cohen, 1996; Tuttle, 1995). Child care programs under the Lanham Act were the most wide-reaching and inclusive child care services that have ever been offered in the United States, providing services to all children regardless of age and

income status (e.g., Cohen, 1996; Riley, 1994; Tuttle, 1995). However, similar to child care offered during the Great Depression, funding for child care programs during this time was only temporary, and these programs closed after the war ended (e.g., Cohen, 1996; Riley, 1994).

The child care system in place throughout World War II was the last time that the United States had a universal government-funded child care system for working parents. Since that time, select populations and programs have received federal funding for child care but universal, government funded services have not been instituted. For example, the federal government allocated funding for low-income families in the 1960s when President Johnson declared the War on Poverty. As a result, Head Start programs were established under the Economic Opportunity Act of 1964 in an effort to eliminate poverty by providing educational opportunities for disadvantaged preschool children as well as services related to health, social-emotional development, and nutritional needs (e.g., Cohen, 1996; ECLKC, 2015; Wrigley, 1989).

Shortly after the initiation of the Head Start program, early childhood advocates attempted to institute universal child care again, but were unsuccessful. In 1971, Congress enacted the first national child care legislation and worked to pass a bill to create comprehensive and federally funded child care services (e.g., Cryer & Clifford, 2003). However, the bill did not receive support from President Nixon as he believed that such a system would represent a “communal approach to child-rearing” and give the government inappropriate control over traditional family duties (e.g., Cohen, 1996; Cryer & Clifford, 2003). The rejection of this bill

impeded future efforts to institute public universal child care and led to a more fragmented system of child care with an assortment of programs functioning primarily in a private market system. Subsequently, similar to government support in the early twentieth century, federal funding for child care during the late twentieth century stemmed from women's increased workforce participation.

### **The Growing Demand for Child Care**

The increased demand for child care over the last 25 years has stemmed primarily from the institution of welfare reform policies through the Family Support Act of 1988 and the Personal Responsibility and Work Opportunity Reconciliation Act of 1996. This legislation aimed to increase employment and reduce the use of public assistance by low-income families through the mandated employment of welfare recipients (e.g., Blank, 1997; Herbst & Tekin, 2010; Vesely & Anderson, 2009). As a result of these policies, the number of women entering the workforce rose considerably, as did the need for child care services in order to support the influx of working mothers. In 2013, the US Census Bureau reported that 10.9 million preschoolers lived with employed mothers compared to 8.2 million children in 1985 (U.S. Census Bureau, 2013). Consequently, the Child Care and Development Fund (CCDF) was established, combining preexistent child care funding sources and giving states substantial control over funding use (Blau & Tekin, 2001; Lowe & Weisner, 2004). The Child Care and Development Fund is still the principal source of federal funding for low-income families in the United States and is the primary form of federal support used for child care quality improvement efforts (Administration for Children and Families, 2012).

Although changes in workforce participation are the primary forces that have driven up the demand for child care, advancements in early childhood research have also contributed to the high demand for nonparental care in the United States (e.g., Guzman et al., 2009). Research focused on the benefits of child care and the impact of early education on children's development have heightened public awareness of child care programs, increased interest in utilizing out-of-home care, and fueled families' desire to place children in child care settings with positive developmental benefits and educational opportunities (e.g., Guzman et al., 2009). This research has shown that child care fosters positive development in a number of developmental domains (e.g., Campbell et al., 2012; Caughy et al., 1994) and that investments made in early childhood offer the highest rate of return (e.g., Heckman, 2008).

### **The Current State of Child Care in the United States**

Child care remains in high demand today with over 60% of young children participating in regular child care arrangements (e.g., Mamedova, Redford, & Zukerberg, 2013; U.S. Census Bureau, 2013). The current child care system still resembles the patchwork system that was in place several decades ago with a collection of organized group (e.g., center-based child care, family child care programs) and informal care arrangements (e.g., family, friends, babysitters) that have disparate purposes ranging from standard care to early education services (e.g., Kamerman & Gatenio-Gabel, 2007; Mamedova, Redford, & Zukerberg, 2013; U.S. Census Bureau, 2013). Children tend to spend 3 to 11 hours per day in these care settings including part-day, full-school-day, and full-work-day arrangements

(e.g., Kamerman & Gatenio-Gabel, 2007).

Moreover, organized group care programs are provided through both private and public markets with an assemblage of different funding streams depending on income level (e.g., Cohen, 1996; Kamerman & Gatenio-Gabel, 2007; Mamedova, Redford, & Zukerberg, 2013; U.S. Census Bureau, 2013). In addition, organized group care arrangements in particular are marked by inconsistent quality and differing regulations depending on the state and child care type. For example, research suggests that the quality of care in family child care programs is lower compared to child care centers, likely because these settings are not as strongly regulated, and licensing requirements differ substantially across states (e.g., Administration for Children and Families, 2011; Bassok, Fitzpatrick, Greenberg, & Loeb, 2016). Furthermore, only 11% of child care programs in the country are accredited by the National Association for the Education of the Young Child or the National Association for Family Child Care. In South Dakota, 1% of child care centers and family homes are accredited compared to 46% in Connecticut (e.g., Durana & Schulte, 2016).

Common organized group care programs utilized by families include preschool, center-based child care, and family child care programs (e.g., Mamedova, Redford, & Zukerberg, 2013; U.S. Census Bureau, 2013). Preschools serve children between the ages of three and five and include both private and public programs that typically offer half-day services (e.g., Kamerman & Gatenio-Gabel, 2007). Center-based child care includes full-day programs that usually function five days a week for the full year. These programs also serve three- to five-

year-olds but some additionally provide care for infants under the age of three (e.g., Kamerman & Gatenio-Gabel, 2007). Head Start began as a preschool program but many programs now offer full day services for three- to five-year-olds. As previously described, Head Start programs are federally funded, target low-income children, and offer comprehensive services including education, health, nutrition, and developmental supports (e.g., ECLKC, 2015; Kamerman & Gatenio-Gabel, 2007). Similarly, Early Head Start (EHS) programs serve infants and toddlers under the age of three, and pregnant women, providing intensive comprehensive child development and family support services to low-income infants, toddlers, and their families. Family child care programs are delivered in a provider's home and are intended for infants and children through age five. Generally, these programs serve up to 10 children and vary in terms of regulations and accreditation status across states (Child Care Aware of America, 2016).

As previously noted, the abovementioned organized group care environments (e.g., center-based child care, family child care programs) differ in relation to quality, regulations, and licensing. For example, family child care settings have different regulations compared to center-based care, and enforcement of regulations varies across programs and states (e.g., Administration for Children and Families, 2011). Standard licensing is not required for family child care programs and licensing requirements are not standardized across states. For example, Idaho, Louisiana, and New Jersey do not have mandatory licensing requirements for family child care programs, and Indiana and Kansas do not include family child care programs in their regulation requirements (Administration for

Children and Families, 2011). In addition, there are differences in requirements related to provider qualifications and health standards across programs. Only one third of states require family child care providers to have a high school diploma and only 12 states require environmental health inspections in family child care settings (Administration for Children and Families, 2011).

Statistics pertaining to the percentage of children in different forms of nonparental child care differ across sources but nonetheless demonstrate the widespread use of child care in this country as well as the variety of child care arrangements utilized by American families. According to representative data from the 2012 National Household Education Survey, out of the 60% of children under the age of five in nonparental child care, 56% of children attend preschool and other center-based care programs, 24% are cared for in a private home by nonrelatives, and 42% are under the care of a family member. For children cared for by relatives, 78% are in grandparent care, 11% are cared for by aunts or uncles, and 10% are cared for by other relatives (Mamedova, Redford, & Zukerberg, 2013).

The US Census Bureau presents different figures using representative data from the US population. Similar to the National Household Education Survey, 61% of children under the age of five are reported to be in some type of regular child care arrangement. However, about a quarter of children are reported to be cared for in organized facilities, with 13% of children in day care centers, 6% in preschool programs, and 5% in family child care programs (U.S. Census Bureau, 2013). Six percent of these children were also reported to be in Head Start programs, but this estimate includes children under the age of five who were also in a kindergarten or

grade school program. In addition, the US Census Bureau (2013) reported that 42% of children are under the care of relatives. However, parents and siblings are included in these estimates. Of these children, grandparents and other relatives are reported to care for 24% and 7% of children respectively (U.S. Census Bureau, 2013). Furthermore, 22-29% of children were reported to be in multiple child care arrangements depending on the child's age. While the statistical differences between these two data sources may result from differences in the ways in which child care categories were defined, the reasons for some of the observed inconsistencies are still unclear.

Moreover, although these statistics are meant to be representative of the overall population in the United States, child care utilization differs greatly based on income level (e.g., U.S. Census Bureau, 2013). For example, low-income children are less likely to be placed in organized group care compared to families with incomes at least twice the federal poverty level. Among poor and low-income children with working mothers, 19-22% of children participate in center-based programs compared to 29% of higher-income children (U.S. Census Bureau, 2013). In addition, poor and low-income children are more likely to be cared for by a relative at home compared to higher-income children (30-33% compared to 25%) (U.S. Census Bureau, 2013). Moreover, low-income children are less likely to be placed in higher quality child care arrangements. For example, results from the NICHD Study of Early Child Care and Youth Development (SECCYD) showed that at six months of age, 18.3% of low-income infants were in high quality child care arrangements compared to 34.2% of high-income infants. Similar figures were

reported at 24 months of age with 8.1% of low-income infants in high quality care compared to 42.3% of higher-income participants (Dearing, McCartney, & Taylor, 2009).

These figures demonstrate the differences that exist in child care delivery and utilization, a trend that has persisted throughout history. Insufficient funding at federal and state levels prevents many low-income families from receiving child care assistance and therefore using organized group care (e.g., Adams & Rohacek, 2002; Lowe & Weisner, 2004). Moreover, families that are eligible for child care assistance face a number of barriers in obtaining and using subsidies such as administrative complications or provider acceptance rates and fees (e.g., Adams, Snyder, & Sandfort, 2002; Herbst & Tekin, 2010). In addition, there are several factors that often lead low-income families to choose more informal care arrangements (e.g., family or friend care). For instance, there may be cultural beliefs surrounding parenting or the belief that children in organized group care may receive lower quality care (e.g., Lowe & Weisner, 2004).

### **Summary and Rationale for Present Study**

Overall, a substantial percentage of young children in the United States spend an extensive amount of time in nonparental child care contexts. The current child care and early education landscape derives from centuries of transitory, disparate, and fragmented child care systems. The majority of child care movements in the United States surfaced to ameliorate a social, economic, or war-related problem, offered particular child care services based on individual or contextual factors, and thus had divergent purposes that were rarely integrated. This

history is reflected in our current system of child care where conflicting child care values still exist and where the division between standard care and early education is still readily apparent within many child care arrangements. Moreover, this history has influenced the current configuration of child care services, which is characterized by a mixed delivery system with a collection of organized group care and informal care arrangements as well as disjointed sources of funding. Thus, although child care and early education have evolved throughout history, the historical roots of child care in this country are tightly woven throughout our contemporary system of care and within the policies and programs that shape it.

As previously noted, in certain instances, the National Household Education Survey and US Census Bureau may differ in regard to the ways in which they define particular child care categories, leading to differences in child care statistics among these two data sources. These incongruities, in addition to other unexplained discrepancies, however, make it difficult to get an accurate picture of overall child care experiences in the United States. Accordingly, further study of child care utilization is necessary to gain a stronger understanding of child care prevalence in this country. In addition, although rates and patterns of child care utilization have been studied across low-income populations, there has been limited empirical examination of child care utilization in other populations of children that are at increased risk for medical, psychological, developmental, and social problems, particularly children born to adolescent mothers. One study has shown that nonparental child care was prevalent in a sample of adolescent mothers and their children (i.e., children spent over 30 hours per week in organized group care and

nearly 20 hours per week in the care of grandparents or other family and friends) (Katz & Easterbrooks, under review). These findings parallel research documenting the overall prevalence of nonparental child care in the United States and highlight the importance of studying child care participation in children of young mothers. In order to continue to address the gaps of knowledge related to child care use in children of adolescent mothers, this dissertation built upon these results and investigated the extent of child care use, the type of child care utilized, and patterns of child care participation across time among children of adolescent mothers.

### **Child Care Utilization and Children's Developmental Functioning**

The extensive time that children spend in early care arrangements underscores the importance of evaluating the impact of children's early child care experiences on developmental functioning. Thus, it is essential to consider the child care environment in relation to children's developmental outcomes. In this context and in all instances following, "outcome" is not used to signify a developmental aspect or static developmental end but refers to a statistical association related to developmental functioning in a particular domain. Furthermore, although a substantial number of infants and children of all ages participate in a variety of different child care arrangements, the majority of research investigating relations between child care participation and child outcomes has focused primarily on organized group care (e.g., center-based child care) in preschool-age children. Moreover, despite the widespread prevalence of family child care providers, little research has considered family child care programs in relation to child functioning. Therefore, subsequent discussion of organized group care and children's

development primarily focuses on center-based child care arrangements and developmental functioning in young children.

Although some studies suggest that organized group care may be associated with negative behavioral outcomes (e.g., Magnuson, Ruhm, & Waldfogel, 2007; NICHD Early Child Care Research Network, 2003), research investigating the impact of early child care on development suggests that these child care environments can promote positive child development in a variety of areas (e.g., cognitive, academic, social) (e.g., Campbell et al., 2012; Gormley, Gayer, Phillips, & Dawson, 2005; Isaacs, 2008). Moreover, for families living in challenging contexts (e.g., children from low-income families), child care has been found to serve as a barrier against risks that adversely influence developmental trajectories (e.g., Caughy, DiPietro, & Strobino, 1994).

### **Model Early Childhood Programs and Children's Development**

The strongest evidence for the positive developmental impact of child care stems from rigorous evaluations of three high quality, comprehensive early childhood programs. Findings from a series of long-term studies demonstrate that the Carolina Abecedarian Project, the High Scope Perry Preschool program, and the Chicago Child-Parent Centers promote positive child development, school readiness, academic achievement, and future life success (e.g., Campbell et al., 2012; Reynolds & Temple, 2005; Schweinhart et al., 2005). These center-based programs are viewed as highly effective early education interventions and were specifically designed to support positive development in children from disadvantaged backgrounds (e.g., Isaacs, 2008).

The Carolina Abecedarian Project and the High Scope Perry Preschool program were well-designed early education programs that were evaluated with rigorous randomized controlled trials. Through a series of experimental studies, researchers found that program participants outperformed the control groups on a variety of assessments (e.g., cognitive, language, academic). Furthermore, long-term follow-up studies show positive outcomes in the experimental group through adulthood (e.g., lower criminal activity, higher rates of schooling and employment, stronger relationships) (e.g., Campbell et al., 2012; Isaacs, 2008; Schweinhart et al., 2005). The Carolina Abecedarian Project served low-income children in North Carolina between 1972 and 1977 and provided intensive, year-round services to program participants from infancy through age five. Developed using a General Systems Theory framework (von Bertalanffy, 1975), the intervention was created with the idea that children's early environments strongly impact development. Thus, the full-day program was established to create a high-quality environment for vulnerable children where positive development could unfold and be sustained (e.g., Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002). The program included small child-teacher ratios and curriculum that aimed to foster positive social and emotional development, cognitive stimulation, motor skills, and linguistic abilities. The center-based program was also supplemented by a home visiting component for the first three years of program participation (Campbell et al., 2002; Campbell & Ramey, 1994; Currie, 2001; Isaacs, 2008; Vandell, 2004).

After comparing program participants with the control group who did not participate in the intensive early education program, researchers reported that the

experimental group outperformed the control group on cognitive assessments measured at 18 months, 8 years, and 12 years of age (Campbell & Ramey, 1994; Ramey & Campbell, 1991). Moreover, at 8 and 12 years of age, program participants scored higher on tests of math and reading and continued to show higher performance on these achievement assessments through 15 and 21 years of age relative to the control group (Campbell & Ramey, 1995; Ramey & Campbell, 1984). Furthermore, the experimental group demonstrated higher rates of high school graduation and college attendance as well as more years of overall schooling. As a result, program participants had higher employment rates and income levels, stronger family-based relationships in adulthood, lower levels of criminal activity, and better health outcomes compared to the control group (e.g., Campbell et al., 2012; Campbell et al., 2014; Council of Economic Advisers, 2015; Currie, 2001; Isaacs, 2008).

Comparable results have been found in evaluations of the High Scope Perry Preschool Project (e.g., Council of Economic Advisers, 2015; Schweinhart, 2003; Schweinhart, 2007; Schweinhart et al., 2005). The Perry Preschool program provided children with age-appropriate early education activities and emphasized active and self-directed learning (e.g., Currie, 2001; Isaacs, 2008; Schweinhart, 2003; Schweinhart et al., 2005). The program served low-income three- and four-year-old African-American children who were at high risk of academic failure in Michigan during the 1960s. The center-based half-day program operated on weekdays during the academic year and included weekly home visits, small child-teacher ratios, and activities that promoted cognitive, social, and physical

development (e.g., Currie, 2001; Isaacs, 2008; Schweinhart, 2003; Schweinhart et al., 2005).

Program participants have been assessed until 39 to 41 years of age, the longest evaluation of its kind (e.g., Council of Economic Advisers, 2015). Comparisons to a control group of children who did not receive the intervention program revealed that program participants scored higher on language and cognitive assessments in preschool and scored higher on math and literacy assessments at nine and ten years of age (Schweinhart, 2003; Schweinhart, 2007; Schweinhart et al., 2005). Perry Preschool participants also demonstrated higher motivation, more positive attitudes towards school, and higher rates of homework completion through age 15 (e.g., Council of Economic Advisers, 2015). In addition, the program group showed higher literacy abilities at 19 and 27 years of age and had higher rates of school completion (Schweinhart, 2003; Schweinhart, 2007; Schweinhart et al., 2005). Long-term outcomes revealed that program participants had lower rates of criminal activity, stronger relationships, and fewer teenage pregnancies relative to the control group (Barnett, 1995; Currie, 2001; Schweinhart, 2007; Schweinhart et al., 2005). Moreover, program participants' earnings were approximately 25% higher than the control group when assessed through age 40 (e.g., Heckman, Moon, Pinto, Savelyev, & Yavitz, 2010).

Evaluations of the Chicago Child-Parent Centers (CPC) have additionally demonstrated positive short- and long-term outcomes stemming from program participation (e.g., Reynolds & Temple, 2005). Although a quasi-experimental design with a matched comparison group was used rather than the random

assignment design employed in evaluations of the Abecedarian Project and the Perry Preschool Program, positive results through age 24 in a variety of areas can be observed (e.g., Isaacs, 2008). The CPC program was established in 1967 and is still in operation. The centers provide high quality early education and family supports to low-income children and their families.

The program was designed to improve school attendance, family engagement, and student achievement, and aims to promote language skills, self-confidence, and school readiness (e.g., Isaacs, 2008; Reynolds & Temple, 2005). Program participants receive half-day, preschool services through the Chicago Public Schools, and the program includes a comprehensive parent involvement component as well as services during the summer months (e.g., Reynolds & Temple, 2005). Families who participate in the program are offered a team of providers including a head teacher, parent resource teacher, and school community representative. Families can receive the intervention program for up to six years (through Grade 3) (e.g., Reynolds & Temple, 2005; Temple & Reynolds, 2007).

Researchers have assessed program participants into adulthood; this evaluation is the most extensive study of a publicly funded preschool program (e.g., Temple & Reynolds, 2007). Assessments were conducted between kindergarten and seventh grade, and additionally at 15, 17–18, and 22 years of age (e.g., Temple & Reynolds, 2007). Findings showed that relative to the comparison group, program participants scored higher on tests of school readiness at five years of age and reading achievement at 14-15 years of age (e.g., Reynolds, 1995; Temple & Reynolds, 2007). Program participants were also less likely to repeat a grade and

receive special education services (e.g., Isaacs, 2008; Reynolds, Temple, Robertson, & Mann, 2001; Temple & Reynolds, 2007). Moreover, higher rates of high school graduation and college attendance were observed in program participants as well as lower levels of child maltreatment, juvenile and adult criminal activity, and depressive symptoms (e.g., Isaacs, 2008; Reynolds et al., 2007; Reynolds, Temple, Robertson, & Mann, 2001; Temple and Reynolds 2007). Findings also showed that earlier entry into the program (e.g., preschool vs. kindergarten) was associated with higher school achievement and more long-term outcomes (Reynolds & Temple, 2005).

Findings from the Abecedarian Project, the Perry Preschool program, and the Chicago Child-Parent Centers demonstrate the positive impact that quality, comprehensive early childhood programs can have across the life span, specifically for children growing up in adverse circumstances. Findings from these studies show that well-designed intervention programs can promote positive child development, school readiness, academic achievement, and long-term success in work and social settings. However, these model programs are not representative of the naturally occurring child care and early education services available to the majority of families in the United States and primarily focus on preschool-age children. Moreover, as previously noted, child care services in this country are dramatically shaped by state regulations and funding. Studies that have investigated the impact of community-based child care on developmental outcomes provide mixed results in relation to the benefits of early education and care for children in this country (e.g., Gormley, Gayer, Phillips, & Dawson, 2005; Magnuson, Ruhm, & Waldfogel,

2007). However, research investigating the impact of community-based child care on development in children living in challenging contexts (e.g., low-income children) consistently shows that child care can promote positive outcomes and serve as a protective factor in young children's development (e.g., Caughy, DiPietro, & Strobino, 1994).

### **Community-Based Child Care and Children's Development**

Extant research exploring the impact of community-based child care on development presents mixed evidence regarding the positive benefits of nonparental child care on child outcomes. Although many studies suggest that child care fosters positive cognitive and academic outcomes for children, other studies have shown that child care participation is associated with behavioral problems. Despite these mixed results, studies that have focused specifically on children with psychosocial risk factors consistently confirm the positive benefits of child care in relation to cognitive and school-based outcomes as well as socioemotional and behavioral development.

#### **Child care and child development in nationally representative samples.**

Positive cognitive and academic skills stemming from child care participation can be observed in a quasi-experimental study conducted by Gormley and colleagues (2005) with a diverse sample of children. Researchers investigated the impact of Oklahoma's universal prekindergarten program on children's development when entering kindergarten and included children who either participated in the universal prekindergarten program or did not participate in the program before entering kindergarten. Results indicated that prekindergarten program participation was

associated with significantly higher scores on reading tests, prewriting and spelling assessments, and math-related evaluations compared to the control group of children when measured at kindergarten entry. Moreover, positive outcomes were observed in all prekindergarten participants, regardless of race, ethnicity, and income level (Gormley, Gayer, Phillips, & Dawson, 2005).

Conversely, Magnuson and colleagues (2007) found that prekindergarten program participation was associated with positive cognitive development but negative behavioral outcomes in a nationally representative sample of children. Using data from the Early Childhood Longitudinal Study, researchers explored associations between prekindergarten participation and children's school readiness. Findings showed that early education experiences were associated with higher scores on reading and math assessments when children entered kindergarten. However, results also showed higher externalizing behavior problems and self-control issues among children who participated in these programs. Negative behavioral outcomes were not found for children in public prekindergarten programs where the program quality was hypothesized to be higher. In these environments, prekindergarten participation fostered positive reading and math achievement but did not negatively impact behavioral development. In addition, disadvantaged children tended to show the largest academic benefits from the program and the most long-lasting outcomes (Magnuson, Ruhm, & Waldfogel, 2007).

Findings from studies using data from the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care have also shown

associations between more time spent in child care settings and behavior problems in a diverse sample of children (e.g., NICHD Early Child Care Research Network, 2003). In one study, researchers explored children's social behavior, measured at 54 months of age and at kindergarten entry, in relation to early child care experiences measured in infancy and early childhood. Results indicated that children exhibited more problem behaviors and adult-child conflict when they spent more time in child care settings (NICHD Early Child Care Research Network, 2003). In addition, Belsky and colleagues (2007) assessed children's behavior problems from 54 months through sixth grade, children's social skills from kindergarten through sixth grade, and children's emotional functioning from first through sixth grade. Results showed that more time in child care (measured in infancy and early childhood) was associated with higher levels of problem behaviors through sixth grade in this sample of children (Belsky et al., 2007).

**Child care and child development for children living in challenging contexts.** Although studies with nationally representative samples of participants tend to show mixed results in relation to the benefits of nonparental child care, studies that have specifically investigated the impact of community-based child care on development in children with psychosocial risk factors (e.g., low-income children, children of adolescent mothers) show positive outcomes in a variety of areas including behavioral outcomes. For example, Loeb and colleagues (2004) studied the association between child care participation and cognitive, linguistic, and social development in low-income infants and children between the ages of 12 and 42 months. Results indicated that children in center-based child care programs

scored higher on tests of cognitive abilities and school readiness compared to children who were not in child care arrangements. Furthermore, results indicated that children in child care environments with higher quality provider-child interactions had fewer social and behavioral problems relative to children who did not participate in center-based care (Loeb, Fuller, Kagan, & Carrol, 2004).

Research with children of adolescent mothers has also demonstrated the positive impact of nonparental child care on outcomes related to cognitive and behavioral development (Mollborn & Blalock, 2012). Using data from the Early Childhood Longitudinal Study, child care utilization (at 9, 24, and 52 months) by adolescent parents was explored in relation to child outcomes. In addition to family interviews, researchers assessed children's reading and math abilities as well as behavioral and social development. Results indicated that at 52 months of age, children in child care had significantly higher reading and math skills relative to children who did not participate in child care. Furthermore, children who participated in child care displayed more positive behavioral outcomes compared to children under the sole care of parents (Mollborn & Blalock, 2012).

Caughy and colleagues (1994) found similar results with low-income families that were a part of the National Longitudinal Study of Youth (NLSY) (Caughy, DiPietro, & Strobina, 1994). Researchers collected information about family factors, child care, and mothers' education and employment, and observers rated the quality of families' home environments. In addition, researchers evaluated children's cognitive development and assessed children's math, reading, and spelling skills. Results indicated that low-income children who entered child care

before the age of three displayed higher literacy and mathematical abilities and that children in center-based care scored higher on math assessments relative to children who were not in these child care settings. Moreover, child care participation before the age of one was associated with the highest reading scores. Findings also showed that children from lower quality home settings benefited the most from nonparental child care. Thus, results suggest that child care is most beneficial for children when the quality of the child care environment exceeds the quality of the home environment (Caughy, DiPietro, & Strobina, 1994; Desai, Chase-Lansdale, & Michael, 1989).

### **Grandparent Care and Children's Development**

In addition to organized group care arrangements, grandparent care has become recognized as a predominant form of nonparental child care utilized in the United States (e.g., Posadas & Vidal-Fernández, 2013). In recent years, greater life expectancy and changes in socioeconomic factors have concurrently led to increased rates of grandparent caregiving (Bengtson, 2001; Pebley & Rudkin, 1999). It is estimated that 24% of children under the age of five are cared for by grandparents when caregivers are at work or attending school (U.S. Census Bureau, 2013). Researchers have also found that families who utilize grandparent care are more likely to be single parents and come from lower socioeconomic backgrounds (Scommegna & Mossaad, 2011; U.S. Census Bureau, 2013). Thus, in addition to organized group care, the consideration of grandparent care in relation to child development is also important, specifically in regard to the development of at-risk children.

Although a large number of children are routinely cared for by grandparents, there is a dearth of research exploring the associations between grandparent care and children's development. Prior research on grandparent care has frequently focused on descriptive factors (i.e., prevalence of grandparent care, characteristics of grandparents who serve as caregivers) (e.g., Vandell, McCartney, Owen, Booth, & Clarke-Stewart, 2003) and maternal and grandparent outcomes (e.g., Musil, Gordon, Warner, Zauszniewski, Standing, & Wykle, 2010; Posadas & Vidal-Fernández, 2013). For example, research by Posadas and Vidal-Fernández (2013) showed that mothers' employment rates increased at least nine percentage points when grandparents were able to serve as child care providers (Posadas & Vidal-Fernández, 2013). Furthermore, the relation between grandparent care and mothers' workforce participation was highest among families from socioeconomically disadvantaged backgrounds (Posadas & Vidal-Fernández, 2013). Although it is possible that maternal employment could promote positive child development by, for example, decreasing parental stress through greater financial stability, the direct influence of grandparent care on child development is unclear from these findings.

Few studies have focused on child outcomes in relation to grandparent care, but Bishai and colleagues (2008) reported results associated with grandparent care and child safety. In a nationally representative sample of children studied longitudinally from birth through 30-33 months, researchers compared the rates of injury and hospitalizations for children under grandparent care compared to children under maternal care. Findings indicated that children who were cared for by grandparents were significantly less likely to sustain injuries compared to

children under the sole care of mothers (Bishai et al., 2008). Results therefore suggest that grandparent care may benefit young children by lowering the risk of injuries. However, more research is needed to better understand the interrelations between grandparent care and child outcomes, especially development in domains other than physical safety.

### **Summary and Rationale for Present Study**

Extant research shows that child care can foster positive short- and long-term development in children and can be considered a contextual asset specifically for children facing adversities (e.g., low-income status, poverty, lack of resources, negative caregiving experiences, poor psychosocial functioning, low quality home environments). Research from model early childhood programs, community-based child care settings, and limited studies on grandparent care suggest that nonparental child care can foster positive development in children from a variety of backgrounds and serve as a protective factor, impacting children's short- and long-term developmental outcomes. Although the Carolina Abecedarian Project, the High Scope Perry Preschool program, and the Chicago Child-Parent Centers show stronger and longer-lasting benefits compared to community-based programs, research suggests that the benefits of model intervention programs extend to community-based programs that are more typically utilized by families in the United States. In addition, while some studies with nationally representative samples of children show that child care may be associated with behavior problems, research consistently confirms the cognitive and academic benefits of organized

child care and suggests that child care is most beneficial for populations with psychosocial risk factors.

Although extant research has investigated the impact of child care on the development of children from poor and low-income families, few studies have focused specifically on children of adolescent mothers. Moreover, there has been limited research exploring associations between grandparent care and children's developmental functioning. This dissertation built on prior work with adolescent mothers and children (Katz & Easterbrooks, under review) to further study associations between nonparental child care use and children's developmental outcomes. Study results showed that at 24 months of age, organized group care was associated with higher performance on assessments of socioemotional competence and language development. Moreover, findings suggested that grandparent care had positive influences on children's development, particularly when children were also in organized group care arrangements (Katz & Easterbrooks, under review).

The current study expanded on these findings and investigated child outcomes related to school readiness and executive function in early childhood to assess whether the benefits of child care continued to be observed at older ages (i.e., at approximately six years of age). A stronger understanding of the benefits of child care during the early childhood years is essential in order to promote positive functioning, optimize development in the face of adversity, and contribute to our understanding of development in children and families growing up in adverse circumstances, especially among children of adolescent mothers.

## **Mechanisms Underlying the Association Between Child Care and Development**

In order to thoroughly understand the complex processes through which child care impacts developmental outcomes, it is important to consider both the direct and indirect benefits that may stem from child care participation. Considering the aforementioned research within a relational theoretical framework (e.g., Overton, 2015) can help to illuminate the processes by which child care promotes positive development, and more specifically, the mechanisms underlying the protective nature of child care for populations with psychosocial risk factors. From a relational theoretical perspective (e.g., Overton, 2013; Overton, 2015), the positive outcomes stemming from child care utilization may result not only from the child's direct experience in the child care environment, but also concurrently from interrelations among individual, family, community, societal, political, and economic contexts. However, this perspective is rarely reflected in child care research. Specifically, there is a dearth of research investigating the multiple pathways through which child care may promote positive development.

### **Theoretical Framework**

In order to better understand child care as a protective factor as well as the mechanisms through which child care may foster positive development, it is beneficial to consider the impact of child care through relational developmental systems (RDS) models (e.g., Lerner, 2006; Overton, 2013; Overton, 2015). Framed by RDS theories, a transactional-ecological model of development suggests that development is a product of mutually influential relations between individuals and

the multiple levels of the environment over time (e.g., Bronfenbrenner, 1979; Sameroff, 2009). According to this model, an individual's environment is comprised of multiple interconnected levels that impact the individual both directly and indirectly. Changes in one level of the environment bring about changes in other contextual levels, leading to both positive and negative outcomes.

Development results from proximal and distal factors in one level of an individual's environment influencing variables in other contextual levels, and these individual-context transactions engender development across ontogeny (e.g., Bronfenbrenner, 1979; Sameroff, 2009). Thus, individuals cannot be considered separate from the multiple contexts in which they are embedded. Individual factors, past and current experiences, and the broader ecological context continually interact to produce developmental outcomes (Bronfenbrenner, 1979; Sameroff, 2009). An understanding of the interrelations between individuals and their multiple contexts contributes to our understanding of development and the broader ecology of human development (e.g., Bronfenbrenner, 1979; Sameroff, 2009).

In order to optimize development, it is necessary to foster positive relations between individuals and the multiple contexts that they navigate (Lerner, 2006; Sameroff, 2009). For families living in challenging contexts, child care can serve as a contextual asset and promote individual-context transactions that are mutually beneficial (e.g., Caughy et al., 1994; Bronfenbrenner, 1979; Sameroff, 2009). As elucidated by a transactional-ecological model of development, when studying the impact of child care on development, it is essential to consider the transactions between multiple levels of the child's environment in order to fully understand the

promotive role of child care. Moreover, the protective role that child care may play in the lives of children and families can be better understood by concomitantly considering reciprocal relations between the child and child care environment and the mutual relationships among all ecological levels. In this view, development is not only influenced by the compensatory nature of child care, but concurrently, by interrelations among the individual, family, community, political, and economic contexts, as they are connected to the child care context and can thus influence the entire ecological system.

For example, research suggests that low-income children tend to live in lower quality home settings (e.g., higher rates of negative parenting, lower levels of affection, lower rates of cognitive enrichment) compared to their more affluent counterparts (Berlin et al., 2002; Evans, 2004). Characteristics related to home and family contexts may be impacted by and may impact neighborhood qualities (e.g., availability of resources, physical living environment, social capital), and may also influence or be influenced by more distal levels of the environment (e.g., political context, economic climate). In the presence of these risk factors, child care may serve as a contextual asset, providing children with resources, stimulation, and positive caregiving experiences that may not be available in their home environment (e.g., Caughy et al., 1994). It is also possible that child care use may enable parents to pursue employment or education, lower parental stress, promote parental involvement in children's early education, and help families incorporate learning and enriching activities into the home context. As a result, parents may engage in more positive parenting practices, which could further influence child

outcomes and the broader ecology of human development. Moreover, families may impact the child care context through communication with teachers and providers or participation in curricula. These influences might enhance the child care environment, further promoting positive development.

Figure 1 illustrates these dynamic and reciprocal relations. In this model, transactions between the individual and more proximal levels of the environment (i.e., the immediate setting that encompasses the individual) interact with the child care context to produce both parent and child outcomes. Parent outcomes impact child outcomes and vice versa, creating a feedback loop in which all levels of the developmental system impact one another and mutually influence (and are influenced by) the broader ecology of human development. This model demonstrates the complex processes through which child care may impact development and the many bidirectional relationships that contribute to this dynamic system.

Therefore, although there may exist a direct association between child care and positive child development, it is also possible that child care may positively impact parents and families which in turn may positively influence child development. Thus, the association between child care and children's development is complex as this relationship results from multiple bidirectional relations and direct and indirect processes. Considerations for how the child care context mutually interacts with the home and family context as well as how these variables may influence and be influenced by political, cultural, and economic factors should be taken into account when investigating associations between child care and

development.

### **Research Related to the Direct and Indirect Benefits of Child Care**

Although prior research has investigated both child and parent outcomes resulting from child care utilization, such research has primarily focused on child and parent outcomes separately (e.g., Ramey et al., 2000). Therefore, studies have not fully considered the bidirectional nature of these outcomes or the interconnection between parent and child effects stemming from child care participation. For example, Ramey and colleagues (2000) found that parents with children who participated in the Carolina Abecedarian Project had higher rates of educational attainment and employment relative to mothers in the control group. As previously discussed, this randomized controlled trial was a comprehensive child care intervention program that served low-income children. Children were assigned to a program group who received high quality child care services or to a control group who did not receive the program but were provided with other social, pediatric health, and nutritional services (Campbell et al., 2002; Campbell & Ramey, 1994; Isaacs, 2008; Ramey et al., 2000). In addition to the aforementioned long-term, positive child outcomes that were reported to be associated with program participation, findings from this study have also shown that mothers of children in the program group were more likely to have attained employment and education beyond high school compared to mothers in the control group. Moreover, adolescent mothers in the program group were most likely to be employed while adolescent mothers in the control group were least likely to be employed (Ramey et al., 2000).

Although findings from the Abecedarian Project revealed both parent and child outcomes stemming from program participation, the mechanisms underlying these outcomes were not tested or discussed in detail. Researchers alluded to the fact that child outcomes resulted from the high-quality intervention services and that maternal outcomes resulted from the fact that program group families received several years of free child care services, better enabling parents to pursue education and employment. However, it is also possible that mothers' job and school attainment may have contributed to children's positive outcomes. Perhaps maternal employment increased families' economic security, which decreased maternal stress, leading to more positive parent-child interactions and thus more positive child development. Despite these possibilities, factors in addition to the intervention program were not considered or tested in relation to child outcomes.

Maternal outcomes stemming from early education interventions were also investigated using data from the Infant Health and Development Program (Brooks-Gunn, McCormick, Shapiro, Benasich, & Black, 1994). This randomized controlled trial intervention provided high quality center-based care and family support services to families with low-birthweight, premature infants. Two thirds of the sample included low-income families and mothers with low levels of education. The intervention group received pediatric services, home visits from birth to age three, and center-based child care in the second and third years of life. Families in the control group only received pediatric follow-up services and referrals to other services (Brooks-Gunn et al., 1994).

Findings indicated that mothers in the intervention group were more likely to be employed, were employed for a longer period of time, and returned to work earlier than mothers in the control group. Results related to earlier entrance into the workforce were observed around 18 months of age, suggesting that this finding could be attributed to child care utilization, which began when children were between 12 and 13 months (Brooks-Gunn et al., 1994). The authors noted that the indirect benefits of this early education intervention, i.e., increased maternal employment, could positively impact children's development. However, this assumption was not directly tested and the indirect mechanisms underlying positive child outcomes were not fully examined.

In addition, McCartney and colleagues (2007) explored the direct and indirect benefits of child care participation in a sample of low-income children. Using data from the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (NICHD SECCYD), researchers hypothesized that quality child care would not only serve as a protective factor for low-income families by providing resources, learning supports, and enriching opportunities for children, but would also indirectly promote positive child development through the improvement of children's home environments. Accordingly, tests of children's school readiness and language competence were administered, and the quality of children's child care and home environments were assessed.

Results showed that children from low-income families in higher quality child care programs scored higher on the child assessments compared to children in

lower quality child care settings and children who did not participate in child care programs. These outcomes were attributed to the higher levels of sensitive and responsive caregiving and cognitive and verbal stimulation provided in the higher quality care environments. Additionally, results suggested that child care that was considered to be lower in quality was still associated with higher language outcomes for these low-income children. Furthermore, researchers also found that child care participation indirectly benefited children by improving the quality of their home environments (McCartney, Dearing, Taylor, & Bub, 2007). Although this study provided evidence for both direct and indirect pathways through which child care may promote positive outcomes, the specific mechanisms underlying the association between child care and improvements in the home context are unknown. Researchers hypothesized that improvements in the home environment may result from decreased parental stress and increased parenting knowledge. However, these theories were not directly examined or confirmed.

### **Summary and Rationale for Present Study**

Extant research demonstrates that for children with psychosocial risk factors, nonparental child care can serve as a protective factor and promote positive development for both children and families (e.g., Brooks-Gunn et al., 1994; McCartney, Dearing, Taylor, & Bub, 2007; Ramey et al., 2000). These findings are supported by relational theories (e.g., transactional-ecological model of development) that underscore the importance of considering bidirectional relations between individuals and the multiple levels of the environment across ontogeny (e.g., Overton, 2013; Overton, 2015; Sameroff, 2009). From this perspective, the

positive outcomes associated with child care utilization not only result from the child's experience in the child care setting but also from the indirect benefits that may play a role in promoting positive child development (e.g., parental school or job attainment, lower parental stress, improved quality of the home environment).

Accordingly, it is important for researchers to consider both the direct and indirect mechanisms underlying the association between child care and development. However, there is limited research exploring the multiple pathways through which child care may influence developmental trajectories. Moreover, within the limited pool of research investigating parent and child outcomes stemming from child care utilization, the abovementioned study by Ramey and colleagues (2000) is the only one to consider positive parent outcomes in relation to adolescent mothers. Thus, additional research is needed to better understand why child care may be beneficial for adolescent mothers in particular as well as other areas in which child care may promote positive parent functioning.

This dissertation therefore tested possible pathways by which child care exerted benefits for adolescent mothers and their children. Specifically, parenting stress was considered as a mechanism underlying the association between child care use and children's development given the prevalence of stress in this population of mothers. Adolescent mothers have been found to experience higher rates of stress compared to older mothers and are at greater risk for developing symptoms of posttraumatic stress disorder (PTSD; (e.g., Emery, Paquette, & Bigras, 2008; Larson, 2004). Moreover, compared to adult mothers, the transition to parenthood for adolescent mothers may differ due to unique emotional challenges that

accompany adolescent parenting, including stress (e.g., Hans & Thullen, 2009). Parenting stress and depressive symptoms in adolescent mothers have been found to be associated with repeat pregnancies, lower educational attainment, negative parenting practices, and problem behaviors in children during the preschool years (Cox et al., 2008; Holub et al., 2007; Lanzi, Bert, & Jacobs, 2009; Leadbeater, Bishop, & Raver, 1996; Mollborn & Morningstar, 2009). Therefore, the consideration of factors (e.g., child care) that may decrease parents' stress and ultimately lead to more positive child functioning is important. A greater understanding of the mutual transactions between the individual, child care environment, and the broader ecological context can help to optimize human development and provide a deeper understanding of the benefits stemming from nonparental child care participation, particularly in this population of mothers and children.

### **Present Study**

As demonstrated by the aforementioned findings, research investigating the impact of early child care on development suggests that for children living in challenging contexts (e.g., children from low-income families), nonparental child care can promote positive development and serve as a barrier against risks that adversely influence developmental trajectories. In early childhood, research suggests that positive developmental functioning and school readiness consist of socioemotional and behavioral skills as well as the ability to be prepared cognitively to navigate the demands of school and home environments (e.g., Blair & Diamond, 2008). Although early academic skills (e.g., knowledge of rudimentary

subjects such as letters and numbers) have traditionally served as markers of school readiness, research now suggests that positive developmental functioning and early school readiness include both socioemotional and academic competence (e.g., Blair, 2002; Denham, 2006). Thus, the concept of school readiness has been expanded to include social and emotional aspects of development, including executive function (EF), which is one of the processes underlying self-regulatory skills. EF consists of three main components including working memory, cognitive flexibility, and inhibitory control, which are interrelated higher-order cognitive processes (Zelazo et al., 2003). However, although EF is often conceptualized as a cognitive process, research suggests that EF is also directly implicated in children's socioemotional development (e.g., Blair, 2010). Thus, this construct straddles both cognitive and socioemotional domains. Early childhood is characterized by substantial growth in cognitive and social development, which influences school readiness and future success. Thus, measurement of EF and other cognitive skills are key within investigations of positive developmental functioning and school readiness in school-age children. The present study therefore used measures of both EF and school readiness to assess children's cognitive and socioemotional development.

Although a substantial number of studies have investigated the impact of child care on developmental functioning in children from low-income families, there is a dearth of research focused specifically on children of adolescent mothers. A stronger understanding of nonparental child care use and child care as a contextual asset, however, is important in order to promote positive development in vulnerable populations and gain a deeper understanding of protective factors that

may buffer the risks often faced by young mothers and their children. Furthermore, few studies have focused on the mechanisms by which child care fosters positive development. Child care environments may provide resources, cognitive and social stimulation, and positive caregiving, which may impact children's socioemotional and cognitive outcomes. However, in addition to factors directly associated with the child care environment, it is also possible that the positive outcomes associated with child care participation may be influenced by caregiver qualities or factors related to the home environment. It is therefore necessary to consider the varied pathways through which child care participation may impact children's development and family functioning. The consideration of these pathways and multiple mechanisms can shed light on the interrelations that exist between the individual, child care environment, and broader ecological context.

### **Research Questions and Hypotheses**

In this dissertation, I investigated patterns of child care use over time, associations between early child care participation and child outcomes in early childhood, and possible mechanisms by which child care may foster positive development using a randomized controlled-trial evaluation of a voluntary statewide home visiting family support program for first-time young parents. This study aimed to address the following questions using data from a sample of adolescent mothers and their children, approximately two thirds of which participated in the newborn home visiting program.

- Research Question 1: What are the characteristics of child care utilization in this sample of adolescent mothers? Are there different patterns of child care

utilization across three time points (ranging from infancy to early childhood)? Patterns in the type of child care and timing of child care used across three points in time were examined. Given that few studies have explored patterns of child care use in adolescent mother families, these results provided descriptive and contextual information necessary for interpreting subsequent analyses that investigated associations between patterns of child care use and developmental outcomes. Documenting the extensive amount of time children spend in early child care arrangements highlights the importance of evaluating the influence of children's early child care experiences on developmental functioning.

- Research Question 2: Is the early use of child care among adolescent mothers associated with positive child functioning in early childhood? In this dissertation, I examined child outcomes to assess whether the benefits of child care observed at 24 months of age in this sample (Katz & Easterbrooks, under review) continued to be evident in early childhood. Specifically, this study explored associations between patterns of early child care use (when children were on average 12 months, 24 months, and 5 years of age) and children's school readiness and executive function performance when children were on average 6 years of age.
  - Hypothesis: Although findings are dependent on the patterns found in Research Question 1, given that previous research has shown associations between nonparental child care use and positive developmental functioning in children with psychosocial risk factors, it was expected that children in the sample who participated in consistent

nonparental child care over time would demonstrate more positive developmental functioning in socioemotional and cognitive domains compared to children who did not participate in regular nonparental child care or were primarily cared for by parents.

- Research Question 3: What are possible mechanisms by which child care may foster positive outcomes among adolescent mothers and their children? In this dissertation, I tested whether parenting stress mediated relations between child care and children's development. In order to enhance positive functioning in families with psychosocial risk factors, it is important to consider the different pathways or mechanisms through which child care participation may impact children's development.
  - Hypothesis: Given that previous research has shown an association between nonparental child care use and positive parental outcomes, it was expected that child care use would decrease parenting stress, leading to more positive child functioning.

## CHAPTER TWO: METHOD

The current study is embedded in a longitudinal evaluation study of Healthy Families Massachusetts (HFM), a randomized controlled trial of an intervention for young parents under the age of 21 focused on promoting positive life course trajectories for mothers and children, supporting positive parenting, reducing child maltreatment, and enhancing maternal well-being. Participants in the study were randomly assigned to either a program group (i.e., Home Visiting Services group (HVS)) who received home visiting services or a control group (i.e., Referrals and Information Only group (RIO)) who did not receive home visits but instead were provided with child development information and referrals to other support services. Using a mixed methods approach, data were collected at six time points, including study enrollment (Time 1), 12 months after enrollment (Time 2), 24 months after enrollment (Time 3), and when children were approximately 5 years of age (Time 4), 6 years of age (Time 5), and 7 years of age (Time 6). This dissertation used data from Times 2-5, at which point all mothers were parenting.

### **Participants and Procedure**

The sample was composed of adolescent mothers and their children enrolled in the evaluation of HFM. This prevention-oriented home visiting program was adapted from the Healthy Families America (HFA) home visiting initiative and includes the following main goals: 1) To prevent child abuse and neglect by supporting positive, effective parenting; 2) To achieve optimal health, growth, and development in infancy and early childhood; 3) To encourage educational attainment, job, and life skills among parents; 4) To prevent repeat pregnancies

during the teen years; and 5) To promote parental health and well-being. Families participating in HFM receive information and parenting support services such as home visits and connections to outside resources, and they participate in goal-setting and group-based activities. First-time parents were eligible to enroll in the program prenatally or within the first year of their child's life, and to continue participation until children were three years of age. Study protocols were approved by the university's Institutional Review Board. All participants provided informed consent.

Eligible study participants were English- or Spanish-speaking females who were 16-20 years of age at first childbirth. At Time 1, the average age of mothers was 18.6 years old. According to self report, 37% of mothers identified as non-Hispanic White, 19% identified as non-Hispanic Black, 8% identified as non-Hispanic other, and 36% identified as Hispanic. Furthermore, 74% of mothers reported that their preferred language was English, 6% preferred Spanish, and 20% preferred English as well as another language. Moreover, 837 participants were recruited for the study; 517 (62%) were assigned to the program group; 320 (38%) were assigned to the control group; 133 mothers withdrew or were deemed ineligible; the final sample size was 704.

All participants were asked to complete a semi-structured phone interview, which focused on factors such as family configuration, finances, health, use of services, paternal involvement, and children's socioemotional development and health. Additionally, researchers requested access to participants' state public agency data such as information from the Department of Children and Families

(DCF), the Department of Elementary and Secondary Education (DESE), the Department of Public Health (DPH), and the Department of Transitional Services (DTA). Participants were also given the option of completing an in-person interview consisting of a semi-structured interview, questionnaires, and assessments of mother-child interactions. Additionally, child assessments were completed during the in-person interviews at Times 4 and 5 to evaluate children's socioemotional development, executive function (EF), and school readiness.

Mothers who selected to participate in the phone interview and gave permission for researchers to access state agency data were classified as the impact subsample.

Phone interviews were completed by 564 mothers at Time 2 (82% of the Time 1 sample), 594 at Time 3 (87% of the Time 1 sample), 490 at Time 4 (72% of the Time 1 sample), and 445 participants at Time 5 (65% of the Time 1 sample).

Mothers who additionally participated in the in-person interviews were categorized as the Integrative Study subsample. In-person interviews were completed by 401 mothers at Time 2 (85% of the Time 1 sample), 409 at Time 3 (86% of the Time 1 sample), 433 at Time 4 (92% of the Time 1 sample), and 406 at Time 5 (86% of the Time 1 sample).

## **Measures**

**Child care utilization.** The type and extent of child care used by study participants were measured using questions about child care use administered during the Time 2, Time 3, and Time 4 phone interviews. Participants indicated their children's child care arrangements when they were not available to take care of them. Mothers selected all nonparental child care arrangements used including

grandparents, great grandparents, other family members, friends, babysitters, family child care providers, child care centers, Early Head Start programs, child care centers at schools, and any other arrangements. Mothers could also indicate that they stayed home with their child. Mothers also specified the number of hours per week that the child participated in each child care arrangement. Data related to child care quality were not available.

**Child executive function (EF) measures.** Children's socioemotional and cognitive development were measured using three executive function (EF) measures that were administered during the Time 5 in-person interviews. These measures were used to assess the three components of EF including working memory, cognitive flexibility, and inhibitory control.

***Corsi block-tapping task.*** The Corsi block-tapping task (Corsi, 1972) was used to assess children's working memory, cognitive flexibility, and inhibitory control using two conditions: the Corsi Block task (forward condition) and the Backward Corsi Block task (backward condition). During the task, a child watches an experimenter tap plastic blocks in a specified sequence and is either asked to repeat the tapping actions in the correct sequential order (Corsi Block task) or tap the blocks in a backwards (reverse) order (Backward Corsi Block task). The tapping sequences range from 2 to 9 blocks in the Corsi Block task (forward condition) and 2 to 8 blocks in the Backward Corsi Block task (backward condition). Overall, the task consists of 30 trials: 16 trials on the Corsi Block task and 14 trials on the Backward Corsi Block task.

Both conditions include two sequences per level and children are required to

complete at least one of the two sequences correctly to move up to the next level (in which an additional block is added). The Corsi Block task ends and the Backward Corsi Block task begins when the child reproduces both sequences within a level incorrectly in the forward trials. The entire task concludes if the child incorrectly reproduces both sequences within a level in the backward trials. A proportion score for each task was calculated to reflect the highest level of blocks children achieved relative to the total number of levels per task.

Despite its widespread use in neuropsychological testing, the psychometric properties of this measure have not been extensively documented due to inconsistencies in the administration and scoring of the task (e.g., Kessels, van Zandvoort, Postma, Kappelle, & deHaan, 2000). Nonetheless, this measure has been found to have high reliability in a large sample of Italian youth between 11 and 16 years of age (Orsini, 1994). Moreover, concurrent validity has been found between children's performance on the Corsi block-tapping task and the Wechsler Intelligence Scale for Children—Revised (WISC-R) (Orsini, 1994).

***Digit Span (DS) task.*** The digit span (DS) task (Levine, 1984) was used to assess children's working memory, cognitive flexibility, and inhibitory control using two conditions: digits forward (DF) and digits backward (DB). Each condition is comprised of levels and each level includes six lists (sets of digits). The DF condition contains eight levels and the DB condition contains four levels. Both conditions begin with a two-digit level. During the task, the experimenter recites a list of digits and either asks the child to repeat the list (DF) or recall the list in backwards order (DB). If the child successfully recalls four lists out of the six, the

examiner is able to move on to the next level, which adds one digit to the list. The DF condition ends and the DB condition begins if the child recalls three lists incorrectly within a level. The overall task ends when the child incorrectly recalls three lists within a level during the DB condition. The two subscales yield separate raw scores. Children receive one point for each list completed. The total number correct for both the DF and DB conditions was used in the current study.

This version of the DS measure is comparable to the digit span portion of the Wechsler Intelligence Scale for Children – 3<sup>rd</sup> edition (WISC-III; Wechsler, 1991), which has been shown to have adequate reliability in studies with children aged 6.5 to 15.5 years (Beebe, Pfiffner, & McBurnett, 2000; Levine, 1984; Wechsler, 1974). In addition, WISC-III has been shown to have adequate test-retest reliability in both the forward task and the backward task (Beebe et al., 2000; Levine, 1984; Wechsler, 1974).

***Head-Toes-Knees-Shoulders (HTKS) task.*** The Head-Toes-Knees-Shoulders (HTKS) task (Ponitz et al., 2008) was used to measure children’s inhibitory control, cognitive flexibility, and working memory. During the task, children are first instructed to follow the experimenter’s commands (i.e., “touch your head,” “touch your toes,” “touch your knees,” “touch your shoulders”). Following, a rule is added to the task in which the child is instructed to touch the “opposite” of what the experimenter says (e.g., “touch your head” means “touch your toes”). The task consists of two phases and experimenter feedback is not provided during either of the phases. In the first phase, the child completes the Head-to-Toes-Task (HTT) (comprised of ten instructions) in which “head” is paired

with “toes.” The child receives two points for correct responses, one point for self-corrected responses, and 0 points for incorrect responses. Participants only advance to the second phase if they receive a score of 4 or more in the first block.

In the second phase (HTKS), the experimenter adds a rule: “shoulders” must be paired with “knees” in addition to the “head” to “toes” pairing introduced in the first phase. The second phase consists of twenty instructions. Scoring for the second phase is the same as the first phase but children do not receive any points for the second phase if they do not pass this block. An overall sum score was calculated by adding together the number of points a child received in each phase of the task. HTKS has been shown to have strong interrater reliability (Wanless et al., 2011) and the Head-to-Toes task, a version of HTKS designed for younger children, has been found to have convergent validity (Ponitz & Morrison, 2009).

**Bracken School Readiness Assessment.** Children’s cognitive development and school readiness were measured using the Bracken School Readiness Assessment, 3rd Edition (BSRA-3; Bracken, 2007). This measure assesses children’s knowledge and understanding of the five fundamental academic concepts: Colors (10 items), Letters (15 items), Numbers/Counting (18 items), Sizes/Comparisons (22 items), and Shapes (20 items). The assessment includes a total of 85 items and children answer questions by pointing to the picture that represents the concept named by the examiner. The Colors items (e.g., “Show me which color is red”) assess children’s knowledge of primary colors, secondary colors, and basic color concepts. The Letters items assess children’s knowledge of upper and lowercase letters (e.g., “Show me the A”). The Numbers/Counting items

(e.g., “Show me the one”) assess children’s understanding of single- and double-digit numbers as well as number values related to sets of objects. The Sizes/Comparisons items (e.g., “Which animal is big?”) assess children’s ability to match, differentiate, and compare objects based on a variety of characteristics. The Shapes items (e.g., “Show me the star”) assess children’s knowledge of one-, two-, and three-dimensional shapes.

The Bracken has been shown to have adequate test-retest reliability and the average split half reliability coefficient of the School Readiness Composite (SRC) has been determined to be excellent (Bracken, 2007). Moreover, evidence of content validity has been established and concurrent validity of the measure has been found to be acceptable (Bracken, 2007).

**Parenting Stress Index Short Form (PSI-SF).** Mothers’ parenting stress was measured using the Parenting Stress Index Short Form (PSI-SF), a self-report questionnaire that assesses parents’ perceived parenting stress (Abidin, 1995). Mothers reported their level of agreement with 36 items that fall into three subscales: (1) Parental Distress; (2) Difficult Child; and (3) Parent–Child Dysfunctional Interaction. Mothers indicated the degree to which they agreed with statements (e.g., “I feel trapped by my responsibilities as a parent,” “My child rarely does things for me that make me feel good”) using a 5-point scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The measure yields an overall (total) score as well as three subscale scores. The overall sum score was used in this dissertation. The PSI-SF has been shown to have adequate test–retest reliability, very good internal reliability, and strong convergent and predictive validity (Abidin,

1995; Haskett, Ahern, Ward, & Allaire, 2006).

### **Analytic Strategy**

Table 1 provides an overview of the dissertation research questions and corresponding analytic strategies. Detailed explanations about each analysis are included below.

### **Research Question 1:**

In order to investigate the extent of child care utilization and the types of child care used by adolescent mothers in this sample, descriptive statistics were run with child care data collected at Time 2, Time 3, and Time 4. First, child care type was recoded into categories: Organized Group Care, Grandparent Care, and Other Family and Friend Care. Organized Group Care included family child care providers, child care centers, and Early Head Start. Although these different organized child care arrangements may vary in terms of quality and substance (as stated earlier), there are substantive differences between organized group care arrangements and care provided by a grandparent, other family member, or friend. Moreover, the number of children cared for by family child care providers was much smaller than the number of children in center-based care. Thus, there were too few children to comprise a robust independent group. For these reasons, family child care and center-based child care arrangements were grouped in the same category and identified as Organized Group Care. In addition, Grandparent Care included maternal and paternal grandparents and Other Family and Friend Care included other family members, friends, or babysitters. These categories were not mutually exclusive given that many children were in more than one child care

arrangement. Moreover, following the standards set by large child care studies such as the NICHD Study of Early Child Care and Youth Development (SECCYD) (e.g., NICHD Early Child Care Research Network, 2005), children were only included in a child care category if they spent at least 10 hours per week in the child care arrangement.

To investigate the extent of child care use among families in this study, the mean number of hours per week that children participated in child care arrangements was computed, and the average number of hours spent in each specific type of care arrangement was calculated. In addition, to gain a stronger understanding of the types of child care used by families in this sample, frequencies of Organized Group Care, Grandparent Care, and Other Family and Friend Care were computed.

In order to explore patterns of child care use over time, Longitudinal Latent Class Analysis (LLCA)/Repeated Measures Latent Class Analysis (RMLCA) was used with Mplus software (version 8.0) using full information maximum likelihood (FIML) to account for missing data (Muthén & Muthén, 2010). LLCA/RMLCA is a person-centered finite mixture modeling procedure that uses latent class variables to characterize longitudinal response patterns. This method uses categorical indicator variables to estimate distinct groups of individuals with similar patterns of data who differ from individuals in other groups (e.g., Muthén & Muthén, 2000; Raykov, 2016). In other words, there is internal cohesion or homogeneity within groups as well as external isolation or separability from the other groups (e.g., Muthén & Muthén, 2000; Raykov, 2016). Groups are latent in nature and the probability of an

individual belonging to a specific group is dependent on their response patterns on particular measures, i.e., observed variables. The current study explored patterns of child care use across Times 2, 3, and 4.

LLCA/RMLCA uses the same modeling process as latent class analysis but single variables are measured at multiple time points rather than multiple measures assessed at a single time point. Models are estimated in a series of steps beginning with the assessment of a one-class model. The number of classes is then increased and models with sequentially increasing numbers of classes are compared to one another using fit indices and theoretical considerations. The number of classes is increased and tested against a model with one fewer classes until the model fit deteriorates. The best fitting model was identified using five model indices: Bayesian Information Criteria (BIC; Schwartz, 1978), Akaike Information Criteria (AIC; Akaike, 1973), entropy (e.g., Masyn, 2013), Lo-Mendell-Rubin Likelihood Test (LMR; Lo, Mendell, & Rubin, 2001), and the Bootstrap Likelihood Ratio Test (BLRT; McLachlan & Peel, 2000).

The BIC and AIC are goodness of fit measures that indicate how well the model fits the data. Lower values indicate lower levels of model misfit (e.g., Nylund, Asparouhov, & Muthén, 2007). Entropy measures the accuracy of classification. Values range from 0 to 1 with higher values indicating better classification certainty. However, entropy values tend to decrease as the number of classes increase so this statistic should not be the main factor used when determining model fit (e.g., Raykov, 2016). The LMR Likelihood Test and the BLRT compare each model with a model with one less class to identify whether

model fit significantly improves when an additional class is added. Both tests produce a  $p$  value that indicates the better fitting model when statistically significant (e.g., Berlin, Williams, & Parra, 2014).

### **Research Question 2:**

In order to explore the associations between patterns of early child care use and children's school readiness and executive function performance, a one-step Bolck–Croon–Hagenaars (BCH) approach (Asparouhov & Muthén, 2014) was used. This analysis explores relations between latent categorical variables and observed continuous auxiliary variables. Thus, the BCH method compares the mean of a continuous distal outcome variable across latent classes. If the observed variable is included in the initial LLCA/RMLCA model, class membership may shift given that model estimation is based on indicator variables in addition to observed variables of interest. Vermunt's 3-step approach (Vermunt, 2010) was originally used to prevent the shifting of classes but this approach does not fully prevent such shifting. The BCH method has been found to be superior to the 3-step approach as shifting is prevented at all stages of the analysis and class membership is therefore fully preserved (Asparouhov & Muthén, 2014). In this dissertation, the BCH method was used to investigate mean differences in children's EF scores (The Corsi block-tapping task, The digit span (DS) task, and The Head-Toes-Knees-Shoulders (HTKS) task) across the child care latent classes as well as mean differences in children's school readiness scores (Bracken School Readiness Assessment) across the child care latent classes.

**Research Question 3:**

In order to investigate possible mechanisms by which quality child care may foster developmental outcomes, mediation analyses using structural equation modeling (SEM) were conducted. Mediation models are used to describe the processes or mechanisms by which one variable influences another. A third variable is added to the analysis of an  $X \rightarrow Y$  relation in order to improve understanding of the association ( $X \rightarrow M \rightarrow Y$ ). However, when previous levels of the variables are not controlled for, the paths in the mediation model may be over- or underestimated (e.g., Little, 2013; Selig & Preacher, 2009). Thus, the most rigorous mediation models measure variables of interest at multiple time points. The current study used longitudinal mediation and accounted for prior levels of mediator and outcome variables (i.e., controlled for the impact of mediator and outcome variables at earlier time points). This approach allows for more accurate results in relation to the effect of the mediator variable on the outcome variable, i.e., this method allows estimation of the relation between the predictor variable and mediator variable, while accounting for prior levels of the mediator. Moreover, more accurate results are obtained by accounting for prior levels of the outcome variable. Partial mediation was used in this dissertation, in which the independent variable has both direct and indirect effects on the dependent variable. The direct effect is not mediated, whereas the indirect effect stems from a mediator variable. In the current study, analyses were conducted to investigate whether parenting stress mediated associations among child care use and children's developmental outcomes (Figure 2).

## CHAPTER THREE: RESULTS

**Preliminary Analyses**

Preliminary analyses were run to obtain general information about the sample as well as descriptive information about the variables of interest. Overall sample sizes were calculated and the mean age of mothers and children, mothers' preferred language, as well as mothers' average education level were computed. In addition, descriptive statistics were run to explore the distributions of children's sex, mothers' race and ethnicity, and the percentage of families enrolled in HFM. Furthermore, means, standard deviations, and ranges were computed to obtain descriptive information about child outcome measures and parenting stress. Table 2 provides an overview of these results. Analyses to obtain descriptive information about the extent and type of nonparental child care used by families in this sample are described in the next section.

**Research Question 1a: Extent and Type of Nonparental Child Care Used**

In order to investigate the extent of child care utilization and the types of child care used by young mothers in this sample, descriptive statistics were run with child care data collected at Time 2, Time 3, and Time 4. To investigate the extent of nonparental child care use among families in this study, the average number of hours per week that children participated in each child care arrangement was computed. Subsequently, the frequencies of families utilizing child care were calculated to determine the percentages of families using each type of care.

Results are presented in Tables 3 and 4. At Time 2, approximately 24% of children were in organized group care arrangements, 35% of children were in

organized group care at Time 3, and at Time 4, 56% of children participated in organized group care. Therefore, participation in organized group care increased over time with more children participating in this type of care arrangement when they were older in age. In addition, approximately 32% of children at Time 2 were cared for by grandparents, 32% were under the care of grandparents at Time 3, and 30% of children were cared for by grandparents at Time 4. Thus, grandparent care remained stable across time with slightly less than a third of children participating in this type of care. Finally, the percentage of children in other family or friend care was stable and low across time with approximately 14%, 14%, and 11% of children cared for by other family and friends at Time 2, Time 3, and Time 4 respectively.

When considering the number of hours that children participated in child care, results showed that children spent on average between 24.18 and 34.97 hours in these care arrangements. Specifically, children spent 32.82 hours, on average, in organized group care at Time 2, 34.97 hours at Time 3, and 32 hours at Time 4. At Time 2, children spent an average of 25.55 hours in grandparent care, 27.58 hours at Time 3, and 27.36 hours in grandparent care at Time 4. In addition, on average, children spent 24.18, 28.27, and 24.82 hours in other family and friend care at Time 2, Time 3, and Time 4 respectively.

### **Research Question 1b: Patterns of Child Care Participation Across Time**

The measures included in the LLCA/RMLCA analyses contained missing data and thus initial analyses investigated missing data patterns. The purpose of these analyses was to determine whether the missing data in the study sample was significantly associated with a variety of demographic characteristics in order to

identify what variables should be included as auxiliary variables during the latent class identification process. Accordingly, in order to examine potential bias in the sample due to missing data, correlation analyses, logistic regression, and Pearson's chi-square tests were conducted to determine relations between patterns of missing data and observable sample characteristics.

Analyses revealed significant associations between missing data patterns and mothers' age, child sex, perceived adequacy of resources (The Family Resources Scale (FRS); Dunst & Leet, 1987), and mothers' involvement with the Department of Children and Families (DCF) (at least one substantiated child maltreatment report since study enrollment). Given that associations between sample characteristics and missing data patterns were established, data were considered missing at random (MAR), which allows for the use of FIML as a procedure to account for missing data in subsequent analyses. FIML is the default method to account for missing data in Mplus and is the preferred method in structural equation modeling as it produces unbiased parameter estimates and standard errors. Furthermore, given that the abovementioned variables were related to missing status, mothers' age, child sex, FRS scores, and DCF involvement were included as auxiliary variables in the following LLCA/RMCLA analyses.

### **Identification of Child Care Classes**

Analyses were run to classify individuals into groups based on patterns of child care use at Time 2, Time 3, and Time 4. The probability of an individual belonging to a specific group was dependent on their child care response patterns over time and classes were created so that individuals within a group were more

similar to each other than to individuals in other groups.

Table 5 displays model fit statistics for one through four classes. Compared to one and two classes, a three-class model represented the best model fit based on model fit indices and theoretical interpretability. Although there was a small increase in the BIC value from a two-class to a three-class model, the substantive interpretation of the three-class model was more meaningful than the two-class model and showed better separation between classes. Moreover, the three-class model exhibited a lower AIC value compared to the two-class model as well as significant LMR and BLRT  $p$  values, indicating model improvement and good model fit. In addition, for each LLCA/RMLCA model, the number of pairs with a Pearson Chi-Square test statistic greater than 30 was counted in order to determine additional violations of model fit. A two-class solution yielded two pairs while the three-class solution indicated zero pairs, suggesting that the degree of misfit stabilized at three-classes. Furthermore, in a four-class model, the BIC value increased and the LMR  $p$  value was no longer significant, indicating poorer model fit. Moreover, in a four-class model, some groups were too small to be meaningful as few members had the probability of being in that group (e.g., 5% of the sample). In other words, the final class counts and proportions based on individuals' most likely group membership for four latent classes were not well distributed. Conversely, group counts and proportions were well balanced in the three-class model. Consequently, these statistical and theoretical considerations led to the final selection of a three-class model.

The three identified classes included Class 1: low early child care use; Class 2: organized group care plus grandparent care; and Class 3: organized group care. In the three identified classes, Class 1 included 36% of the sample ( $n = 145$ ) and was characterized by a low likelihood of using organized group care at early time points followed by an increased likelihood of using organized group care at Time 4 (as well as a generally low likelihood of using grandparent and other family and friend care across time points). Class 2 was comprised of 29% of the sample ( $n = 119$ ) and was characterized by an increased likelihood of using organized group care over time, a stable and high likelihood of using grandparent care over time, and a generally low likelihood of using other family and friend care over time. Class 3 included 35% of the sample ( $n = 142$ ) and was characterized by a generally high likelihood of organized group care use over time and an overall low likelihood of using grandparent care and other family and friend care over time. Although the three classes were distinctly different from one another, the likely use of organized group care and grandparent care differed substantially across the groups while the likely use of other family and friend care was generally low and stable across all three classes. Figure 3 shows model estimated probabilities for a three-class solution.

### **Mean Differences in Demographic Variables Across Classes**

After a three-class solution was selected, associations between the classes and participants' background characteristics were examined to investigate whether class membership was associated with sample demographic information (Table 6). Specifically, analyses explored the relation between the classes and maternal age,

child age, maternal race/ethnicity, program participation, living arrangements, mothers' history of maltreatment, maternal education, and mothers' relationship status. Results showed that compared to Class 2 (organized group care plus grandparent care) and Class 3 (organized group care), Class 1 (low early child care use) was likely comprised of older mothers and participants who identified as non-Hispanic White. In addition, compared to Class 2 (organized group care plus grandparent care), Class 1 (low early child care use) and Class 3 (organized group care) were more likely comprised of participants in the HVS group<sup>1</sup>. Furthermore, although only marginally significant, compared to Class 2 (organized group care plus grandparent care), Class 1 (low early child care use) was more likely comprised of mothers who had been victims of maltreatment during their childhoods.

At Time 2, Time 3, and Time 4, Class 2 (organized group care plus grandparent care) was more likely comprised of participants who lived with parents/caregivers compared to both Class 1 (low early child care use) and Class 3 (organized group care). Furthermore, at Time 2 and Time 4, Class 2 (organized group care plus grandparent care) and Class 3 (organized group care) were more likely comprised of mothers who participated in post-high school education compared to Class 1 (low early child care use)<sup>2</sup>. Furthermore, at Time 3, Class 3 (organized group care) was more likely comprised of mothers who participated in

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<sup>1</sup> The difference between Class 1 and Class 2 was marginally significant ( $p = .053$ )

<sup>2</sup> The difference between Class 1 and Class 2 at Time 2 was marginally significant ( $p = .055$ )

post-high school education compared to Class 1 (low early child care use) and Class 2 (organized group care plus grandparent care)<sup>3</sup>.

In summary, Class 1 (low early child care use) was more likely comprised of older mothers, mothers who identified as non-Hispanic White, and participants in the HVS group (compared to Class 2). Class 2 (organized group care plus grandparent care) was more likely comprised of participants who lived with parents/caregivers as well as mothers who participated in post-high school education at Times 2 and 4 (compared to Class 1). Class 3 (organized group care) was more likely comprised of participants in the HVS group (compared to Class 2) and mothers who participated in post-high school education at all time points (compared to Class 1). In addition, this class was more likely comprised of mothers who participated in post-high school education at Time 3 (compared to Class 2). There were no significant associations between class membership and children's age or class membership and mothers' relationship status at Time 2, Time 3, or Time 4.

### **Research Question 2: Relations Between Child Care and Child Outcomes**

The one-step Bolck–Croon–Hagenaars (BCH) method (Asparouhov & Muthén, 2014) was used to investigate associations between patterns of early child care use and children's school readiness and executive function performance. Mean differences in children's scores on the Bracken School Readiness Assessment (measuring cognitive development and school readiness at Time 5) across the child care classes showed that children in Class 2 (organized group care plus grandparent

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<sup>3</sup> The difference between Class 2 and Class 3 was marginally significant ( $p = .088$ )

care) were more likely to score higher on the Bracken School Readiness assessment compared to children in Class 3 (organized group care) (Figure 4). Therefore, higher school readiness was associated with organized group care plus grandparent care over time compared to organized group care only over time. Children's performance on the EF measures did not differ across the three classes.

### **Research Question 3: Mechanisms by Which Child Care Fosters Development**

Mediation analyses using SEM were conducted to investigate possible mechanisms by which child care may foster children's school readiness. The latent child care classes in the aforementioned analyses are comprised of multiple time points, however, mediation is inherently a time-based analysis. Therefore, in order to conduct analyses to explore possible mechanisms underlying the relation between child care use and children's school readiness, child care variables were created at a static point in time (Time 3) that best matched and represented the longitudinal child care patterns found in prior analyses: (1) organized group care only at Time 3 and (2) organized group care plus grandparent care at Time 3. Time 3 was chosen as the time point of interest in these analyses due to child age, a larger percentage of children in child care arrangements at this time, and the time-based nature of mediation analyses (e.g., the predictor variable is measured at an earlier time point than the mediator and outcomes variables). Moreover, analyses controlled for the impact of mediator and outcome variables at earlier time points to prevent the over- or underestimation of paths in the mediation model (e.g., Selig & Preacher, 2009).

In addition, maternal age and race/ethnicity were included as covariates in the model. Following Little's (2013) guidelines for including control variables in longitudinal models, the direct effects of the covariates were estimated at the first time point and then controlled for at subsequent time points as indirect effects. This approach is suitable for longitudinal models because once the covariates are initially accounted for, it is assumed that the effects of covariates at later time points will dissipate over time.

### **Longitudinal Structural Equation Model**

A longitudinal structural equation model was estimated among the child care variables at Time 3 (organized group care only; organized group care plus grandparent care), parenting stress, and children's school readiness. Specifically, the model specified direct effects from the child care variables to parenting stress at Time 4 and school readiness at Time 4. Moreover, direct effects were estimated from parenting stress at Time 3 to parenting stress at Time 4 and school readiness at Time 4. Direct effects were also specified from parenting stress at Time 4 to school readiness at Time 4, parenting stress at Time 4 to school readiness at Time 5, and from school readiness at Time 4 to school readiness at Time 5. In addition, indirect effects were estimated from the child care variables to school readiness at Time 5 through parenting stress and school readiness at Time 4, and from the child care variables to school readiness at Time 5 through school readiness at Time 4. The structural model with unstandardized path coefficients is presented in Figure 5. Numerical integration was required when estimating the structural model given that categorical predictor variables were included in the model. Thus, model fit statistics

and an absolute fit index were not provided because fit indices are not available with Mplus software when using numerical integration (e.g., Muthén, 2016).

The direct effects between organized group care (Time 3) and parenting stress (Time 4), as well as between organized group care (Time 3) and school readiness (Time 4) were not significant. Furthermore, the direct effect between parenting stress (Time 3) and school readiness (Time 4) was not significant. However, the path coefficient between organized group care plus grandparent care (Time 3) and parenting stress (Time 4) was significant and negative in valence,  $\beta_{\text{organized group care + grandparent care} \rightarrow \text{parenting stress}} = -7.092, p < .05$ . The path coefficient between parenting stress at Time 3 and parenting stress at Time 4 was also significant,  $\beta_{\text{parenting stress at Time 3} \rightarrow \text{parenting stress at Time 4}} = 0.529, p < .001$ . Moreover, the path coefficient between organized group care plus grandparent care (Time 3) and school readiness at Time 4 was significant and positive in valence,  $\beta_{\text{organized group care + grandparent care} \rightarrow \text{school readiness at Time 4}} = 7.485, p < .05$ . There were no significant direct effects between parenting stress (Time 4) and school readiness (Time 4) or between parenting stress (Time 4) and school readiness (Time 5). However, the direct effect between school readiness at Time 4 and school readiness at Time 5 was significant,  $\beta_{\text{school readiness at Time 4} \rightarrow \text{school readiness at Time 5}} = 0.546, p < .001$ .

In addition to direct effects, there was a significant indirect effect between organized group care plus grandparent care at Time 3 and school readiness at Time 5 through school readiness at Time 4,  $\beta_{\text{organized group care + grandparent care} \rightarrow \text{school readiness at Time 4} \rightarrow \text{school readiness at Time 5}} = 4.088, p < .05$ . However, the indirect effect between organized group care only at Time 3 and school readiness at Time 5 through school

readiness at Time 4 was not significant. Moreover, the indirect effect between organized group care plus grandparent care at Time 3 and school readiness at Time 5 through both parenting stress at Time 4 as well as school readiness at Time 4 was not significant. Similarly, the indirect effect between organized group care only at Time 3 and school readiness at Time 5 through both parenting stress at Time 4 as well as school readiness at Time 4 was not significant. Therefore, although organized group care plus grandparent care was associated with higher school readiness scores as well as lower parenting stress, the relation between child care and school readiness was not mediated by parenting stress.

## CHAPTER FOUR: DISCUSSION

For the majority of children in the United States, nonparental child care arrangements serve as typical settings where development unfolds during the early childhood years (Mamedova, Redford, & Zukerberg, 2013; U.S. Census Bureau, 2011). A substantial percentage of young children spend extensive amounts of time in organized (e.g., center-based child care) as well as informal (e.g., grandparent care) child care settings, underscoring the importance of considering the influence of these care environments on developmental functioning in both children and caregivers. This view is further supported by a transactional-ecological framework in which developmental outcomes are thought to result not only from direct and bidirectional relations between the child and child care context, but additionally from the reciprocal interactions that exist among all levels of an individual's environment (e.g., Sameroff, 2009). According to this model, child care participation may promote positive outcomes for both parents and children due to a feedback loop in which all levels of the developmental system impact one another and mutually influence the broader ecology of human development (e.g., Bronfenbrenner, 1979; Sameroff, 2009).

Research investigating the influence of early child care on development suggests that for at-risk populations in particular (e.g., children from low-income families), nonparental child care can promote positive development in multiple domains and serve as a barrier against risks that adversely influence developmental trajectories (e.g., Campbell et al., 2012; Caughy, DiPietro, & Strobina, 1994; Loeb, Fuller, Kagan, & Carrol, 2004; Reynolds & Temple, 2005; Schweinhart et al.,

2005). However, although associations between child care participation and children's development have been studied extensively in low-income families, limited research has focused specifically on children of adolescent mothers, a population also at risk for challenging developmental and psychosocial outcomes. Furthermore, few studies have explored the multiple pathways by which child care may exert benefits for children and caregivers and foster positive developmental functioning. In an effort to fill these existing gaps in the literature and build on prior work in this area, this dissertation investigated patterns of child care use over time, associations between child care participation and socioemotional and cognitive outcomes in early childhood, and possible mechanisms underlying relations between child care and development in a sample of adolescent mothers and their children.

Given that prior research has shown that nonparental child care promotes positive development in a variety of developmental domains in children with psychosocial risk factors, it was hypothesized that children in this sample who participated in consistent nonparental child care over time would demonstrate more positive developmental functioning in socioemotional and cognitive domains compared to children who did not participate in regular nonparental child care or were primarily cared for by parents. It was also hypothesized that child care utilization would decrease parenting stress, leading to more positive child functioning, given that previous research has demonstrated associations between nonparental child care and positive parental outcomes. Study results provided partial support for these hypotheses.

**Extent and Type of Child Care Utilization**

Results indicated that a substantial percentage of children participated in nonparental child care over time from infancy (12 months) to early childhood (5 years of age). Approximately one quarter of children were cared for in organized group care settings at 12 months of age and by Time 4 (5 years of age), over half of the children in the study sample were participating in organized group care. In addition, nearly one third of children were in the care of their grandparents at all three time points examined. Results also indicated that other family and friend care remained stable and low across time, suggesting that on average, families used this type of care less often than organized group care and grandparent care. Regardless of type, findings showed that children spent extensive amounts of time in these child care settings each week. Overall, on average, children spent between 24 and 35 hours per week in the child care arrangements assessed. Depending on the time point examined, on average, children participated in organized group care for approximately 32-35 hours per week, grandparent care for approximately 26-28 hours per week, and other family and friend care for approximately 24-28 hours per week. Thus, overall, a large number of children participated in nonparental care and spent an extensive number of hours per week in these various child care arrangements.

Compared to reports of child care use among other populations with psychosocial risk factors (e.g., low-income families), this sample of adolescent mothers and their children (although likely to come from disadvantaged backgrounds) were more likely to utilize organized group care arrangements.

According to the US Census Bureau (2013), 19-22% of low-income children under the age of five participate in center-based child care programs. The percentage of organized child care participation in the current study sample was slightly higher at even 12 months of age (24% of children participated in organized group care at Time 2), reaching over 56% by Time 4. These figures more closely resemble child care data collected from nationally representative samples of families in the United States, which, depending on the data source, show that 25% and 56% of young children participate in organized group care (Mamedova, Redford, & Zukerberg, 2013; U.S. Census Bureau, 2013). Moreover, these findings are comparable to results reported by Mollborn & Blalock (2012) which showed that adolescent mothers and older parents demonstrated similar patterns of child care use in a study with a nationally representative sample of families in the United States.

In addition, data suggest that 30-33% of low-income children are cared for by relatives, and in general, grandparents are more likely to serve as child care providers relative to other family members (e.g., Mamedova, Redford, & Zukerberg, 2013; U.S. Census Bureau, 2013). Similar results were found in the present study with 30-32% of children participating in grandparent care depending on the time point. Moreover, higher percentages of children utilized grandparent care compared to other family and friend care, further demonstrating the incidence of this type of care during the early childhood years.

The prevalence of organized group care in the current sample of adolescent mothers and their children (mostly low income) is noteworthy as it would be expected that families may not have adequate resources to access this type of care.

Greater child care participation may have resulted from the fact that Massachusetts as a state is more progressive in terms of the supports and programming offered to families and children (e.g., Annie E. Casey Foundation, 2014). For example, Massachusetts recently ranked first among all states for overall child well-being, taking into account education, economic wellbeing, health, and family and community factors (Annie E. Casey Foundation, 2014). In addition, the public preschool programs available in Massachusetts are growing. For example, the public preschool programs in Boston, Massachusetts are reported to serve 68% of the 4-year-olds likely to enroll in public kindergarten (e.g., Mongeau, 2016). Moreover, efforts to expand public preschool have been made in Massachusetts by establishing partnerships between public school-based preschools and community-based preschools using the federal Preschool Expansion Grant, which is expected to provide 15 million dollars annually for four years across five different communities in the state (e.g., Mongeau, 2016).

It is also possible that families enrolled in MHFE were directly provided with resources and referrals to early education and child care programs. Although families in the control group (RIO) did not receive home visiting services through HFM, they were provided with child development information and referrals to other support services. Thus, both the program and control groups may have been offered information about early childhood programs that increased their likelihood of using organized group care relative to other families in the state who were not involved in the evaluation study.

### **Patterns of Child Care Use**

Analyses exploring patterns of child care use across Times 2, 3, and 4 yielded three identified classes including a group characterized by low early child care use, a group characterized by organized group care plus grandparent care, and a group characterized by the use of organized group care only. These subgroups are not surprising given that organized group care and grandparent care were the main types of child care used most often by families in this sample and thus were the primary care arrangements that differentiated the various classes (i.e., the likely use of organized group care and grandparent care differed across the groups while the likely use of other family and friend care was low across all classes). Furthermore, it was also not surprising that grandparent care emerged as a main form of child care that was highlighted in one of the subgroups given that the study sample was comprised of adolescent mothers who were likely more connected to their parents given their young childbearing age and parenting circumstances. In fact, results showed that the organized group care plus grandparent care class was more likely comprised of families who lived with children's grandparents compared to the other child care classes, further supporting this idea.

Class 1, low early child care use, was characterized by minimal early child care usage and an increased likelihood of using organized group care at Time 4, when children were on average five years of age. Therefore, this class was likely comprised of families who only used organized child care programs and just used these arrangements when children were older. This class was also likely comprised of older mothers, so it is possible that these families did not have as great a need for

child care services compared to other young mothers in the study. For example, these mothers may not have been enrolled in school and therefore did not require child care while they were partaking in education activities. This conjecture is further supported by results that showed that this group was less likely comprised of mothers who were participating in education activities relative to the other groups. Mollborn and Blalock (2012) also reported that the “parental care” group in their study of child care use among young mothers was overrepresented by mothers with fewer years of education or no school enrollment. In addition, although only marginally significant, this class was likely comprised of mothers who had been victims of maltreatment while growing up. Therefore, it is possible that mothers did not trust other individuals to care for their children due to past caregiving experiences, further accounting for the lower likelihood of utilizing nonparental child care in this group.

The second class, organized group care plus grandparent care, was characterized by an increased likelihood of using organized group care over time paired with a stable and high likelihood of using grandparent care over time. As previously mentioned, this group was more likely comprised of mothers who lived with their parents/caregivers and who participated in post-high school education. Therefore, it is possible that grandparents may have acted as the primary caregivers for children (relative to mothers) or that mothers were more likely to require child care due to their school-related responsibilities. Moreover, given that mothers and grandparents were more likely to be living together, it is reasonable that this class was likely comprised of children under the care of grandparents in addition to

organized group care. It is also possible that because mothers lived with their parents, they had stronger relationships and placed more trust in the grandparents as caregivers compared to the other two classes, further explicating the higher likelihood of grandparent care in this group.

Conversely, it is also possible that mothers relied on grandparent care because they were less confident in their parenting abilities or were not provided with parenting supports that would have aided them in caring for their children when they were not in the organized group care programs. The fact that this class was less likely comprised of participants in the HVS group further supports this supposition. Given that HFM provides parenting support, information, and services to young parents through home visits, goal-setting and group-based activities, secondary contacts, and linkages and referrals, mothers who received these services may have been more confident parents and self-reliant caregivers. Therefore, since this group was more likely comprised of RIO participants, lack of parenting confidence and fewer parenting supports may have led to the higher use of grandparent caregiving.

Finally, Class 3, organized group care only, was characterized by a generally high likelihood of using organized group care over time and a low likelihood of utilizing other forms of child care. Similar to the second group, this class was likely comprised of participants who partook in post-high school education at all time points and therefore may have had a greater need for nonparental care during the times that they were not able to care for their children due to commitments associated with school or work. This group was also more

likely comprised of participants in the HVS group, so parents may have been more likely to receive information about organized group care, referrals to early childhood programs, and child care supports (e.g., vouchers) to increase their access to, and participation in, child care and early education programs.

### **Relations Between Child Care Classes and Children's Development**

Findings from the current study showed that higher school readiness was associated with organized group care in addition to grandparent care over time compared to the sole use of organized group care. Specifically, results indicated that Class 2 (organized group care plus grandparent care) was more likely comprised of children who scored higher on the Bracken School Readiness assessment relative to Class 3 (organized group care). Although previous research suggests that organized group care promotes positive developmental functioning, particularly in cognitive and academic domains (e.g., Gormley, Gayer, Phillips, & Dawson, 2005; Loeb, Fuller, Kagan, & Carrol, 2004; Mollborn & Blalock, 2012), the positive benefits of grandparent care in conjunction with organized group care have yet to be explored in the literature.

The understudied yet potentially important role that grandparents play in the lives of children has primarily been considered in a descriptive manner. Recent demographic trends suggest that children in the United States spend a substantial amount of time with grandparents (e.g., Dunifon, Near, & Ziol-Guest, 2018; Mamedova, Redford, & Zukerberg, 2013; U.S. Census Bureau, 2013). Moreover, studies have shown that grandparents are actively involved as caregivers, especially during the early childhood years (e.g., Dunifon, Near, & Ziol-Guest, 2018;

Mamedova, Redford, & Zukerberg, 2013; U.S. Census Bureau, 2013). Dunifon, Near, and Ziol-Guest (2018) reported that non-residing grandparents cared for grandchildren for comparable amounts of time as coresident grandparents. However, the nature of activities that grandparents and children engaged in differed depending on residential status. For example, grandparents who lived with grandchildren were more likely to participate in household and learning activities compared to children who did not reside with grandparents. Conversely, grandparents who did not live with grandchildren tended to partake in activities that were focused more on entertainment, play, and food when grandchildren were under their care (Dunifon, Near, & Ziol-Guest, 2018).

In the current study, given that children who participated in grandparent care in addition to organized group care were more likely to live with their grandparents, higher school readiness scores in this group may have been partially due to learning activities provided by coresident grandparents. Moreover, it is possible that these grandparent-led activities supplemented the early learning components present in the organized group care settings in which children were also attending, leading to higher school readiness scores for children in both types of child care settings relative to organized group care alone.

It is also notable that school readiness scores did not differ between Class 1 (low early child care use) and Class 2 (organized group care plus grandparent care) or between Class 1 (low early child care use) and Class 3 (organized group care). Thus, the sheer number of hours that children spent in nonparental child care was not the factor driving the differences found in children's school readiness. If this

were the case, differences in school readiness should have been observed between all three classes. These results therefore suggest that there is something substantively different about grandparent care that, when paired with organized group care, works to promote school readiness above and beyond organized group care only (when it is both high and stable over time or only used at later points in time).

These findings are comparable to results reported within prior work examining child care utilization in this sample of adolescent mothers and their children, which showed that grandparent care promoted positive child development, particularly when children were also in organized group care arrangements (Katz & Easterbrooks, under review). Katz and Easterbrooks reported that when analyses included children who were in multiple child care arrangements at one time, results showed that at 24 months of age, organized group care was associated with higher performance on assessments of socioemotional and language development. However, when analyses considered children who only participated in organized group care, some results were no longer significant. Thus, these findings indicated that the positive results related to children's development could not solely be attributed to organized group care, and that it was possible that positive child functioning stemmed from organized group care participation in addition to grandparent care utilization (Katz & Easterbrooks, under review).

Why might grandparent care paired with organized group care be especially beneficial for children? In the current study, depending on the circumstances, it is possible that compared to the young mothers in this study, grandparents may have

had more time to be regularly engaged with children. Thus, the one-on-one attention, specialized care, and learning activities provided by grandparents could have complemented and even enhanced the care that children received out of the home in the organized child care environments. In addition, grandparents may have fulfilled important caregiving responsibilities such as ensuring that children attended the organized group care arrangements and making sure that they were optimally engaged when participating in these early childhood programs. Therefore, children may not have only experienced child care outside the home that specifically met their developmental, socioemotional, and safety needs, but were also provided with additional caregiving experiences that promoted school readiness and nurtured early development.

Grandparent care may also have been a proxy for family cohesion, social support, and residential status. In the current study, the group characterized by organized group care plus grandparent care was more likely comprised of participants who lived with children's grandparents. It is probable that mothers who lived with family members (e.g., grandparents) had higher familial support and stronger bonds with family, leading to more positive child development. Thus, the presence of grandparent caregiving may have generally reflected stronger family functioning and cohesiveness, such that positive child outcomes may not have been specifically associated with the care arrangement itself but with other protective factors that were present in the home and family context.

It is also possible that the organized group care programs in which children participated were lower in quality and may not have offered adequate educational

activities to successfully foster school readiness. Consequently, the supplemental care that grandparents provided may have been necessary to promote school readiness given the higher school readiness scores identified in this class relative to the class characterized by organized group care alone. Quality information was not available for the child care arrangements analyzed in the current study, and therefore, this possibility could not be tested directly. However, extant research suggests that children with psychosocial risk factors (e.g., low-income children) are less likely to be placed in high quality child care arrangements relative to higher-income families (e.g., Dearing, McCartney, & Taylor, 2009). For example, research findings have shown that at six months of age, 18.3% of low-income infants were in high-quality center-based child care arrangements compared to 34.2% of higher-income infants. Similarly, at 36 months of age, 20% of low-income infants were found to be in high-quality center-based child care arrangements compared to 41.7% of higher-income participants (Dearing, McCartney, & Taylor, 2009).

Similar figures are reported in relation to family child care programs, which are widely used by families throughout the country. Over 20% of families with children under the age of one utilize family child care programs, and research suggests that children spend over 30 hours per week in this type of care arrangement (e.g., Morrissey & Banghart, 2007). Moreover, infants and toddlers are more likely to be cared for in family child care programs compared to center-based programs (NSECE, 2016). Despite the large number of children placed in family child care programs, these programs are highly decentralized, and the quality of care is extremely variable. For example, out of the 160,000 family child care

programs in the United States, only 1.4% of homes are nationally accredited (Child Care Aware, 2015), and one study noted that 43% of family child care providers failed to meet the minimal benchmarks in Basic Care (e.g., Marshall et al., 2003).

Studies with adolescent mothers and their children have shown that teen childbearing is associated with a variety of risk factors and nonoptimal functioning among both adolescent parents and their children (Mollborn & Dennis, 2012). Therefore, the current sample of young mothers and children are comparable to low-income children in prior child care research as they are also considered to be at risk for challenging economic, educational, and psychosocial trajectories. In this view, it is probable that the organized group care settings in the present study in which children participated may have not been high quality, leading to lower levels of school readiness among the group in organized group care only. Given that data related to child care quality were not available for this dissertation, future work should consider the quality of child care arrangements in order to explore these theories further.

Although study findings showed that patterns of child care utilization were associated with children's school readiness scores, children's EF performance did not differ across the child care groups. It is possible that nonparental child care did not influence factors related to children's EF. As previously noted, although studies that are specifically focused on children with psychosocial risk factors tend to show associations between child care use and cognitive and school-based outcomes as well as socioemotional and behavioral development, there is still mixed evidence regarding the positive benefits of nonparental child care on child functioning,

particularly in regard to socioemotional and behavioral outcomes. Given that EF is related to both cognitive and socioemotional development in children, and because prior findings related to socioemotional development in children who participated in nonparental child care are varied, it is conceivable that child care utilization in the current sample may not have impacted EF performance in children.

Furthermore, the nature and quality of care that children received could additionally explain the lack of results related to children's EF performance. For example, research has shown that children in higher quality care environments demonstrate stronger cognitive, language, and communication skills (Burchinal et al., 2000). Moreover, Votruba-Drzal and colleagues (2010) reported that higher quality child care was associated with more positive socioemotional and behavioral development in a sample of economically disadvantaged children (Votruba-Drzal, Coley, Maldonado-Carreno, & Li-Grinning, 2010). If children in the current study sample participated in lower quality child care, it is possible that potentially negative impacts associated with low-quality care may have masked positive results for children in higher quality child care arrangements.

However, it is also possible that EF performance is harder to measure compared to school readiness. Perhaps the EF measures used in the current study were not sensitive enough to assess this multifaceted component of development in relation to child care experiences. EF as a construct is more complicated because it consists of three interrelated components including working memory, cognitive flexibility, and inhibitory control (e.g., Diamond, 2014). These functions are highly connected, and strong executive function skills involve the coordinated operation of

these higher-order processes. Conversely, school readiness is simpler to examine as the measure directly assesses children's knowledge about rudimentary subjects and produces an unequivocal score based on the child's understanding of five fundamental academic concepts. Since the current study was not able to capture EF as a holistic construct, future work exploring child care and EF performance might benefit from using a different measure of EF or a latent EF variable that better assesses working memory, cognitive flexibility, and inhibitory control as connected, interrelated components.

### **Possible Mechanisms by Which Child Care May Foster School Readiness**

Analyses investigating the mediating role of parenting stress in the relation between child care and children's school readiness showed that organized group care plus grandparent care was associated with higher school readiness scores as well as lower parenting stress. However, parenting stress was not found to mediate the association between child care and school readiness. Specifically, the relation between organized group care plus grandparent care and parenting stress was significant, showing a negative association between this type of care arrangement and parenting stress. However, results also showed that while organized group care plus grandparent care was related to school readiness at Time 4, which was related to school readiness at Time 5, parenting stress did not mediate this significant association. Thus, even though organized group care plus grandparent care was associated with both improved school readiness and lower parenting stress, the reason for improved school readiness was not related to reductions in parenting stress.

Although parenting stress was not found to be a mechanism underlying the association between nonparental child care use and children's school readiness, it is possible that other factors might mediate this association. For example, positive parenting practices may serve as a mediating variable that relates to better child functioning. It is conceivable that participation in nonparental child care may help parents to learn effective parenting techniques and ways to support school readiness, additionally fostering cognitive development and school readiness in children.

Alternatively, it is possible that multiple interrelated variables may be involved in the underlying mediation of the relation between child care and children's outcomes. The consideration of only one mediating variable may not capture the complexity of the components that account for the relation between child care utilization and children's developmental outcomes. This perspective is connected to the relational theoretical framework that supports the idea of multiple pathways by which child care may foster development. Perhaps the mediation analysis used in the current study was not able to capture the complex processes through which child care impacts developmental outcomes. For example, it is possible that child care use might enable mothers to pursue advanced education or employment, which in turn might lead to stronger financial security, which could lower stress, and improve parent-child interactional quality, ultimately leading to positive child outcomes. Research suggests that positive development (e.g., school readiness, EF skills) can be facilitated partly through the provision of supportive and dependable relationships, and these positive parent-child relationships may be

influenced by the cumulative effect produced by the abovementioned variables. Future research should conduct mediation analyses with multiple mediators to further test these hypotheses.

Although parenting stress did not mediate the relation between child care and children's school readiness in the current study, the association between organized group care plus grandparent care and parenting stress is important to address. Children's improved school readiness did not result from lower levels of parenting stress but decreases in parenting stress are likely associated with other positive child outcomes. For example, Noel, Peterson, and Jesso (2008) found that children of parents who reported lower levels of parenting stress tended to demonstrate stronger expressive and receptive language skills during the preschool years. In addition, Harmeyer and colleagues (2016) reported that parenting stress when children were 15 months old was negatively related to mother-child closeness when children were 25 months old, showing that lower levels of parenting stress were associated with higher levels of caregiver-child closeness. Furthermore, mother-child closeness was predictive of children's vocabulary and academic and self-regulation skills before kindergarten entry. Thus, not only was lower parenting stress related to mother-child closeness, but mother-child closeness in turn predicted positive child outcomes, showing that reductions in parenting stress can ultimately foster positive child functioning, specifically when caregiver-child interactional quality mediates this relation (Harmeyer, Ispa, Palermo, & Carlo, 2016). These studies show that lower parenting stress is associated with positive child outcomes in other domains that were not explored in the current study, and

therefore suggest that utilizing child care arrangements that may lower parenting stress (i.e., organized group care plus grandparent care) is important as such utilization can have implications for positive child development.

### **Additional Study Limitations**

In addition to the abovementioned limitations, it is important to note that although child care patterns were considered longitudinally, the time points examined represent fixed points in time and are thus not fully representative of child care participation that may have occurred between time points. For example, it is possible that children may have participated in a child care arrangement between Time 2 and Time 3 that was not accounted for in the data. For instance, a child might have been in organized group care at Time 2 and Time 3 but participated in grandparent care between these time points. In this scenario, participation in grandparent care would not be represented in the data so findings related to child and caregiver outcomes stemming from child care participation may not be fully accurate.

Furthermore, as previously noted, there were no available measures of child care quality or information about the type of licensure or registration under which the organized group care arrangements were operating. This is especially important to consider given that center-based child care and family child care programs were grouped in the same category due to the nature of the data. Although it is probable that there were variations in child care quality across all arrangements, these differences were likely more pronounced for family child care programs in which regulations, licensing, and quality have been found to be particularly inconsistent

and variable. Due to the lack of information related to child care quality and given that these different types of organized group care arrangements could not be studied independently, differences in the nature and quality of children's care arrangements could not be taken into account in the current study.

Moreover, the reasons that families chose different types of child care were not available but may have contributed to maternal and child functioning. For example, the group that was characterized by a low likelihood of using organized group care at early time points was more likely comprised of mothers who had been victims of maltreatment during their childhoods. Conversely, the group that was characterized by grandparent care in addition to organized group care was more likely comprised of mothers who lived with children's grandparents. Thus, family environments could have been associated with child care choices and therefore related to child and mother outcomes. In addition, financial instability or constraints may have prevented families from utilizing organized group care arrangements and may have further influenced developmental functioning. Selection bias into types of child care could not be accounted for in the current study but should be considered when interpreting these dissertation findings.

### **Research, Program, and Policy Implications**

Findings from the current study contribute novel and potentially important knowledge to the literature related to young mothers' child care utilization practices. There is a dearth of research focused specifically on adolescent mothers and their children and accordingly, understanding of the associations between patterns of child care and child functioning in this population is limited. The

positive findings showing relations between grandparent care plus organized group care and child outcomes are among the first to my knowledge not only to explore this issue, but to demonstrate the important role that grandparents may play in fostering positive child functioning, specifically when grandparent caregiving is experienced in combination with organized group care. Furthermore, the longitudinal nature of the present study provides more information about children's child care experiences, as detailed patterns of child care utilization over time were considered. Although parenting stress was not found to be a significant mediator of child care and children's school readiness, this study takes important steps towards understanding the multiple pathways through which child care influences development. Future research should work to further uncover the mechanisms underlying this association in order to capture the complex interrelations between child care participation and developmental functioning for both children and caregivers.

Moreover, results from this dissertation have the potential to inform practice and policy. First, findings from the present study may help to inform and promote policy initiatives that aim to increase the quality and availability of child care programs, especially among at-risk populations. Although organized group care use was prevalent in this sample of adolescent mothers and children, access and availability of high quality child care programs for low-income families is lacking (e.g., Schmit, Matthews, Smith, & Robbins, 2013), even in Massachusetts (e.g., Child Care Aware of America, 2017). According to recent reports, it is estimated that nearly 2 in 5 children in working families do not have access to child care in

this state (e.g., Child Care Aware of America, 2017). Therefore, there is inconsistency between the supply and demand of child care for Massachusetts families. Furthermore, only 26% of child care centers and 1% of family child care programs in Massachusetts are nationally accredited, calling into question the quality of organized group care in this state as well as the availability of information and supports for increasing the quality of early childhood programs (e.g., Child Care Aware of America, 2017).

In recent years, public interest in early childhood programs has grown and efforts have been taken to make high quality preschool and early education available to more families throughout the United States (e.g., State of the Union Address, 2013). Moreover, historic funding increases for early childhood education and child care programs were recently passed, doubling funding for the Child Care and Development Block Grant, the nation's largest federal child care assistance program (e.g., Center for Law and Social Policy (CLASP), 2018). In order to continue to promote these important initiatives and ultimately increase child care availability, access, and quality, providing as much evidence as possible about the benefits of nonparental child care participation for at-risk families is key. Moreover, the current study suggests that policies surrounding child care participation must change to reflect an ecological and systems-based perspective. Public discourse related to child care policy tends to focus on outcomes solely related to the child. However, when considering child care participation through a transactional-ecological framework, child care is thought to promote positive development in children as well as in caregivers, families, and communities as a whole. If this

relational framework is used to promote the multifaceted benefits resulting from child care (e.g., positive child development, lower parenting stress), support for quality child care could grow given that early education would be seen as benefiting larger systems beyond the individual child.

It would also be valuable for child care programs and policies to include additional programmatic elements targeted directly to parents and families. For example, child care programs could have a stronger focus on caregiver education and involvement so that caregivers could learn successful ways to support learning and enhance development in the home environment. These efforts could work to promote a double protection niche (Watanura, Phillips, Morrissey, McCartney, & Bub, 2011) in which both the child care and home environments are high in protective factors. Therefore, child care participation could influence development through multiple pathways in order to better promote positive functioning in both children and families.

The idea of promoting higher levels of family engagement is especially important given the benefits of grandparent care plus organized group care identified in the current study. Study results suggest that family engagement strategies should work to include grandparents in addition to parents in order to provide more supports for grandparents who are increasingly likely to serve as caregivers for children. Especially in the case of families with young mothers, a multigenerational approach that involves grandparents, parents, and children would be particularly beneficial in promoting positive child and caregiver functioning. Moreover, given the prevalence of grandparent care, policies and programs that

work to proactively engage grandparents would be advantageous both to foster positive child outcomes (e.g., school readiness) as well as parental outcomes (e.g., reductions in stress). Further discussion about the best ways to approach and involve grandparents who are primarily responsible for caring for grandchildren are important as child care initiatives continue to evolve.

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Table 1

*Overview of Research Questions and Analytic Strategies*

<b>Research Question</b>	<b>Analytic Strategy</b>
1. What is the extent of child care use, the type of child care utilized, and patterns of child care participation across time in this sample of adolescent mothers and their children?	Descriptive Statistics, Longitudinal Latent Class Analysis (LLCA)/Repeated Measures Latent Class Analysis (RMLCA)
2. Is the early use of child care among adolescent mothers associated with positive child functioning in early childhood?	One-step Bolck–Croon–Hagenaars (BCH) Method
3. What are possible mechanisms by which child care may foster developmental outcomes?	Mediation Analyses using Structural Equation Modeling (SEM)

Table 2

*Sample Descriptive Information*

Construct	Variable	N	Mean	Percent	SD	Range
Program Assignment	HVS vs. RIO	406		RIO: 38.5% HVS: 61.5%		
Mother Age at Birth (in years)	Age of Mother at Birth of Child	405	18.80		1.29	15.84-21.43
Time 2 Child Age (in months)	Age at Time 2 Research Interview	289	11.99		5.59	3.84-28.95
Time 3 Child Age (in months)	Age at Time 3 Research Interview	297	24.56		6.16	14.72-45.54
Time 4 Child Age (in years)	Age at Time 4 Research Interview	386	4.93		0.48	3.75-6.93
Time 5 Child Age (in years)	Age at Time 5 Research Interview	406	6.24		0.55	4.75-7.89
Child Sex	Female vs. Male	406		Male: 53.9% Female: 46.1%		
Maternal Education	Less than high school/GED vs. High school/GED or more	397		Less than high school/GED: 16.6% High school/GED or more: 83.4%		
	No post-high school education vs. post-high school education	402		No post-high school education: 64.2% Post-high school education: 35.8%		
Mother Race/Ethnicity	White (non-Hispanic)	405		34.6%		
	Black (non-Hispanic)			20.7%		
	Hispanic			37.5%		
	Other (non-Hispanic)			7.2%		

Mother Preferred Language	English	402		76.4%		
	Spanish			4.2%		
	English and Other			18.7%		
	Other			0.7%		
Time 5 Child EF Measures	Corsi Task Forward Condition (Proportion Correct)	342	0.25		0.14	0-0.59
	Corsi Task Backward Condition (Proportion Correct)	340	0.19		0.15	0-0.68
	Digit Span Task Forward Condition (Total Correct)	341	2.60		0.86	0-5
	Digit Span Task Backward Condition (Total Correct)	341	0.78		.64	0-3
	HTKS Task (Total Correct)	242	58.45		28.03	0-94
Time 5 Cognitive Development/ School Readiness	Bracken School Readiness Assessment (Composite Standard Score)	342	94.17		16.16	40-133
Time 4 Parenting Stress	Parenting Stress Index Short Form (Overall Sum Score)	355	70.23		19.42	36-154

Table 3

*Types of Child Care Used (10 or more hours per week)*

	N	Frequency		Percent	
		No	Yes	No	Yes
Time 2 Organized Group Care	565	427	138	75.6%	24.4%
Time 3 Organized Group Care	594	388	206	65.3%	34.7%
Time 4 Organized Group Care	490	214	276	43.7%	56.3%
Time 2 Grandparent Care	565	382	183	67.6%	32.4%
Time 3 Grandparent Care	594	402	192	67.7%	32.3%
Time 4 Grandparent Care	490	341	149	69.6%	30.4%
Time 2 Other Family and Friend Care	530	457	73	86.2%	13.8%
Time 3 Other Family and Friend Care	554	479	75	86.5%	13.5%
Time 4 Other Family and Friend Care	490	438	52	89.4%	10.6%

Note. Groups are not mutually exclusive.

Table 4

*Extent of Child Care Used (10 or more hours per week)*

	N	Mean	SD	Range
Time 2 Hours Per Week in Organized Group Care	138	32.82	9.06	10-50
Time 3 Hours Per Week in Organized Group Care	206	34.97	9.52	12-50
Time 4 Hours Per Week in Organized Group Care	276	32.00	12.28	10-100
Time 2 Hours Per Week in Grandparent Care	183	25.55	19.65	10-168
Time 3 Hours Per Week in Grandparent Care	192	27.58	23.18	10-168
Time 4 Hours Per Week in Grandparent Care	149	27.36	19.37	10-132
Time 2 Hours Per Week in Other Family/Friend Care	73	24.18	21.19	10-133
Time 3 Hours Per Week in Other Family/Friend Care	75	28.27	21.20	10-168
Time 4 Hours Per Week in Other Family/Friend Care	52	24.82	14.47	10-72

Table 5

*Model Fit Statistics for Longitudinal Latent Class Analysis (LLCA)/Repeated Measures Latent Class Analysis (RMLCA) for a Model With One, Two, Three, and Four Classes*

Number of classes	AIC	BIC	Entropy	LMR <i>p</i> value	BLRT <i>p</i> value
1	3813.29	3849.35	—	—	—
2	3747.10	3823.22	0.54	<.001	<.001
<b>3</b>	<b>3720.17</b>	<b>3836.35</b>	<b>0.56</b>	<b>&lt;.050</b>	<b>&lt;.001</b>
4	3714.32	3870.57	0.62	.697	<.050

Table 6

*Means, Standard Errors, and Mean Comparison of Covariates by Class*

	Class 1 (low early child care use)		Class 2 (organized group care plus grandparent care)		Class 3 (organized group care)		Overall $X^2(2)$	1 vs. 2 $X^2(2)$	1 vs. 3 $X^2(2)$	2 vs. 3 $X^2(2)$
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>				
Maternal Age	19.25	0.14	18.61	0.15	18.57	0.14	12.38**	8.43**	9.87**	0.04
Child Age	6.33	0.07	6.16	0.07	6.22	0.05	2.90	2.74 †	1.46	0.37
Race/Ethnicity: % White	0.47	0.06	0.30	0.05	0.28	0.05	5.90 †	3.94*	5.06*	0.03
Program Assignment: % HVS	0.64	0.06	0.47	0.06	0.67	0.05	6.26*	3.76 †	0.18	5.72*
Living Arrangements T2: % Living with Parents/Caregivers	0.55	0.06	0.83	0.05	0.65	0.05	12.04**	11.33**	1.48	5.19*
Living Arrangements T3: % Living with Parents/Caregivers	0.42	0.06	0.68	0.06	0.45	0.05	10.86**	8.91**	0.12	7.46**
Living Arrangements T4: % Living with Parents/Caregivers	0.26	0.05	0.42	0.06	0.22	0.05	6.72*	3.91*	0.21	6.32*
Maternal History of Maltreatment	0.62	0.07	0.44	0.07	0.54	0.06	2.89	2.85 †	0.54	1.03
Maternal Education T2: % Post-HS	0.20	0.05	0.36	0.06	0.40	0.05	6.62*	3.68 †	5.76*	0.14
Maternal Education T3: % Post-HS	0.29	0.06	0.39	0.06	0.53	0.05	8.65*	1.26	8.51**	2.91 †
Maternal Education T4: % Post-HS	0.19	0.05	0.43	0.06	0.44	0.05	12.63**	8.68**	9.68**	0.002

†  $p < .10$ , \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

Note. T2 = Time 2; T3 = Time 3; T4 = Time 4

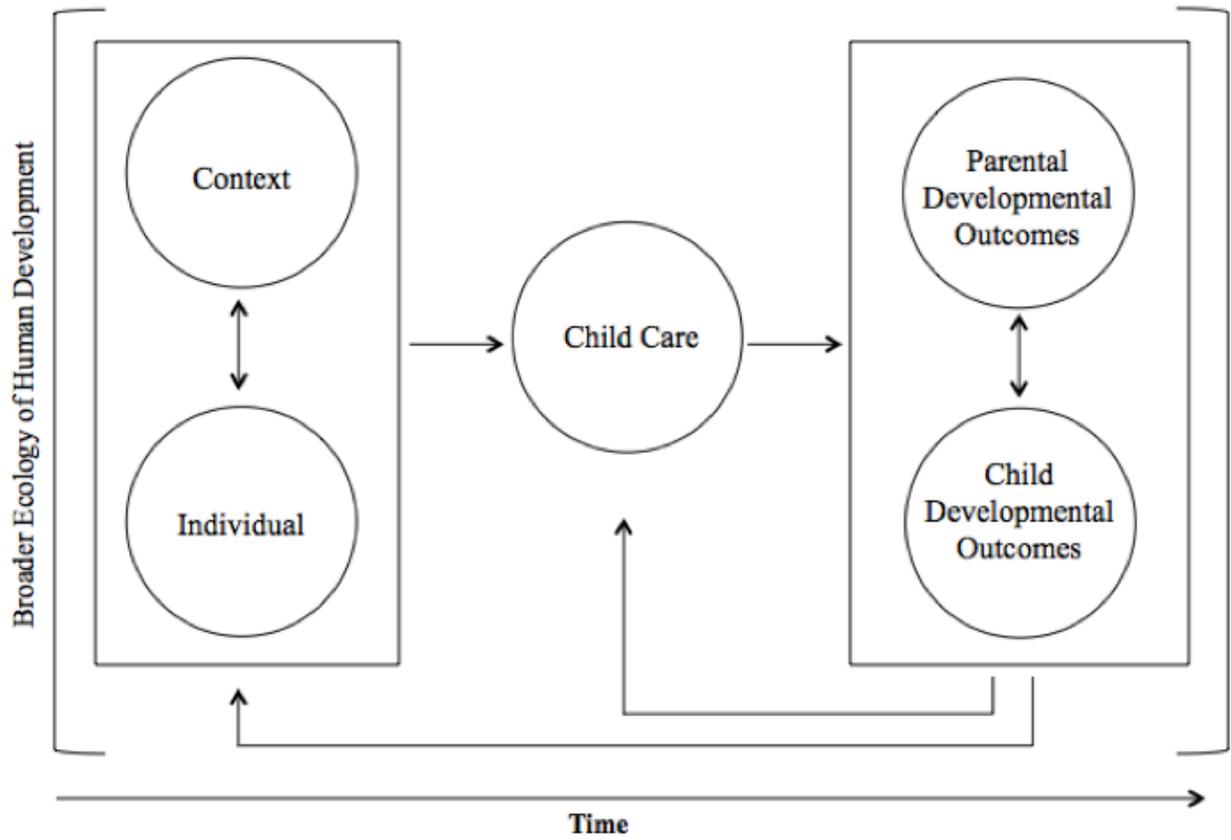
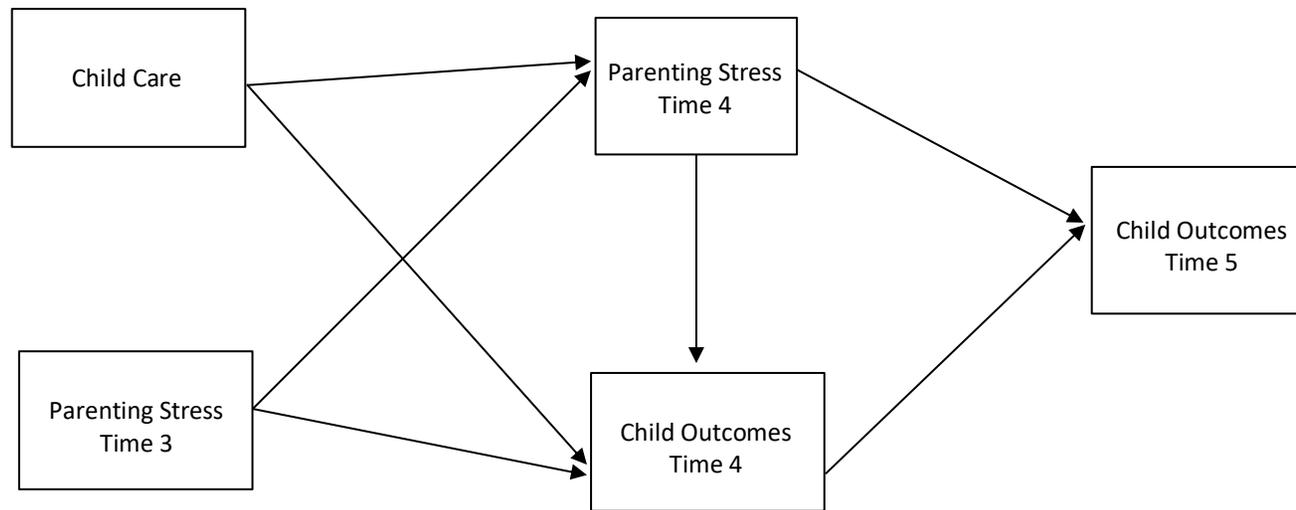


Figure 1. A transactional-ecological framework of individual-context relations: Child care and developmental outcomes.



*Figure 2.* Conceptual model illustrating the proposed mediation model in which parenting stress is hypothesized to mediate the association between child care use and children’s school readiness (accounting for prior levels of the mediator and outcome variables).

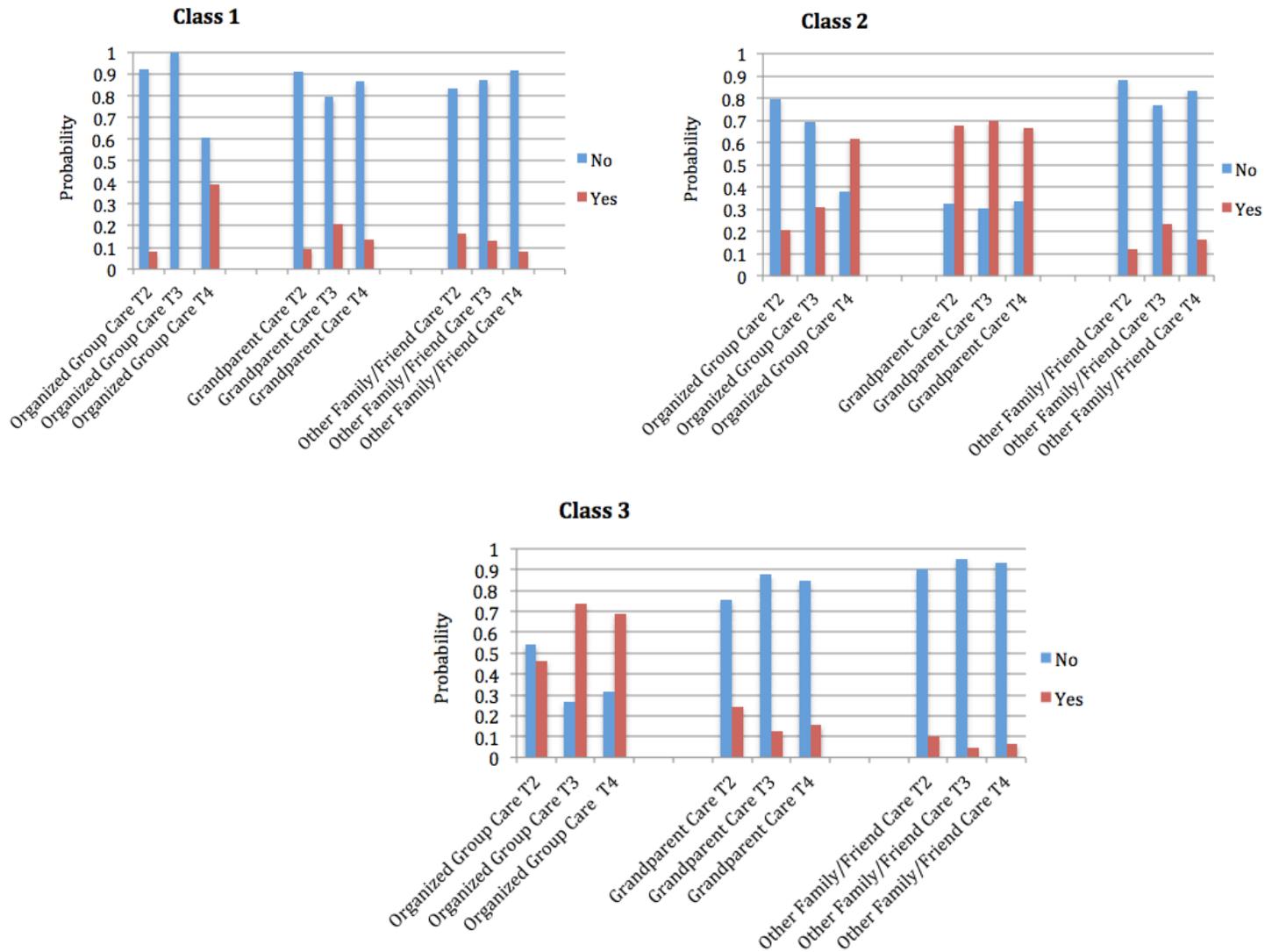


Figure 3. Model estimated probabilities for a three-class solution.  
 Note. T2 = Time 2; T3 = Time 3; T4 = Time 4

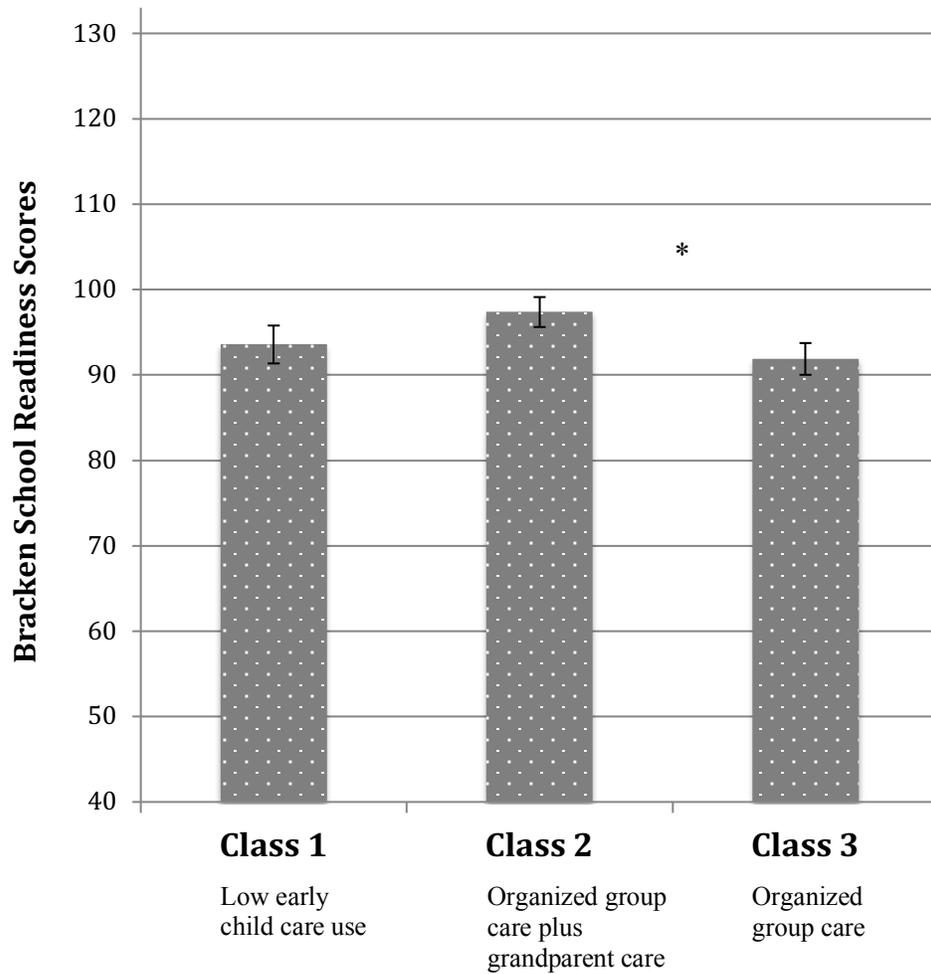


Figure 4. Class-specific means of Bracken School Readiness scores for a three-class model. Note. Significant differences among means were found between Class 2 and Class 3.

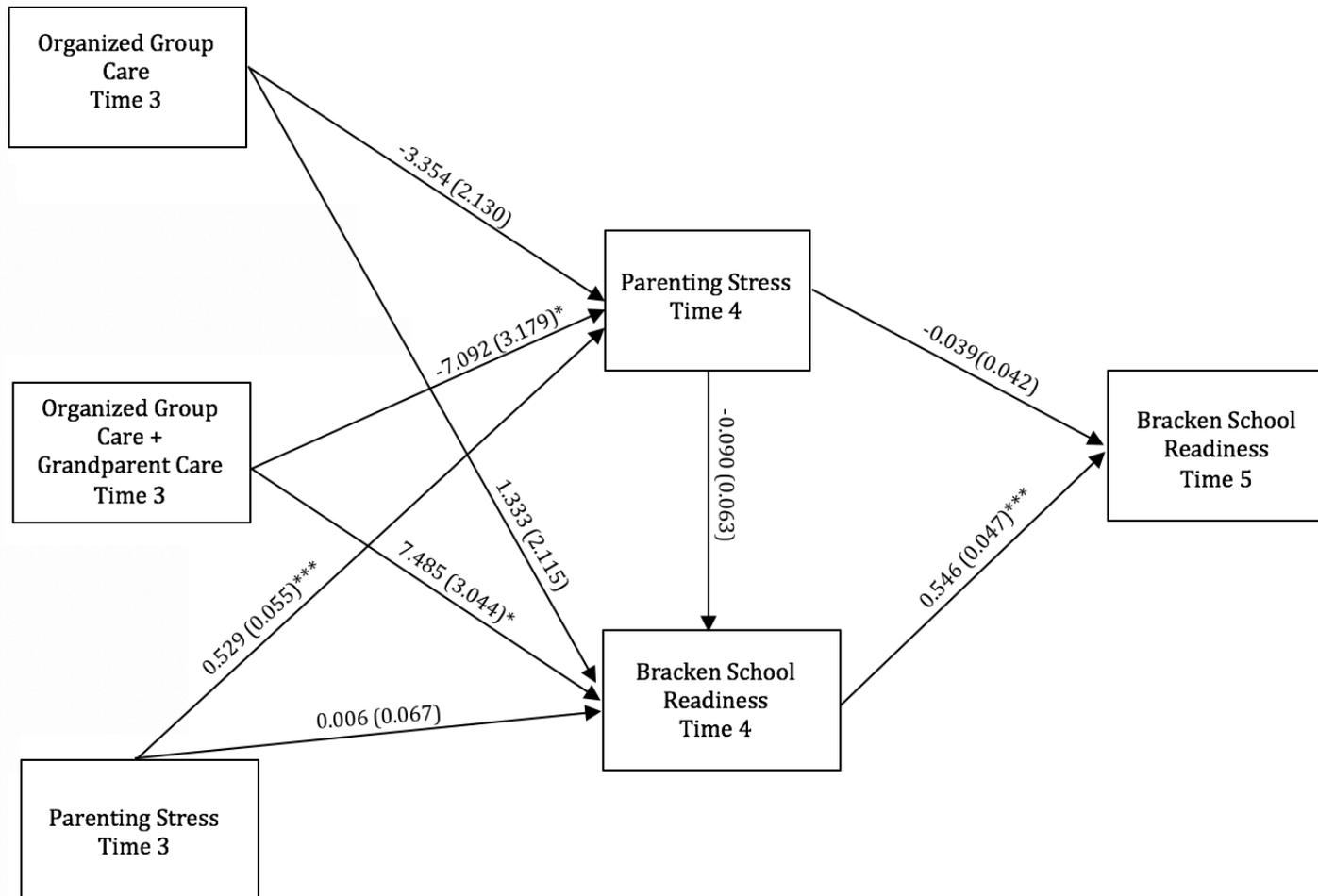


Figure 5. Mediation model: Child care (i.e., organized group care, organized group care plus grandparent care) and school readiness through parenting stress.

Note. Path coefficients and standard errors are presented. Asterisks represent significant paths (\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ ). Variances are not depicted to reduce figure complexity. Analyses controlled for race/ethnicity and maternal age, but these variables/paths are not shown for simplicity.