



Exploring Intergenerational Effects of Education: A Mixed-Methods Approach to Understanding Mothers' Educational Pursuits and Their Young Children's Development

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Exploring Intergenerational Effects of Education:
A Mixed-Methods Approach to Understanding Mothers' Educational Pursuits and Their
Young Children's Development

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Abstract

The positive relationship between parental education and children's educational outcomes is one of the most well established connections in the developmental literature. However, nearly all of this research treats parent education as static across a child's development. Estimates from the 2008-2009 Survey of Income and Program Participation suggest that nearly 2 million low-income parents were engaged in some form of continued education that year. Given this, it is critical to understand parents' experiences in school, as well as the relationship between child development and parent education, as the latter changes over time. In this two-study dissertation, drawing broadly from ecological theories of development, I used quantitative and qualitative methods with multiple datasets to explore the relationship between mothers' attainment of additional education and their young children's development.

In Study 1, I used data from a national sample of low-income families with young children to test whether there is a relationship between the development of children's cognitive skills between the ages of 3 and 7 and mothers' attainment of additional education. Based on individual growth modeling analyses, I found a positive relationship between maternal educational attainment and children's early writing and mathematics skills. In addition, children appeared to benefit more when their mothers attained additional education after children had transitioned to elementary school. For children's mathematics skills only, the positive relationship between children's growth trajectories and mothers' attainment of additional education was largest in magnitude for children whose mothers had the lowest levels of education at baseline.

In Study 2, I employed grounded-theory methods and longitudinal qualitative interviews from a different sample of low-income mothers (with preschool-aged children) to

understand mothers' motivation for pursuing additional education while raising a young child. I found that women's motivation to pursue, or not to pursue, additional education was related to their caregiving responsibilities, and their personal goals, in contradictory and complementary ways. Specifically, the need to provide and care for their children simultaneously pushed mothers towards, and pulled them away from, additional schooling. However, women were also motivated to pursue schooling by their desire for intellectual growth and personal fulfillment. The extent to which women articulated these personal motivations may be related to their success in pursuing additional education.

Chapter 1: Introduction

Hypotheses Regarding the Relationship Between Mothers' Education and Children's Early Life Development: An Ecological Approach

Economic mobility remains out of reach for many low-income families in America. Children born to parents in the bottom fifth of the income distribution have only a 10% chance of earning in the top fifth as adults (Chetty, Hendren, Kline, Saez, & Turner, 2014). In addition, due to the rise of income inequality, the financial difference between those at the top and those at the bottom has grown substantially in the last decades. In 1977, the difference between the household incomes of families at the 80th and 20th percentile of the income distribution was about \$60,000; by 2007, the gap had grown by nearly 50% to over \$85,000 (G. J. Duncan & Murnane, 2011). To use Chetty et al.'s (2014) metaphor, not only is it unlikely that low-income children and families will climb the figurative ladder of income and prosperity, but over time, the rungs on that ladder have grown further and further apart.

Theories of social stratification, family processes and child development suggest many mechanisms to explain this lack of social mobility and the transmission of poverty across generations (Mayer & Ludwig, 2006); chief among them is maternal education, and its relationship to children's life chances. It is well-documented that, on average, children whose mothers have higher levels of education have more favorable developmental, educational, and economic outcomes throughout the life course (Harding, Morris, & Hughes, 2015). Researchers have paid particular attention to the importance of maternal education in children's early life development (age 8 and younger). For example, mothers with higher levels of education tend to have more income to provide resources—such as nutritious foods, a safe home, and educational toys—that support early childhood development

(Eyster, Callan, & Adams, 2014; Harding, Morris, & Hughes, 2015; Jackson, Brooks-Gunn, Huang, & Glassman, 2000; Mayer & Ludwig, 2006; Yoshikawa, Weisner, & Lowe, 2006). Recent research also suggests that mothers with higher levels of education often have more time to spend with their young children (perhaps due to more flexible employment) (Kalil, Ryan, & Corey, 2012) and are better able to seek out and engage their children in activities that build the knowledge and skills valued in school (Bassok, Lee, Reardon, & Waldfogel, 2015; Lareau, 2000, 2003).

Two prominent trends within the extensive literature on the relationship between maternal education and child development guide the inquiry in this two-study, mixed-methods dissertation. First, maternal education is almost always measured once and assumed to be unchanged across a child's life. Second, and in part due to the perception that mothers' educational levels are static, mothers' educational experiences while raising a young child are under-studied. However, demographic data suggest that these trends do not reflect the realities of many American families, particularly those in low-income communities. An analysis of the 2008-2009 data from the Survey of Income and Program Participation suggested that there were over 1.8 million low-income parents engaged in education and training activities, including GED preparation, adult basic education, and post-secondary training (Eyster et al., 2014). Treating maternal education as static may miss the developmental processes that occur for children and families when mothers return to school. Thus, in this dissertation, I aim to better understand the motivations for, and consequences of, mothers' attainment of additional education while raising a young child.

Although an inquiry into the developmental processes that occur when a parent returns to school could focus on fathers, grandparents, or any primary caregiving relationship between an adult and child, I have chosen to focus on mothers. While the time

that fathers spend engaged in child care has increased over the last 30 years, in most two-parent American households mothers still bear the brunt of child rearing responsibilities (Sayer, Bianchi, & Robinson, 2004). And, according to 2014 data from the American Community Survey, 80% of children living in single-parent homes live with their mothers. In this way, the mother-child relationship is a central context for children's development. Finally, mothers made-up 80% of a national sample of low-income parents engaged in training and education (Eyster et al., 2014). Mothers may be more likely to return to school while raising their children than fathers.

In the first study of this dissertation, I examine whether mothers' transitions between policy-relevant educational categories—such as attaining a GED, or attending some post-secondary education for the first time—are related to their children's early cognitive development. Using a large national sample of low-income families, I apply individual growth modeling to describe whether the growth trajectories of children's vocabulary, early writing, reading, and mathematics abilities between the ages of 3 and 7 change when their mothers report an educational transition. In the second study, I draw on theories of human capital development, motivation, and motherhood to delve more deeply into the experiences of the mothers themselves. Using longitudinal interview data from a second sample of low-income mothers with children in Head Start, I explore mothers' motivation to pursue and persist in, or to forgo or drop out of, continued education while raising a young child.

Both studies are largely guided by an ecological approach to the study of human development (Bronfenbrenner, 1977; Bronfenbrenner & Morris, 2006; Cicchetti & Lynch, 1993; Sameroff, 2010; Weisner, 2002). Ecological theories suggest that individuals grow and change over time—that is, they develop—within many different nested contexts and settings that collectively make up their unique ecology. Indeed, ecological theories posit that human

development is the product of the dynamic interactions between an individual and the contexts of his or her ecology (Bronfenbrenner, 1977; Sameroff, 2009). In my dissertation studies, I focus on the family—specifically the mother-child relationship—as a salient developmental context for both women and children. I also draw from Weisner’s ecocultural theory of development (Weisner, 1998, 2002) which, grounded in the core principles of ecological theories, focuses on the roles that culture, goals, motivation, and routines play in the developmental process for children and parents in the family unit. Through the application of these theories, I aim to better understand the developmental and familial process that take place when mothers of young children pursue additional education. I present new research findings that may help to inform policies and practices that support positive outcomes for children and families from low income-communities.

In the remainder of this introduction, I provide a rationale for the study of the relationship between maternal education and early child development, and further describe the ecological theories of development that organizes this work. I then outline the dissertation by briefly describing and motivating each individual study.

Maternal Attainment of Additional Education and Early Childhood Development

According to recent data from the Panel Study of Income Dynamics, maternal education is the strongest predictor of children’s educational outcomes (both years of education completed and rate of college going) among a host of other family characteristics, including family-income, and single-parent status (Ziol-Guest, Duncan, & Kalil, 2015). In recent years, creating opportunities for low-income mothers to increase their education has been cited as a promising policy strategy to improve families’ economic stability, while also promoting children’s healthy development in a variety of domains, including their cognitive skills and school readiness (Chase-Lansdale & Brooks-Gunn, 2014). Indeed, the literature

suggests a variety of different mechanisms, such as increases in family income or changes to parenting practices, through which mothers' educational pursuits may positively affect their children's cognitive development (Magnuson, 2007). Given that children's development in the early years of life (ages 8 and younger) is uniquely sensitive and responsive to relationships with caregivers (Nelson, 2007), it is reasonable to hypothesize that mothers' attainment of additional education, and any changes to the mother-child relationship that results, may be particularly important for young children.

In addition, demographic data suggest that low-income adults who return to school are more likely than more affluent adult students to have young children (under the age of 5) (B. Cook & King, 2004). Estimates from a 2008 sample of low-income families suggested that nearly 70% of parents enrolled in education or training had children who were not yet of school age (Eyster et al., 2014). Yet little is known about why parents of young children, in particular, are drawn to schooling, especially given the difficulties parents often face in finding safe affordable child care for children under the age of 5 (Yakaboski, 2010). Is there something particular about mothering a *young* child that might lead a woman to enroll in continued education? To better understand mothers' educational decisions, and experiences in school, it is necessary to study how they balance their educational motivations, goals, and pursuits with the needs of their young children.

Ecological Theories of Development

The hypotheses that a mother's enrollment in school might influence her young child's cognitive development, or that a woman's role as a mother might factor into her educational decisions, are rooted in an ecological approach to understanding human development. Ecological theories of development put context at the heart of studying how individuals change over time. Urie Bronfenbrenner is often cited as a foundational scholar

who—through his presentation of the Ecological Systems Theory (Bronfenbrenner, 1977), and later, the Bioecological Model of Human Development (Bronfenbrenner & Morris, 1998, 2006), pioneered the study of context as a critical component of developmental science (Darling, 2007). The notion of *process* (Bronfenbrenner & Morris, 2006), or the idea that human development is the product of the dynamic interactions between individuals and their surroundings, is at the core of Bronfenbrenner’s work and other ecological models of development (Cicchetti & Lynch, 1993; Masten & Cicchetti, 2010; Sameroff, 2009). Specifically, “...human development takes place through processes of progressively more complex reciprocal interaction between an active, evolving biopsychological human organism and the persons, objects, and symbols in its immediate external environment” (Bronfenbrenner & Morris, 2006, p. 797). Under this approach, the study of human development is fundamentally the study of how individuals understand, experience, and interact with, and respond to the world around them.

The influence of these ideas is evident in both studies of my dissertation. In Study 1, I examine the nature of the relationship between mothers’ attainment of additional education and young children’s cognitive outcomes. The inquiry is motivated by the hypothesis that a mother’s return to school will affect the family context—e.g., through increased financial resources or changes in parenting practices—in ways that influence children’s cognitive development. In Study 2, I explore how the context of motherhood—specifically, being a caregiver to a preschool age child—influences women’s motivations to pursue, or not to pursue, additional education. I assume that women’s family contexts, including their relationships with their children, influence their human capital decisions, and thus, their human capital development (S. Duncan & Edwards, 1999; Hagelskamp, Hughes, Yoshikawa, & Chaudry, 2011).

In this dissertation, I primarily examine human development within the family unit, which is a proximal, or immediate, context in the lives of young children and their mothers. However, I also draw on the principles of ecological theories of development that focus on an individual's entire ecology, and the ways that multiple nested settings—and the interactions between them—influence human development (Bronfenbrenner, 1977; Cicchetti & Lynch, 1993). These additional settings can be proximal—such as a family's neighborhood or a mother's community college classroom—or more distal—such as the social policies shaping a family's access to financial and social resources, or the larger societal beliefs about women's involvement in the labor force while raising children. For example, in Study 1, I describe how social policy and educational interventions might better enable low-income mothers to pursue more schooling, and, in turn, support their children's development. In Study 2, I discuss how societal norms regarding “good” mothering may help to explain why mothers do, or do not, choose to pursue more schooling while raising a young child.

An Ecocultural Theory of Development

The ecocultural theory of human development falls within the larger tradition of ecological approaches to human development, but distinguishes itself through its focus on the ways culture, routines, and values within ecological contexts, but particularly within the family, affect human development (Bernheimer, Gallimore, & Weisner, 1990; Weisner, 1998, 2002). Ecocultural theory suggests that the routines of daily life within families and communities—e.g. going to school every morning, cooking dinner at night as a family—determine the “pathways,” (Weisner, 1998) or processes, through which development occurs. These routines differ across contexts and serve to socialize all individuals, but especially children, into the norms, values, and culture of a community (Weisner, 1998).

Routines organize daily life and communicate the larger developmental goals a community has for its members (Super & Harkness, 1986, 2002; Weisner, 2002).

Across multiple social science disciplines, the literature is filled with descriptions of how culture and routines influence children and families. For example, in the field of developmental science, Tamis-LeMonda and colleagues' (2008) work described the ways different parenting practices (such as disciplinary styles) and daily routines (such as the care of elders) across a range of families in the United States and abroad socialized children into different cultural norms regarding the values of individualism and autonomy, and collectivism and relatedness. Sociologist Annette Lareau documented social class differences in American children's daily activities and routines, and how the disparities between more and less affluent families may influence children's skill development and school success (Lareau, 2002, 2003).

The importance of cultural routines, values, and goals in children's development further illuminates why we might hypothesize a relationship between maternal attainment of additional education and young children's cognitive development. A mothers' enrollment in school might fundamentally alter the daily routines of her family's life in ways likely to affect her child (Sommer et al., 2012). For example, a mother might begin to do her homework alongside her child after enrolling in school, increasing a child's motivation to learn.

In addition, the factors that motivate a mother to pursue, or not pursue, more schooling are likely influenced by her family's daily routines, her goals for her children, and her beliefs and values regarding familial roles. Indeed, the literature suggests that culture and values influence mother's motivation to work, a related aspects of human capital development (S. Duncan & Edwards, 1999). That is, the extent to which mothers see working outside of the home as enabling, or conflicting with, their ability to provide routines

that support healthy child development affects their motivation for, and decisions about, employment (Hagelskamp et al., 2011; Hattery, 2001; Hays, 1996). In Study 2, I explore whether the same patterns hold for mothers' motivation for schooling.

Study 1. Maternal Pursuits of Additional Education and Children's Cognitive Development: A Longitudinal Analysis

Within the field of human development there is a long tradition of studying how parents' behaviors, such as their parenting style (Baumrind, 2005), parents' social and financial resources, such as their income and employment (Brooks-Gunn, Han, & Waldfogel, 2002; G. J. Duncan, Magnuson, & Votruba-Drzal, 2014), and parents' personal characteristics, such as their depressive symptoms (Naicker, Wickham, & Colman, 2012), are related to children's outcomes in multiple developmental domains, including children's cognitive outcomes. While a number of studies document the positive relationship between mothers' educational level and children's cognitive development (Harding et al., 2015), few use longitudinal data and analysis to understand how mothers' educational transitions after they have begun to raise a family are related to children's outcomes over time during the important early childhood period.

In Study 1, I employ data from the Head Start Impact Study, a national evaluation of Head Start that followed a large sample of low-income families from 2002 to 2006. I use a sample ($n=3,263$) of children (and their mothers) with data on children's cognitive outcomes, including their language and literacy abilities, and mathematics skills collected over 5 waves when children were between the ages of 3 and 7. The dataset also contains information on the mothers' levels of education at each wave, thus allowing me to track when mothers' increased their educational attainment. For the purposes of the study, I define educational attainment as mothers' transitions between four policy-relevant educational categories: 1)

having no high school degree; 2) a high school degree or GED; 3) some post-secondary education; or 4) a post-secondary degree. I apply longitudinal growth modeling to test whether children's cognitive developmental growth trajectories change when their mothers report an educational transition. Capitalizing on the longitudinal nature of the data, I test whether or not the relationship between mother's attainment of additional education and children's growth trajectories differs depending on when the shift in education occurred, i.e., during children's preschool years or after their transition to elementary school. Building on previous research suggesting that children whose mothers have the lowest level of education to start may be the most likely to benefit from their mothers' educational pursuits (Magnuson, 2007; Magnuson, Sexton, Davis-Kean, & Huston, 2009), I also test whether the relationship is moderated by mothers' baseline levels of education.

Study 2. Negotiating Motherhood and Education: Low-Income Mothers' Motivation for Attending School while Parenting a Young Child

In study 2, I draw on theories of motherhood to explore women's experiences in school while parenting a young child. Specifically, I focus on how women understand their motivation for schooling in relation to their children's needs, their role as mothers, and their own personal goals for their human capital development. Student-parents' experiences have received little attention in the literature. Most work that examines parents' educational pursuits focuses on how financial resources (e.g., tuition support, and cash transfer benefits) and in-kind services (e.g., child care) support enrollment and persistence (Astone, Schoen, Ensminger, & Rothert, 2000; Goldrick-Rab & Sorensen, 2010; Yakaboski, 2010). Much less research has focused on parents' educational goals or motivation, and more specifically, how their children and the experience of parenthood affect parents' schooling decisions. I attempt to address this gap in the literature.

I use longitudinal in-depth interview data from a sample of low-income mothers with at least one child enrolled in a Head Start program in Tulsa, Oklahoma ($n=18$). Women were interviewed twice over the course of a 2-year period as part of a mixed-methods evaluation of an educational intervention for low-income families. All women in the study expressed an interest in pursuing more education but only some mothers ($n=10$) enrolled in schooling over the course of the study. The in-depth interviews included questions about women's educational experiences, goals, and motivations, as well as questions about their experiences as a parent. I apply grounded-theory coding methods to these data to describe how women make meaning of their motivation to go to school when their children are still young. I make use of the longitudinal data to track mothers' feelings over time, in addition to comparing those mothers who did and did not pursue more education over the course of the study.

Chapter 2: Study 1

Maternal Pursuits of Additional Education and Children's Cognitive Development: A Longitudinal Analysis

Research indicates that, on average, children whose mothers have higher levels of education have higher scores on measures of early childhood cognitive development (Bradbury, Corak, Waldfogel, & Washbrook, 2015; Christian, Morrison, & Bryant, 1998; Hackman, Gallop, Evans, & Farah, 2015; Hoff, 2003). In a recent study, for example, Waldfogel and Washbrook (2011) found that maternal education, when compared to a large set of indicators of socioeconomic-status, was the single most important factor in accounting for income-related gaps in children's early literacy skills, mathematics ability and receptive vocabulary at school entry.

In most research on child development, parents' levels of education are assumed to remain the same across childhood. Much less attention has been paid to whether parents increase their education while raising their children, and further, how parents' pursuits of additional education affect their children's cognitive outcomes and cognitive development. However, it is quite common for parents to continue their education after having a child. For instance, using a sample of low-income families from the Fragile Families and Child Wellbeing Study, MacGregor (2009) found that nearly half of mothers in the study engaged in some form of schooling within five years of giving birth to their first child. In addition, the few studies that explore the relationship between increases in maternal education and early childhood development (ages 5 and under) find that, indeed, children do benefit when their mothers attain additional education (Gennetian, Magnuson, & Morris, 2008; Harding, 2015; Magnuson et al., 2009). However, these studies include child outcomes measured on

only one or two occasions, and are therefore unable to model how maternal educational attainment affects children's development longitudinally throughout the early-childhood period. In addition, none of these studies have explored whether there are particularly sensitive times in early childhood during which children might benefit more from their mothers' attainment of additional education.

There has been increasing policy attention to programs and interventions that aim to improve the well-being of low-income families by providing parents opportunities to build their own skills (Annie E. Casey Foundation, 2014; Chase-Lansdale & Brooks-Gunn, 2014; Shonkoff & Fisher, 2013). These programs are motivated in part by the hypothesis that building parents' human capital can lead to benefits for children (Chase-Lansdale & Brooks-Gunn, 2014; Shonkoff & Fisher, 2013), yet scholars still need to tease out for whom, and under what circumstances, this hypothesis holds. Given the gaps in the literature, and these pressing policy concerns, I make several contributions to the existing literature through this study. I employ individual growth modeling, a method of longitudinal data analysis that has not been used to explore the relationship between early childhood development and mothers' attainment of additional education. This method allows me to understand the potential effects of maternal acquisition of further education on children's vocabulary, early reading and writing, and mathematics growth trajectories across the early childhood period (ages 3-7). Growth modeling also allows for an exploration of whether the timing of mothers' attainment of additional education during early childhood moderates any observed effects on children's outcomes. Given the growing interest in providing early childhood and family support services when children and parents are most likely to benefit (Doyle, Harmon, Heckman, & Tremblay, 2009; Landry, Smith, Swank, & Guttentag, 2008), understanding the

role that timing plays in the relationship between parent education and child outcomes is important to the development of practice and policy.

Background Literature

Maternal Education and Child Outcomes

The observed link between maternal educational level and child cognitive outcomes—including IQ, early vocabulary, reading, writing, and mathematics skills—is well-established in the literature (G. J. Duncan & Brooks-Gunn, 1995; G. J. Duncan & Magnuson, 2005; Hoff, 2003; Mulligan, McCarroll, Flanagan, & Potter, 2014; Puranik, Lonigan, & Kim, 2011). For instance, Duncan and Brooks-Gunn (1995) found that children whose mothers had completed more years of schooling had higher IQ scores at age 5, on average. Results from the most recent round of the Early Childhood Longitudinal Study data (the Kindergarten class of 2010-11) suggested that for each progressive category of parent education—i.e. having less than a high school degree, a high school degree or GED, some college or technical education, and a Bachelor’s or professional degree—children scored higher on measures of early reading and mathematics ability at the end of kindergarten and first grade (Mulligan et al., 2014). Some research suggests that the cognitive advantage that children with parents of higher levels of education possess is evident before children turn two years old (Fernald, Marchman, & Weisleder, 2013; Roe & Bronstein, 1988).

There are a number of hypotheses regarding the mechanisms through which children may benefit from their parents’ schooling. For example, mothers with higher levels of education are likely to have higher paying jobs and may have more financial resources to support the positive development of their children (Dearing, Berry, & Zaslow, 2006; B. A. Taylor, Dearing, & McCartney, 2004). Harding, Morris and Hughes (2015) suggest that while material resources are important, maternal education might also affect children via mothers’

access to various forms of capital. They provide a theoretical model describing the importance of: (a) *maternal human capital*, including a mother's language use and knowledge of parenting practices that support child development; (b) *maternal cultural capital*, including a mother's ability to employ a set of behaviors that are valued in educational settings, and how she consciously or unconsciously models them for her children; and (c) *maternal social capital*, a mother's social networks that provide access to resources and information that support child development (Harding et al., 2015). All three forms of capital are likely to increase as a result of a mother's schooling and may then lead to improvements in her child's cognitive skills.

The financial, cultural, and social resources that mothers with higher levels of education can offer to their children are particularly important for supporting cognitive development during early childhood (Hyson & Tomlinson, 2014). Family income during the early years of life (ages 5 and under) is a strong predictor of children's long-term educational outcomes, specifically years of completed schooling (Levy & Duncan, 2000), and developmental theory suggests that the social interactions that children have with their parents and caregivers during infancy and early childhood are important to healthy development (Nelson, 2007). For example, parents' contingent responsiveness to their infants' communicative bids are thought to help children build a foundation of cognitive skills upon which future learning taking place (Tamis-LeMonda, Bornstein, & Baumwell, 2001). If parents with higher levels of education are better able to mobilize these parenting skills, their children may be at an advantage. Indeed, Lugo-Gil and Tamis-LeMonda (2008) analyses indicated that, on average, mothers with higher levels of education had children who scored higher on a global measure of cognitive ability at 14, 24 and 36 months of age, an effect that was mediated by mothers' levels of responsive parenting.

Accounting for Changes in Maternal Education

Building on this evidence, scholars theorize that providing opportunities for parents to attain more education when their children are young might be one effective policy strategy to enhance the development of young children in poverty (Kalil & Crosnoe, 2010). A small group of studies have explored whether a mother's pursuit of additional education—after she has already given birth to, and begun to raise, a child—is related to her young child's cognitive outcomes (Harding, 2015; Magnuson, 2003, 2007; Magnuson et al., 2009). Most of these studies, however, are correlational in nature (as is the present study). For this reason, the policy implications of these works have been offered cautiously. Indeed, it is notoriously difficult to estimate a causal relationship between child outcomes and parents' levels of education (Holmlund, Lindahl, & Plug, 2011). However, examining the relationship between *changes* in maternal education and child outcomes (as opposed to mothers' education measured at one point in time only) addresses one important threat to validity: the possibility that any observed relationship between parental education and children's outcomes is explained by the transmission of innate ability from parent to child (Neiss & Rowe, 2000). That is, exploring changes in maternal education addresses the threat that children of more highly educated parents may have a cognitive advantage not because of their parents' financial resources or responsive parenting, but because of the shared intelligence between parent and child. If inherited ability completely confounds the relationship between parent education and child development, we would not expect to see any concurrent changes in child outcomes when their parents attend school. As such, exploring how parents' real-time educational attainment might influence children provides further insight into the relationship in question.

Maternal pursuits of additional education can take on many forms, and, from a research standpoint, can be measured in a variety of ways. Adult education can include, for example, GED preparation, adult basic education (e.g., pre-secondary and secondary education), English as a second language courses, workforce training and vocational education, or post-secondary education. Attainment of additional education could be conceptualized as participation (did a mother enroll or not?), the accumulation of additional years of completed education (Gennetian et al., 2008; Magnuson, 2007), or the attainment of a certificate or degree (Sabol et al., 2015; Sabol & Chase-Lansdale, 2015). In my research, I operationalize mothers' educational attainment as movement through 4 policy-relevant categories: having no high school degree, having a high school degree or GED, having attended some post-secondary education, or having a post-secondary degree. Given the role a high school degree and post-secondary training plays in the labor market, these categories are most likely to correspond to subsequent changes in parents' employment or income (Arkes, 1999). In addition, parents' experiences in formal education (e.g., GED preparation or post-secondary education), may be most likely to provide access to information or skills that might help parents support child development, or to alter how parents socialize their children to value and succeed in educational experiences (Crosnoe & Kalil, 2010). However, as evident in the literature reviewed below, studies operationalize mothers' education in a variety of ways.

In this small body of literature, most studies find that mothers who pursue additional education while raising a family have children who score higher on subsequent cognitive outcomes, as compared to children whose mothers did not return to school. Using a large national dataset, Magnuson and colleagues (2009) found that, on average—among the most disadvantaged families only—children whose mothers completed an additional year of

schooling between their child's second and third birthdays scored higher on measures of expressive and receptive vocabulary at age 3 than did children whose mothers did not increase their education. Similarly, Gennetian et al.'s (2008) instrumental variables analyses indicated that six months of a mother's participation in workforce training led to small average increases in her child's school readiness (an effect size of about 18% of a standard deviation). Harding's (2015) quasi-experimental work suggested that low-income mothers' attainment of additional education (measured as any change in a mother's reported level of education) between children's entry into preschool (ages 3 or 4) and the end of kindergarten improved children's literacy and mathematics outcomes, on average, at the end of first grade.

There are discrepancies in the literature, however, that suggest the need for additional research. For example, Magnuson's (2007) analysis of the National Longitudinal Survey of Youth (1979 cohort) showed that children's reading and math achievement (between the ages of 6 and 12) improved, on average, when their mothers completed an additional year of schooling. By contrast, a different research study using the same dataset found little evidence that changes in maternal education were related to differences in children's cognitive outcomes at age 7 (Kaestner & Corman, 1995). The omission of an important moderator, mothers' initial levels of schooling, may help to explain these differences. Magnuson (2007) may have found an effect of increases in maternal education where Kaestner and Corman (1995) did not because the analyses in the former study did not explore whether the relationship of interest differed depending mothers' baseline levels of education. Magnuson found an effect only amongst children with young mothers who had low levels of education to start. This may suggest that maternal pursuits of education have the greatest benefit for children among the most vulnerable families. I tested this hypothesis in the present study.

The Potential for Negative Effects

Although the results from the studies reviewed above largely suggest a positive relationship between maternal educational attainment and young children's cognitive outcomes, there is the potential that a mother's return to school could be detrimental for her child. Student-parents must juggle multiple roles and responsibilities while pursuing their education, including child care and family commitments, school work, and, often, full- or part-time employment (Spaulding, Derrick-Mills, & Callan, 2016). Managing these responsibilities can leave parents with less time to spend with their children, and lead to increased stress in the home (Fairchild, 2003; Goldrick-Rab, Minikel-Lacocque, & Kinsley, 2011). A large body of literature suggests that household stress—particularly stress related to socio-economic hardship—can have a negative effect on young children's cognitive development (Conger & Donnellan, 2007). In addition, a mother's return to school may result in a child spending more time in child care (Yakaboski, 2010). While research suggests that children who spend time in high quality care benefit from these services (e.g., improved cognitive outcomes and school readiness), low-quality child care has the potential to be detrimental to children's development (Belsky et al., 2007; Love et al., 2003). Parents interested in pursuing additional education who have preschool-aged children often struggle to find adequate child care while they attend class (Adams, Heller, Spaulding, & Derrick-Mills, 2014).

This evidence provides reason to hypothesize that there could be negative effects for children when their mothers go back to school. Indeed, Harding (2015) found that, among a sample of low-income families, children whose mothers increased their education showed more behavior problems at the end of first grade, on average, than children whose mothers did not pursue more education. To note, this pattern did not hold for children's cognitive

outcomes—as described above, children’s cognitive scores increased as a result of maternal educational attainment. However, the potential for negative effects on children’s development motivates further exploration of the relationship between maternal educational attainment and child outcomes.

The Value of Longitudinal Analyses

Most studies that investigated the relationship between a mother’s attainment of additional education and child development focused on child cognitive ability measured at only two occasions. In these works, scholars employed multivariate analyses to test whether there was an association between a change in mother’s education and her child’s outcomes at a later measurement occasion, controlling for the cognitive outcome measured at an earlier occasion (Harding, 2015; Magnuson et al., 2009). Given this research design, these studies only provided a snapshot of the relationship between mothers’ pursuits of additional education and child outcomes, and were limited in the ability to describe how mothers’ educational transitions affect how children grow and develop over time. To rectify this situation, longitudinal data and analyses are needed to describe whether, and if so how, children’s early childhood cognitive growth trajectories are modified when their mothers attain additional education. In the current research I employ individual-growth modeling, a method not often used in this area of research, to bring evidence to bear on this topic.

During the early childhood years, children’s cognitive skills, including their vocabulary, early literacy skills, and mathematics ability grow rapidly (McClelland, Acock, & Morrison, 2006). Longitudinal analyses of children’s skills suggest that, on average, children’s IQ scores, vocabulary, reading, and mathematics growth trajectories take on a curvilinear, quadratic shape during early childhood (Burchinal, Campbell, Brayant, Wasik, & Ramey, 1997; K. E. Smith, Landry, & Swank, 2000). Depending on children’s age and the

developmental domain in question, the direction of the curvature of children's growth trajectories may vary. For example, Pan, Rowe, Singer, and Snow's (2005) work suggested that the rate of change in children's vocabulary scores increased over time during the toddler years (ages 2-3), while Campbell and colleagues (2001) found the rate of growth of children's IQ scores decreased during the preschool years. Echoing the earlier review of the literature, research suggests that mothers' education—when measured at one point in time—predicts both the intercept (i.e., "initial" ability) and the slope (i.e., rate of change) of children's cognitive growth trajectories. That is, young children whose mothers have higher levels of education start off with more skills, and learn faster over time (Burchinal et al., 1997; McClelland et al., 2006).

Given this, we might expect a mother's attainment of additional education to be related to her child's cognitive growth in a variety of ways. If, for example, a mother's schooling leads to a change in her interactions with her child—perhaps an increase in supportive parenting practices—we might expect children's cognitive ability to begin changing more rapidly (Magnuson, 2007). That is, a mother's educational pursuits might affect the slope of her child's learning trajectories. To my knowledge, only one study has used growth modeling to describe the relationship between maternal attainment of additional education and children's cognitive trajectories. Using data from a sample of children in middle childhood (ages 6-12), Magnuson (2007) found that the slopes of children's cognitive growth trajectories became steeper when their mothers reported an increase in their education. I test whether this same patterns holds for younger children.

It is also possible that a mother's educational transition might be related to an immediate shift in elevation of a child's learning trajectory, or the child's average cognitive ability at a given time point. This could be the case if a mother exhibited an immediate change

in behavior leading to rapid changes in her child's skills. Or, as is the case in this study, an observed immediate shift in the elevation of a child's trajectory could reflect the timing and nature of data collection for the available data. That is, in the current study and in other work (see MacGregor, 2009), data collection procedures and coarse measurement of mothers' schooling and education did not provide information about exactly when a mother began going to school, or exactly when she made an educational transition. It is only clear at any given time point whether an educational transition occurred sometime since the last measurement occasion. Therefore, an "immediate" impact on the elevation of a child's trajectory, corresponding to a mother's report of an educational transition, could reflect an acceleration in learning that occurred while a mother was in school, but was not captured until the transition was reported.

Finally, longitudinal data and analysis provide the opportunity to explore whether the relationship between mothers' attainment of additional education and children's cognitive development differs depending on when the transition occurs. Indeed, to the author's knowledge, no other studies have explored whether the timing of a mother's educational transitions moderates the relationship with child outcomes. Developmental theory suggests there are sensitive periods in early childhood during which the presence of certain resources (e.g., attentive care from a parent) are crucial for children's healthy development (Shonkoff & Phillips, 2000; Walker et al., 2011). As such, we might hypothesize that there are particular periods in early childhood during which a mother's return to school might be relatively more, or less, important for child development. For example, mothers' pursuits of education may have a larger positive effect when children are younger (i.e., during the preschool years) if a mother's schooling leads her to engage in more responsive parenting practices that are particularly important for children's cognitive development before the age of 5 (Landry et al.,

2008; Shonkoff & Phillips, 2000).

However, it is also possible that the new skills or information a mother acquires as result of attaining more education may be most beneficial as her child transitions to elementary school (ages 5 and above). If, for example, the primary pathway through which children benefit from their mothers' education is the women's improved ability to navigate the school system, or model behavior valued in school (Harding et al., 2015; L. C. Taylor, Clayton, & Rowley, 2004), the magnitude of the relationship between mothers' attainment of additional education and children's cognitive growth could be larger when a mother's educational transition occurs later in early childhood (i.e. ages 5-8). Children's entrance into kindergarten and first grade is often a family's first introduction to the formal K-12 school system, and marks a time when parents' engagement in their children's education and knowledge of the school system becomes more central to children's educational experiences and success (Rimm-Kaufman & Pianta, 2000). By employing longitudinal data on children who were followed from their preschool years through to early elementary school, I address the timing question. Specifically, I explore whether the relationship between maternal educational transitions and children's cognitive development differs by the timing of mothers' transitions, with a focus on the difference between transition that occur when children were in preschool versus in kindergarten and first grade.

The Present Study

In the present study, I build on this literature and address some of the gaps therein. I make use of longitudinal data on a national sample of low-income families with young children to explore the relationship between mothers' attainment of additional education and their children's development between the ages of 3 and 7. This is a policy-relevant sample, given that low-income parents with young children are more likely than adults without

children, or adults with older children, to return to school (B. Cook & King, 2004). In addition, most policies and programs that aim to improve educational opportunities for parents target low-income communities (Chase-Lansdale & Brooks-Gunn, 2014; Sommer et al., 2012).

Unlike most studies in the literature, I apply individual-growth modeling to these data, permitting an exploration of the relationship between maternal educational attainment and children's growth trajectories over time. I ask:

1. *Are the cognitive developmental trajectories of low-income children between the ages of 3 and 7 altered when their mothers report attaining additional education? Specifically:*
 - a) *Do children's trajectories show a change in elevation?*
 - b) *Does the change in elevation differ based on when—how long after the start of the study—mothers report attaining additional education?*
 - c) *Do children's trajectories show a change in slope?*
2. *Do any observed changes to children's growth trajectories associated with their mothers' attainment of additional education differ based on the mothers' initial levels of education?*

Research Design

Dataset

I drew the data for this study from the database of the *Head Start Impact Study* (HSIS) (Puma, Bell, Cook, & Heid, 2010). The HSIS is the first national randomized longitudinal evaluation of Head Start, the largest federally-funded preschool program for children from low-income families. In the fall of 2002, approximately 4,400 children whose parents applied to Head Start were assigned to either a treatment group that was offered a slot in a Head Start center, or to a control group that was not. The sample was intended to be representative of the national Head Start population at the time. While I did not use the

dataset to estimate the effect of Head Start on child or family outcomes, these data were useful for my analyses, as they provided information on a large national longitudinal sample of low-income families with young children.

The HSIS data included direct child assessments of a variety of early childhood cognitive skills, and a parent survey that requested information about parent, child, and family demographics. Data were collected at five different time points: the fall of 2002 (baseline) and the springs of 2003-2006. Children in the sample were organized into two entering cohorts: a 3-year-old cohort comprising children who applied to Head Start two years prior to beginning kindergarten (i.e., children who were age-eligible for two years of Head Start or other preschool services), and a 4-year-old cohort comprising children who were one school year away from starting kindergarten (i.e., children who were age-eligible for one year of Head Start or other preschool services). Data were collected at all five waves for the 3-year-old cohort (at the beginning and end of their first preschool year, and at the end of their second preschool year, kindergarten, and first grade). Four waves of data were collected on the 4-year-old cohort (at the beginning and end of their only preschool year, and at the end of kindergarten, and first grade). The direct child assessments were collected at children's primary care settings during the preschool years and at home during the kindergarten and first grade data collection waves. I used child assessment data from all available waves. The parent interviews were collected in person with the children's primary caregiver at home. I used the family demographic data collected during the fall 2002 baseline interview only, and make use of information on maternal education from all available waves.

Sample

The analytic sample contains 3,263 children and their mothers, 73% of the original study sample. I excluded 268 children who contributed no outcome data or information on

the time of data collection. I excluded an additional 413 children for whom there was no information about their mothers' education at any of the waves and 239 who were missing information on mothers' baseline levels of education. I excluded the remaining 259 cases because the information recorded on their mothers' levels of education was measured too noisily to be trustworthy (see the Measures section, below, for more detail on the cleaning and coding of mothers' education data)¹.

In my sample, I include children who were assigned to either the treatment and control groups, and who entered in either the 3- or 4-year-old cohort. I chose to include the entire sample—that is, children in both experimental groups and both cohorts—in order to increase statistical power, and to ensure that the sample was generalizable to low-income families who made a variety of different choices for their children's care during the preschool years. Specifically, some children who were assigned to the control group used a range of center-based care settings while other children were cared for at home with a parent or relative during the preschool years. In addition, the two cohorts also provided variation in families' experiences as the decision to apply for one versus two years of Head Start (that is,

¹ There were some notable demographic differences between those children, and their mothers, who I included in the analytic sample and those who I dropped. Children included in the sample were, for example, a few weeks older than those excluded, and more likely to be female. Other demographic suggested that those included in the analytic sample had characteristics that may have made mothers more likely to attain additional education. For example, children in the treatment group were over-represented in the analytic sample (63% of the analytical sample versus 50% of those excluded). As discussed below, mothers of children in the treatment group were more likely to attain additional education during the data collection period, and prior research suggests that Head Start encourages mothers' educational participation (Sabol & Chase-Lansdale, 2015). In addition, those excluded from the sample had higher levels of education at baseline: a smaller proportion of excluded versus included mothers had not earned a high school degree (25% vs 40%), and a larger portion of excluded versus included mothers had either attained some post-secondary education or a post-secondary degree at the start of the study. Due to their initially higher levels of education, the mothers excluded from the sample might have been less likely to attain more education. Note, that I did not compare the rates at which mothers attained more education between those excluded from, and included in, the sample because I dropped the excluded group in part to unreliable data on mothers' education across the waves. However, these demographic differences might suggest that my analytic sample is most representative of, and thus the results may only generalize to, families whose demographic characterized encouraged mothers to pursue more education.

the decision to apply when a child was about 3-years-old versus about 4-years-old) likely represented different childcare needs.

Measures

The individual-growth-modeling analytic approach relies on the creation of a person-period dataset (Singer & Willett, 2003). In this dataset, each child contributed multiple rows, one for each measurement occasion. In doing so, time-varying variables, such as children's outcomes, or, as is explained below, the variable measuring mothers' attainment of additional education, took on different values at different waves. By contrast, time-invariant predictors (e.g., the baseline demographic characteristics) had the same value at each wave.

Child outcomes. I used children's scores on four different assessments to measure their time-varying language and literacy skills (including receptive vocabulary, reading, and writing skills) and mathematics ability. Scores on each of the assessments were vertically-scaled, making them appropriate for longitudinal analysis. First, children's vocabulary was measured using the *Peabody Picture Vocabulary Test* (PPVT; Dunn & Dunn, 1997). As part of the HSIS, researchers applied item-response theory (assuming a single-parameter Rasch Model) to develop a shorter, vertically-scaled assessment from the longer published tool (Puma et al., 2010); I used the scores on this shorter form in my longitudinal analyses. Second, children's early reading skills were measured using the *Letter-Word Identification* subtest of the *Woodcock Johnson Tests of Achievement* (Woodcock, McGrew, & Mather, 2001). For this (and all other Woodcock Johnson sub-tests), I analyzed the vertically-scaled "W-scores," generated by the test publisher. Third, I used the *Woodcock Johnson Spelling* subtest to measure children's early writing skills and, fourth, the *Woodcock Johnson Applied Problems* subtest was used to measure children's early mathematics skills.

Predictors.

Time. At each wave of data-collection, I operationalized time, *TIME*, as the number of years that had passed since the fall 2002 baseline measurement; thus, in the person-period dataset, *TIME* took on a different value in each wave. Each child had a value of 0 for *TIME* at baseline (fall of 2002), that increased with each subsequent wave. This time-varying variable can also be thought of as a measure of child age, centered at each wave, on each individual child's age at baseline (see the "Design covariates" section for information about child baseline age). Due to variation in data collection and testing dates across the Head Start Impact Study sites, the passage of time between data collection waves varied slightly for each child. However, both the person-period format and the individual growth-modeling approach are flexible and can handle complexity of this nature (Singer & Willett, 2003)

Maternal education. At all waves, mothers' education was recorded at one of four possible levels: (a) less than a high-school degree; (b) a high-school degree or a GED; (c) some post-secondary education (including some college education or some vocational training); (d) a post-secondary degree (including an Associate's degree, a Bachelor's degree or a professional degree). In my statistical models, I included a corresponding vector of dichotomous predictors (*HSDEGREE*; *SOMEPESE*; *PSEDEGREE*, where 1=presence; 0=absence) to record mothers' baseline levels of education, measured in the fall of 2002 (I set the "less than a high school degree" group as the reference category).²

² Unfortunately, mothers' education was reported with inconsistent and often illogical values; for example, some mothers reported losing education between waves, while other mothers reported values of education that changed erratically from wave to wave. To address these errors, I followed the procedures suggested by the NLSY and employed by other researchers using longitudinal datasets to record the time-varying values of maternal education. In cases where a loss in education was reported ($n=831$), I filled the dataset forward, recoding the subsequent lower educational levels to the highest value previously reported by the respondent. I made an exception to this rule in cases where the loss of education was followed by two or more consecutive waves where the lower value was recorded ($n=368$). In these cases, I recoded the initial higher value to the subsequent lower values. In cases where mothers' education was missing in one wave but had been recorded in previous waves I again employed a "fill forward" strategy, in which I replaced the missing value with level of education recorded in a previous wave. After employing these coding strategies, 246 cases remained for whom the values of mother's education were untrustworthy or inconsistent with the amount of education one could feasibly attain between data collection waves. In the majority of these latter cases, mothers had reported 2-3

From the values of the vector of four indicators of mothers' education at each data collection wave, I created the primary predictor of interest, a time-varying dichotomous variable that recorded when a mother attained a higher level of education than was listed at baseline. The dichotomous predictor, *SHIFT*, was coded with a zero at baseline for all participants. It then took on a value of one in the first wave that a mother's level of education was reported as a higher value than baseline. Once taking on a value of one, the predictor *SHIFT* maintained this value for all subsequent waves. Therefore, *SHIFT* can be thought of as turning "on" (i.e. taking on a value of one) when the event of interest (a mother's first attainment of additional education) occurred; it effectively distinguishes the time before (with a value of zero) and after (with a value of one) a mother reported increasing her education. By using this coding, in my analyses, I captured a mother's first and only shift in education. While this imposed an important constraint on the interpretation, the coding was consistent with the educational histories of the mothers in the sample, where 98% of mothers who reported any shift in education reported only one.

Covariates.

Design covariates. I included a set of covariates to account for the design of the HSIS; specifically, a time-invariant indicator of treatment status (=1, for those assigned to the Head Start treatment; zero otherwise), a time-invariant indicator of cohort status (=1, for those in the 4-year-old cohort at baseline; zero otherwise). I also included a time-invariant covariate to represent child baseline age. In the sample, children's ages at baseline ranged from 2.8 years old to 5.9 years old, with an overall sample mean of 4.11; I centered child

losses in education over the course of 5 waves, or an increase of 3 levels of education in one wave. I dropped these cases from my analyses (for example, I dropped a case for which the mother's education was recoded as having a high school degree in wave 1, some college education in wave 2, no high school degree in wave 3, and some college in wave 4).

baseline age on the overall sample mean. While the mean baseline age of the 3-year-old cohort was 3.7 years old, and the mean baseline age of the 4-year-old cohort was 4.6 years old, the within-cohort baseline age ranges were almost entirely overlapping. As such, baseline age—in addition to cohort status—is an important measure of children’s developmental status upon entering the study. I included these three variables, and their two-way interactions, in subsequent statistical models. I refer to these covariates as the “design controls,” and represent them by the vector D' below.

Demographic covariates. I also included selected child, family, and maternal demographic time-invariant covariates all measured at baseline. In my models, these are represented by the vector Z' and include: (a) child gender, (b) child language status (a dichotomous variable indicating whether a language other than English was spoken in the home), (c) child special education status (dichotomous indicator); (d) mother’s race\ethnicity (a vector of dichotomous and mutually exclusive variables indicating whether the mother was Black, White or Hispanic); (e) maternal depressive symptoms (a vector of binary variables indicating whether the mother reported no symptoms, mild symptoms, moderate symptoms, or severe symptoms; the categorical variable was derived from a shortened version of the *Center for Epidemiologic Studies Depression Scale* (Seligman, 1993) used by the HSIS); (f) mother’s age at baseline; (g) maternal literacy skills (*Kaufman Functional Academic Skills Test*, K-FAST; Kaufman, 1994); (h) monthly household income (continuous, log-transformed scale); (i) a family risk index created by the HSIS, which includes (1) whether the household received food stamps or cash assistance in Fall 2002, (2) whether the primary caregiver was a high school graduate, (3) whether the primary caregiver was unemployed, (4) whether the mother was a teen mother, (5) and whether the mother was a single mother (all measured at baseline). The risk index was included as vector of 3 binary variables, where the

“low” risk category included those with 0-2 risk factors; “medium” risk category included those with 3 risk factors; and “high” risk category included those with 4-5 risk factors (Puma et. al., 2010). All continuous predictors in vector Z' were grand-mean centered.

Analytic Strategy

To investigate the relationship between children’s cognitive growth trajectories and their mothers’ attainment of additional education, I employed individual growth modeling (Singer & Willett, 2003). To address my research questions, I fit a series of 3-level multilevel models. In the level-1 (L1) submodel, I first represented the hypothesized shape of children’s true cognitive growth trajectories over the data-collection period. Thus, in the L1 submodel, I specified children’s cognitive outcomes as a nonlinear function of time since baseline (*TIME*)—using both linear and quadratic functions—and the time-varying predictor of interest, *SHIFT*. As the primary focus of this work is on how the shape of children’s growth trajectories depends upon mothers’ attainment of education, much of my analytic work focused on interpretations of the fitted L1 submodel. In the level-2 (L2) submodel, I represented inter-individual differences in children’s trajectories by specifying the L1 individual growth parameters (the parameters associated with the predictors at L1) as a function of time-invariant characteristics of children and their mothers. Including time-invariant predictors in the L2 submodels permitted me to control important baseline demographic characteristics that other scholars have found to be related to children’s cognitive outcomes and maternal pursuit of education. In the level-3 (L3) submodel, I accounted for the nesting of children within Head-Start centers³.

³ Children who applied to attend the same Head Start centers likely lived in similar neighborhoods and thus may have had shared experiences that might cause their scores on the cognitive outcomes to be correlated, violating the assumption of residual independence. As such, I chose to account for this nesting with a third level to the model. It is important to note, however, that all children who applied to attend the same Head Start

Before addressing my research questions explicitly, I explored “preliminary” fitted growth models that excluded the substantive predictor, *SHIFT*, and the demographic controls. Given the complexities of this dataset, namely the existence of two experimental groups and the age cohorts, my purpose was to model children’s average trajectories correctly while accounting adequately for potential differences in growth across these design-determined groups. To do so, I fit the following preliminary L1 submodel, which specified the hypothesized value of a generic cognitive outcome, denoted here as Y_{ijk} , measured on the i^{th} occasion, for the j^{th} child, who applied to attend the k^{th} Head Start center:

$$Y_{ijk} = \pi_{0jk} + \pi_{1jk}TIME_{ijk} + \pi_{2jk}TIME_{ijk}^2 + \varepsilon_{ijk} \quad (1)$$

In equation 1, π_{0jk} represents prototypical child j ’s true score on the cognitive outcome at baseline; π_{1jk} represents the instantaneous growth rate of child j ’s true cognitive growth trajectory at baseline, and π_{2jk} represents the (quadratic) curvilinearity of child j ’s true growth trajectory⁴. The L1 residual, ε_{ijk} , represents the portion of child j ’s outcome at time i (in center k) that is not accounted for by *TIME*.

In the L2 submodel, the L1 individual growth parameters were then treated as dependent variables and modeled as a function of the time-invariant design controls, indicated by D' . The preliminary L2 submodel was:

$$\pi_{0jk} = \gamma_{00k} + \gamma_{01}D'_{jk} + \zeta_{0jk} \quad (2)$$

$$\pi_{1jk} = \gamma_{10} + \gamma_{11}D'_{jk} + \zeta_{1jk}$$

$$\pi_{2jk} = \gamma_{20} + \gamma_{21}D'_{jk}$$

center did not necessarily attend the same care setting. Indeed, the children in the control group found alternative care arrangements.

⁴ Exploratory analyses suggested that the functional forms of children’s average growth trajectories for all four outcomes were curvilinear. As such, I included a quadratic term in my preliminary and subsequent growth models.

The L2 parameters capture inter-individual differences between children's true growth trajectories by the characteristics of the Head Start Impact Study experimental design. By including the design controls in this, and all subsequent L2 submodels, I allowed the intercept, instantaneous slope and curvature of child j 's true growth trajectory to differ by treatment status⁵, cohort membership, child age at the start of the study, as well as by their corresponding statistical interactions.

The L2 residuals, ζ_{0jk} and ζ_{1jk} , allow the true intercept and instantaneous slope of child j 's true trajectory to deviate randomly across children from the center means in the population (Singer & Willett, 2003). Notice that, at L2, I fixed the instantaneous curvature of child j 's true growth trajectory, π_{2jk} , and so its submodel has no corresponding random component. By doing so, the curvature of children's growth trajectories is assumed, thus estimated, to be the same across the sample, conditioned on the design controls. I made this decision based on exploratory analyses that suggested that allowing the quadratic term to vary randomly across children within groups defined by the design covariates did not improve model fit.

At level-3, I accounted for the nesting of children within Head Start centers by the inclusion of a random center-level intercept, as follows:

$$\gamma_{00k} = \beta_0 + v_k \quad (3)$$

⁵ In specifying the model this way, I allowed treatment status to predict children's scores at baseline. Given that children were randomly assigned to the treatment and control groups, baseline outcomes should be uncorrelated with group membership, assuming random assignment was successful. However, for the two of the outcomes (reading and mathematics), I find statistically significant treatment-control differences at baseline (see appendix Table A.1 for full results). This could be explained by the fact that baseline outcomes were collected anywhere between 2-5 months *after* random assignment. Children in the treatment group (who attended Head Start) were in school for as many as 3 months before the assessments were given. If Head Start had an early influence on children's outcomes, then treatment status might predict children's scores at baseline. Thus, when the indicator for treatment in the L2 models significantly predicted the L1 intercept, the term was retained. In these cases, I also conducted sensitivity analyses in which I refit final models excluding the indicator for treatment status from the L2 model for the L1 intercept. In all cases there was no change to the primary results.

β_0 is the population grand mean for all children's cognitive outcomes at baseline, and the L3 error term, v_k , allows the within-center mean of the intercepts of children's growth trajectory to vary randomly about this population average.

Finally, I assumed that the errors for the random effects in these multilevel models were distributed in the usual fashion:

$$\varepsilon_{ijk} \sim N(0, \sigma_\varepsilon^2), \quad \begin{bmatrix} \zeta_{0ik} \\ \zeta_{1ik} \end{bmatrix} \sim N \left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \sigma_0^2 & \sigma_{01} \\ \sigma_{10} & \sigma_1^2 \end{bmatrix} \right) \text{ and } v_k \sim N(0, \sigma_v^2) \quad (4)$$

I assumed that the errors at any given level are independent of the errors at the other 2 levels. The L1 and L3 error parameters, ε_{ijk} and v_k , respectively, are assumed to be normally distributed, with population means 0 and variances given as σ_ε^2 and σ_v^2 . I assumed the level-2 residuals, ζ_{0ik} and ζ_{1ik} , were distributed bivariate normal with population means 0 and variances, σ_0^2 and σ_1^2 , respectively. I allowed the individual intercepts and slopes of children's trajectories to be correlated, with a population covariation given by σ_{10} .

In my preliminary analyses, to simplify subsequent analyses and render later models more parsimonious, I fit these hypothesized multilevel models for each of the 4 cognitive outcomes in order to establish which combination of design controls was necessary to represent children's growth trajectories adequately. Specifically, I tested the effects of the design controls and their interactions (at L2), and only retained those effects that contributed to the overall fit of the models (i.e., those effects that were statistically significant at the $\alpha < .10$ level). I regarded the resulting models obtained for each outcome as the "preliminary" fitted multilevel model. I then added the predictor, *SHIFT*, to address the key research questions.

Research Question 1(a): Do children's cognitive growth trajectories show a change in elevation when their mothers report attaining additional education? To

address research question (a), I extended the above individual-growth model and specified the following L1 equation:

$$Y_{ijk} = \pi_{0jk} + \pi_{1jk}TIME_{ijk} + \pi_{2jk}TIME_{ijk}^2 + \pi_{3jk}SHIFT_{ijk} + \varepsilon_{ijk} \quad (5)$$

In this model, I included the time-varying predictor *SHIFT*, which recorded when mothers report attaining a higher level of education than was indicated at baseline. The individual growth parameter π_{3jk} is of primary interest in addressing the research question, as it captures the relationship between a mother's educational transition and the elevation of child *j*'s growth trajectory. Including π_{3jk} at L1 results in an additional component to the model at L2:

$$\pi_{3jk} = \gamma_{30} \quad (6)$$

where the parameter γ_{30} then represents the population average immediate shift in the elevation of a child's cognitive development trajectory associated with her mother's report of attaining additional education. Essentially, this parameter allowed children's trajectories to take on a discontinuous shape, on average, such that the trajectories could shift upwards when mothers report an educational transition. As described above, due to how the data were collected, it was clear that a mother's education transitions occurred sometime between the wave in which it was recorded and the wave prior. However, I could not discern exactly when a mother began going to school or exactly when she shifted from one education level to the next. These events could have occurred two months, or two days, before the wave in which the transitions were recorded. As such, any observed change to the elevation in children's trajectories reflects any increase in children's skill or developmental competency during the time before the transition was recorded, likely when mothers were working toward a new educational level and/or immediately after the degree or new level was attained.

In addressing the first research question, I also added demographic covariates, denoted by Z' , to the L2 model for π_{0jk} , the true intercept for child j 's trajectory, thereby controlling for the main effects of child and family demographic characteristics. Based on the analyses conducted for the preliminary models, I left the L2 models for parameters π_{1jk} and π_{2jk} unchanged from the models specified above.

Research Questions 1(b) and 1(c): Does the change in elevation differ based on when—how long after the start of the study—mothers report attaining additional education? And do children's trajectories show a change in slope? To address research questions 1(b) and 1(c), I added a two-way interaction between *SHIFT* and *TIME* to the L1 submodel for individual change over time, and a corresponding new component to the L2 model. As I describe in more detail below, the parameter associated with this interaction simultaneously addresses research questions 1(b) and 1(c), allowing me to hypothesize that the effect of *SHIFT* differs depending on the time that had passed between baseline and the occasion that a mother reported attaining more education, *and also* that the slope of children's trajectories differed before and after their mothers reported a shift in education (i.e., once the variable *SHIFT* “turned on”). Consequently, the new L1 submodel was:

$$Y_{ijk} = \pi_{0jk} + \pi_{1jk}TIME_{ijk} + \pi_{2jk}TIME_{ijk}^2 + \pi_{3jk}SHIFT_{ijk} + \pi_{4jk}TIME_{ijk} \times SHIFT_{ijk} + \varepsilon_{ijk} \quad (7)$$

Note that I chose not to interact the predictor *SHIFT* with the quadratic function of *TIME*, in the hypothesized L1 model, as preliminary analyses suggested that this additional term did not improve the fit of the model. Thus, to keep the model parsimonious, I excluded it. In addition, I added the following corresponding component to the L2 submodel:

$$\pi_{4jk} = \gamma_{40} \quad (8)$$

Like any interaction term, the L2 parameter γ_{40} has two possible interpretations, corresponding to research questions 1(b) and 1(c) respectively. First, γ_{40} represents the population average increment or decrement to the effect of *SHIFT* on child *j*'s trajectory depending on how long after baseline her mother reported attaining a higher level of education. That is, fitting this model permitted me to test whether the hypothesized shift in elevation of children's trajectories was larger (or smaller) depending on when it occurred. In this new model, the linear combination of π_{3jk} and π_{4jk} now captures a *time-varying* relationship between mothers' educational transitions and the elevation of children's cognitive growth trajectories. A positive and statistically significant parameter estimate for γ_{40} would indicate children's trajectories show a greater shift in elevation when their mothers' report attaining additional education longer after the start of the study. By recovering the estimated effects of *SHIFT* for different values of *TIME*—specifically values that correspond to the data collection waves—I explored whether the effect of *SHIFT* was largest during the preschool years (waves 2 and 3) versus when all children had transitioned to elementary school (waves 4 and 5).

Second, the inclusion of the L1 interaction $TIME_{ijk} \times SHIFT_{ijk}$ —and correspondingly, L2 parameter γ_{40} —also allowed a shift in mother's educational attainment to influence the linear slope of children's trajectories, thereby addressing research question 1(c). In this interpretation, L2 parameter γ_{40} also represents the population average increment or decrement to the linear slope of children's trajectories that is associated with their mothers' reports of attaining additional education. A positive and significant γ_{40} would indicate that the population average instantaneous rate of change of children's trajectories became steeper, or that children's skills began to grow faster, after mothers reported

increasing their education.⁶

Research Question 2: Do any observed changes to children's growth

trajectories differ based on mothers' baseline levels of education? To address research question 2, I extended the hypothesized models specified for research question 1. Here, I explored whether the associations between a mother's educational transition and her child's cognitive growth trajectory are moderated by a mother's baseline level of education. As denoted in equation 7, the L1 growth parameters π_{3jk} and π_{4jk} jointly describe the relationship between children's trajectories and mother's levels of education. To test whether these terms differed by mother baseline levels of education, I included the vector of binary variables indicating mothers' baseline education in the L2 submodel equations associated with these terms as follows:

$$\begin{aligned}\pi_{3jk} &= \gamma_{30} + \gamma_{31}HSDEGREE_{jk} + \gamma_{32}SOMEPSSE_{jk} \\ \pi_{4jk} &= \gamma_{40} + \gamma_{41}HSDEGREE_{jk} + \gamma_{42}SOMEPSSE_{jk}\end{aligned}\tag{9}$$

γ_{30} and γ_{40} now collectively represent the time-varying change to the elevation of children's trajectories, and the change to the slope of children's trajectories, for those children whose mothers had no high school degree at baseline (i.e., the reference group). L2 parameters γ_{31} and γ_{32} represent in the increment or decrement to the instantaneous effect of *SHIIIFT* (at time 0) for children whose mothers had a high school degree, or some post-secondary education at baseline, as compared to the reference group. A positive and significant estimate of γ_{31} , for example, would indicate that the change in elevation to children's trajectories associated with their mothers' attainment of additional education was larger for

⁶ Note that the hypothesized L2 submodel for π_{4ik} does not include an error term, and so the value of the parameter is fixed across children. Exploratory analyses suggested this was appropriate as the corresponding L1 interaction term did not vary significantly across children in the sample.

children whose mothers had a high school degree at baseline, in comparison to those children whose mothers had no secondary degree.

Similarly, a positive and significant estimate for γ_{41} would indicate, that the increment to the change in the elevation of children's trajectories for each year following baseline is larger for children whose mothers had a high school degree at baseline, in comparison to those children whose mothers had no secondary degree. That is, the time-varying effect of SHIFT would be more pronounced for children whose mothers had higher levels of education to start. Or, when approached from the alternative interpretation of the interaction term focused on the slope of children's trajectories (i.e., the interpretation for research question 1(c)), a positive and significant estimate of γ_{41} would indicate that the increment to the slope of children's trajectories associated with a mother's shift in education is larger for children whose mothers had a high school degree or GED as compared to children whose mothers did not have a secondary degree at baseline.

Missing Data. Missingness ranged from 1-33%, depending on the demographic covariate in question. There were complete data on children's cohort membership and treatment-group status in the analytic sample, while family income had the largest percentage of missing data (at 33% of the sample had no information on this variable) To resolve this problem, following Graham et al. (2007), I made use of a multiple-imputation strategy, generating 30 imputed data sets (using Stata 14's ICE routine) with complete data on all covariates. I did not impute values for the outcomes, child age, time, or shifts in mothers' education; however, these variables, along with other available demographic characteristics, were used in the imputation model. All of my hypothesized statistical models were fitted in all 30 datasets; and the resulting model estimates were combined (using Stata 14's MI routine) to produce the results presented here.

Analytic Limitations, Threats to Validity, and Sensitivity Analyses

Characteristics of these analyses, and the design of the HSIS dataset, introduced complexity into the modeling process. As described below, these complexities limited the application of the analytic strategy, and may threaten the internal validity of the estimated relationship between mothers' attainment of additional education and children's cognitive growth trajectories. I conducted a number of sensitivity analyses to test the robustness of the findings to these threats.

Reverse-causality misspecification. The nature of individual growth modeling, and the specification of the hypothesized models above, rest on the assumption that a mother's attainment of additional education leads to concurrent improvements in her child's outcomes. However, theory also suggests that mothers may be motivated to pursue more education when they witness their children thriving in school and increasing their skills (Sommer et al., 2012). If the latter description reflects the true nature of the relationship between maternal education and child outcomes, then the models estimated here were misspecified, and present a case of "reverse-causation" (Allison, 1999, p. 52). Specifically, what should be a dependent variable (mothers' attainment of additional education) was specified as an independent variable, and what should be an independent variable (child outcomes) was specified as a dependent variable.

I could not completely rule out the threat of this misspecification; however, additional sensitivity analyses, specifically a lagged analysis, provided insight as to whether or not the primary models were biased by the problem of reverse causation. If the true nature of the relationship in question is such that increases in children's outcomes cause mothers to attain additional education, then we would not expect mothers' educational shifts to have an effect on children's outcomes in the waves following a mother's report of her attainment of

additional education. To test this hypothesis, I refit the models for each research question altering the coding of *SHIFT* such that the variable took on a value of one in the wave *following* a mother's report of an increase in education (in all other ways the models remained the same). This alternative coding allowed the models to estimate the lagged effect of mothers' attainment of additional education on child development.

Distributional properties of the outcomes. While all of these outcomes are vertically-scaled and therefore nominally suitable for longitudinal data analysis, univariate and bivariate (by child age) distributions of the Woodcock Johnson outcomes suggest the presence of a floor effect in each case. Assuming that the latent construct underlying an assessment is normally distributed, floor effects like these may occur when the assessment is too difficult. As a result, participants with low values on the latent construct have their values censored. In Appendix Figure A.1, I plot children's scores on each of the four assessments versus child age (measured in years). The blunt horizontal bottom of the point cloud in the plots for Letter-Word Identification, Spelling, and Applied Problems provide evidence of the observed floor effect. The floor effects may violate the assumptions underpinning the individual growth-modeling analyses, in terms of the distributional assumptions on the random effects (which, if left unchecked, may be misinterpreted as a failure of the specification of the individual growth models). To test the robustness of my findings to the presence of the floor effect, I refit all final models using multi-level tobit regression, a modeling strategy designed to account for censored data. The tobit analysis corrects for censoring with a two-step estimation process that analyzes the relationship between the dependent and independent variables for those cases that have not been

censored while accounting for the probability that any given observation is censored (McDonald & Moffitt, 1980).⁷

Design of the HSIS. The modeling process for this study was complicated by multiple factors of the original HSIS design. While I included the design controls in all primary models, it is still possible that idiosyncrasies, or unaccounted differences across the treatment and control groups, or the 3-and 4- year-old cohorts, might have biased the parameter estimates associated with the variable of interest, *SHIFT*. To test the robustness of the primary results to design of the study, I refit the final models for each research question on four different subsamples: the treatment group only, the control group only, the 3-year-old cohort only, and the 4-year-old cohort only. By fitting the final models to the treatment and control group subsamples, I tested the robustness of the primary models to the experimental design of the HSIS data, and I explored whether the Head Start treatment effect confounded the estimated relationship between mothers' attainment of additional education and their children's growth trajectories. By fitting the final models to the cohort subsamples, I tested whether either of the cohorts drove the primary results.

Causality. The design of my analysis does not allow me to say with certainty that any observed changes in children's trajectories were *caused* by mothers' attainment of additional education. Mothers who attained additional education may have been different than mothers who did not on observed and unobserved characteristics related to their children's development. Thus, any observed relationship between maternal educational attainment and children's growth trajectories may have been confounded by these characteristics. While I cannot address this concern completely, I hope that the inclusion of the demographic covariates accounted adequately for observable baseline differences among

⁷ See the appendix for more information on the tobit regression analyses.

families, limiting to some degree the potential impact of selection bias in the findings.

Related to the threat of confounding variables, it is also possible that other aspects of families' lives were changing concurrently with mothers' attainment of additional education; these other changes may actually be the root cause of any observed changes to children's trajectories. For example, it is possible that a change in family income could cause a mother to attain more education (i.e., more income in the home for tuition) and cause a child to increase her cognitive skills (i.e., more resources in the home to support children's development). If this were the case, what I estimate to be a relationship between maternal educational attainment and child outcomes may actually be a spurious correlation, and the result of "third paths" between these two variables and family income. I chose not to control for time-varying characteristics, like family income, that might be related to child outcomes and mothers' education because these potential confounders are also potential mediators of the effect of interest. Returning to the previous example, an increase in income may cause a mother to go to school and improve child outcomes, *or* a mother's return to school may cause an injection of funds in the home that leads to improved child outcomes. In the latter scenario, family income is a mediator of the relationship of interest, rather than a confounder. Because I aimed to estimate the total, direct association between maternal attainment of education and child outcomes, it would have been inappropriate to include, and essentially "control out," the effects of potential mediators. For this reason, I excluded them. However, the absence of other time-varying controls in the models contributes to my inability to draw any causal inferences.

Results

Characteristics of the Sample

I present descriptive statistics on the demographic controls in Table 1. The sample includes 3,263 children who applied to attend Head Start in 2002. The children were 4.11 years old, on average, at the start of the study, 50% of them were female, and about 25% of the sample spoke a language other than English at home. Children in the treatment group and children in the 3-year-old cohort were slightly over-represented. Mothers were about 29-years-old, on average; most families reported between zero and two household risk factors, and just over 50% of mothers reported no depressive symptoms. Families in the sample had an average income of about \$1,500 a month, which would put a family of three at approximately 120% of the 2002 poverty line.

Patterns of Mothers' Attainment of Additional Education. In this analytic sample, approximately 23.69% of mothers ($n=773$) reported attaining additional education between baseline and the last wave of data collection. Approximately 41% of these mothers had no high school degree at baseline, another 41% had completed either a high school degree or GED, and 18% of these mothers had some college experience when they started the study. As displayed in the descriptive statistics in Table 2, women in the sample made a variety of educational transitions. Most reported transitioning one level ($n=660$; 85%). The largest percentage of women transitioned from having a high school degree at baseline to attaining some post-secondary education (35.96%). Approximately 30% of mothers who reported an educational transition earned their GED. Only 18% of mothers earned a post-secondary degree after beginning the study with some post-secondary education.

A small percentage of women transitioned 2 education levels: 74 mothers (about 10% of those who reported any shift in education) had no high school degree at baseline, but later in the study reported that they had attended some post-secondary education. Only 5% of women who experienced an educational transition (and less than 1% of the full

sample) attained a post-secondary degree after having only a GED or high school diploma at baseline. While these patterns were consistent across key subgroups in the sample, namely the treatment and control groups, and the two age cohorts, mothers who reported an educational transition were more likely to have children in the treatment groups (64.42% of those who reported a transition), and more likely to have children in the 3-year old cohort (58.09% of those who reported a transition). These patterns are logical given the nature of the Head Start services and dataset. Head Start is designed to connect families to community resources; as such, parents in the treatment group may have had more support finding educational opportunities. The provision of child care (via Head Start) may have also made it more feasible for mothers in the treatment group to pursue education. In addition, mothers whose children were in the 3-year-old cohort were, on average, in the study for one additional year, and thus had more opportunity to pursue education, perhaps explaining the higher number of transitions in this group.

Mothers' reported transitions in education were spread relatively evenly across the 4 waves (mothers could not report an increase in education at wave 1), with the smallest number of increases recorded in the last wave (this is logical given that only the mothers with children in the 3-year-old cohort could report a shift in this wave). Twenty-nine percent of increases were recorded in wave two, 26% in wave three, 30% in wave four, and 15% in wave five.

Children's average cognitive growth over time. Before exploring how mothers' attainment of additional education affected child development, it is useful to understand the average shape of children's developmental trajectories for the four outcomes. In Table 3, I present descriptive statistics for child age, and the corresponding cognitive outcomes for each wave. Children's ages ranged from just younger than 3 years to 8.65 over the course of

the study (though most children were about 7 years old in their last wave of data collection). As would be expected, children's average scores on the outcomes increased with each data-collection wave, suggesting children's cognitive skills improved with age.

Results from fitting the preliminary individual models (as described in the Analytic Strategy section) provided a description of children's average cognitive trajectories. In Figure 1, I present an average fitted trajectory, based on the results from fitting the preliminary models, for each outcome (parameter estimates from the preliminary models can be found in Appendix Table A.1). As the figure suggests (and consistent with the earlier descriptive statistics), the average child's scores on all of the outcomes increased over time. For example, at baseline the average child (controlling treatment status, baseline age, and cohort) had a score of 300 points on the reading assessment that increased at an average linear growth rate of approximately 30 points per year (approximately 50% of the full sample standard deviation at baseline). The instantaneous growth rate of children's reading skills increased over time as indicated by the parabolic shape of the curve (and a positive parameter estimate associated with $TIME^2$). Children's writing trajectories followed a similar pattern to their reading skills, while children's vocabulary and mathematics trajectories took on a different shape. Children's vocabulary and mathematics scores generally increased with the passage of time, but the flattening out of the average preliminary growth curves—particularly for the PPVT—indicated that children's instantaneous growth rates for these skills slowed over time. For example, the average instantaneous rate of children's vocabulary trajectories at baseline was approximately 57 points per year, nearly one standard deviation, that decreased over time (as indicated by the negatively signed parameter estimate associated with $TIME^2$).

The Relationship Between Child's Cognitive Growth and Mother's Attainment of Additional Education

Research Question 1(a): Do children's cognitive growth trajectories show a change in elevation when their mothers report attaining additional education? In Table 4, I present results from the fitted models that addresses research question (a). As noted earlier, the fitted coefficients associated with the predictor *SHIFT* describe any change to the elevation of children's developmental trajectories when their mothers report attaining a higher level of education than was reported at baseline. For two of the three outcomes—reading, writing and mathematics—estimates of this parameter of interest, $\widehat{\gamma}_{30}$, were positive and statistically significant (1.68, 2.11, and 1.57 respectively). This suggests that when controlling mothers' baseline level of education, and including the demographic and design controls, children's early writing, mathematics, and reading trajectories show a vertical shift upward, on average, when their mothers attain more education. However, these shifts are small, with effect sizes of .07, .06, and .04, respectively, for writing, mathematics skills, and reading.⁸ I found no evidence to suggest that children's vocabulary growth trajectories showed a shift upward when mothers report attaining additional education.

To illustrate the magnitudes of these relationships, I present these results graphically in Figure 2. Here, I display fitted early reading, writing, and mathematics developmental trajectories for a prototypical child who was 4-years-old at baseline (the average baseline age for children in the sample) and whose mother reported attaining more education approximately 2.5 years after baseline (around the time of the 4th wave of data collection, when about 30% of the recorded shifts took place), or when the child was about 6 and half years old. The small “jig” in each trajectory corresponds to parameter estimate associated

⁸ To calculate these effect sizes, I used the wave 4 standard deviations, as the highest percentage of mothers' educational transitions were recorded at this time point.

with *SHIFT*, and captures the growth children made during the time their mothers were acquiring additional education.

Research Questions 1(b) and 1(c): Does the change in elevation to children's trajectories differ depending when—how long after the start of the study—mothers report attaining additional education? Do children's trajectories show a change in slope when their mothers attain additional education? In Table 5, I present fitted models that address research questions 1(b) and 1(c). The estimated parameter of interest is $\widehat{\gamma}_{40}$, which summarizes simultaneously whether the effect of *SHIFT* differs depending on how long after baseline the mother reported attaining additional education *and also* whether the slopes of children's growth trajectories change when mothers report attaining additional education.

For two of the language and literacy outcomes—reading and vocabulary—estimates of γ_{40} were not statistically significant ($-0.14, p=.57$; and $-.19, p=.44$, respectively). In addition, I conducted joint tests of significance for the parameter associated with *SHIFT* and the interaction between *SHIFT* and *TIME*, and failed to reject the null hypothesis for both outcomes. As such, there was no evidence to suggest the effect of *SHIFT* on children's early reading or receptive vocabulary trajectories was moderated by time, or that the slopes of children's trajectories changed after mothers reported attaining additional education.

The pattern of results for children's mathematics and writing growth trajectories differed from the outcomes described above. For mathematics, the estimated parameter associated with the interaction between *SHIFT* and *TIME* ($\widehat{\gamma}_{40}$) was positive and statistically significant ($1.13; p<.05$); the coefficient on the interaction was also positive for the writing outcome, ($\widehat{\gamma}_{40}=1.05$), and approached statistical significance ($p=.06$). As noted above, the magnitude and direction of the parameters associated with the interaction term has two

possible interpretations. First, I turn to the interpretation that addresses research question (b). I will focus on children's mathematics ability given the stronger evidence of moderation for this outcome. The first interpretation of the interaction terms suggests that, on average, children's developmental mathematics trajectories experience a larger shift in elevation when mothers report attaining more education longer after baseline. Specifically, with each additional year after baseline, the elevation to children's trajectories associated with mothers' attainment of additional education increased by 1.13 points. In addition, with the inclusion of the corresponding interaction term in the L1 model, the main effect of *SHIFT* ($\widehat{\gamma}_{30}$) must now be interpreted as the effect of *SHIFT* when *TIME*=0, or the effect of *SHIFT* at baseline. However, given that mothers could not acquire additional education at baseline, this main-effect parameter is of little interest on its own.

By combining the magnitudes of estimated parameters $\widehat{\gamma}_{30}$ and $\widehat{\gamma}_{40}$, the latter multiplied by the amount of time that passed, I recovered, and conduct post-hoc tests of statistical significance on, the effect of *SHIFT* on children's mathematics growth trajectories at various points in time following baseline. The results of these tests suggested that the relationship between mothers' attainment of additional education and children's early mathematics trajectories was indistinguishable from 0 if the educational transition was recorded soon after baseline (between .5 and 1.5 years, or when data-collection waves 2 and 3 took place). However, if mothers reported attaining more education further into the study, at around 2.5 and 3.5 years after baseline (waves 4 and 5), then the effect of *SHIFT* on the growth trajectory was positive and statistically significant. To make this clear, I display these results in the fitted growth trajectories of Figure 3. In the figure, and similar to my earlier display of fitted trajectories in Figure 2, I present fitted trajectories for three prototypical children who were four-years-old at baseline. The fitted trajectory in plot (a) is for a child

whose mother reported attaining more education when her child was 5.5 (about 1.5 years after baseline, or at wave 3). Here, as noted above, there is no discernable effect of the mother's additional educational attainment ($\widehat{\gamma}_{30} + \widehat{\gamma}_{40} * 1.5 = .80$; $t_{\text{stat}} = 1.15$ $p = .25$). The fitted trajectory in plot (b) represents a child whose mother reported increasing her education when her child was about 6.5 (about 2.5 years after baseline or at wave 4). Here, the small vertical jig in the trajectory at time = 2.5 represents the positive, statistically significant association between a mother's attainment of additional education and her child's early childhood mathematics ability ($\widehat{\gamma}_{30} + \widehat{\gamma}_{40} * 2.5 = 1.93$; $t_{\text{stat}} = 3.10$ $p < .01$), with a small effect size of .08. Finally, the last fitted trajectory in panel (c) represents the development of a prototypical child whose mother reported attaining more education when her child was 7.5 (or 3.5 years after baseline at wave 5). In this case, the average relationship between *SHIFT* and children's mathematics trajectory was positive, and statistically significant ($\widehat{\gamma}_{30} + \widehat{\gamma}_{40} * 3.5 = 3.05$; $t_{\text{stat}} = 3.41$ $p < .001$) with an effect size of .15 standard deviations, nearly double that observed for a transition occurring one year earlier. Thus, Figure 3, displaying increasingly larger "jigs" in the fitted growth trajectory in each panel, illustrates the role of the interaction between *SHIFT* and *TIME* in estimating the magnitude of change in elevation in children's trajectories. The positively signed parameter estimate indicates that, on average, children benefited more when the occasion that their mothers reported attaining additional education occurred longer after baseline. Notably, the effect of *SHIFT* was largest (and became statistically significant) in waves 4 and 5, when children had transitioned into elementary school.

As described above, a second interpretation of parameter γ_{40} concerns the slopes of children's corresponding fitted trajectories. This parameter also represents the population average increment to the instantaneous linear slope of a child's fitted mathematics

trajectories after his mother reported attaining additional education. Said differently, my fitted model presented in Table 4 indicates that—following a mother’s report of having attained additional education—the instantaneous linear slope of her child’s fitted trajectories became steeper by an average of 1.13 points (or the value of $\widehat{\gamma}_{40}$). This small difference is also present in each panel of Figure 3. Though difficult to discern, given its small magnitude, the linear slopes of children’s trajectories before and after the “jig” associated with *SHIFT* do indeed differ by a statistically significant amount of 1.13 points.

The pattern was similar for children’s writing growth trajectories. Although the interaction term between *SHIFT*×*TIME* was only marginally significant, results from post-hoc tests of statistical significance recovering the association of mothers’ attainment of additional education at different points in time suggested the same pattern for children’s early writing skills as is displayed in Figure 3 for children’s mathematics trajectories. The effect of *SHIFT* was largest for children when their mothers report attained more education longer after baseline. For the writing outcome, the average change to elevation to their children’s growth trajectories was not significant when mothers reported an educational transition .5 years after baseline (wave 2), but was statistically significant ($p<.05$) when the transition occurred 1.5-3.5 years after baseline, with the effect sizes ranging from .05 to .14, which became progressively larger with the passage of time. Turning to the second interpretation of $\widehat{\gamma}_{40}$, the coefficient associated with the interaction term also suggests that following a mother’s report of additional education, the instantaneous linear slope of children’s fitted growth trajectories increased, on average, by 1.04 points ($p<.10$).

Research question 2: Do any observed changes to children’s growth trajectories associated with their mothers’ attainment of additional education differ based on the mothers’ levels of education at baseline? As described in the methods

section, I addressed research question (2) by extending the specified models for research questions 1. Specifically, I tested whether or not the observed changes to the elevation or slope of children’s growth trajectories differed by mothers’ baseline levels of education. I only found evidence to suggest that mothers’ levels of baseline education moderated the relationship between children’s cognitive development and mothers’ attainment of additional education for one outcome: children’s early math skills. (See Footnote 9 for a more complete discussion of the results from the other outcomes.) Although not shown here in the primary results, I began by testing a model that included a vector of binary indicators for mothers’ baseline levels of education as predictors in the L2 submodels for the L1 growth parameter associated with *SHIFT*, π_{3jk} , and *SHIFT*×*TIME*, π_{4jk} . Post-hoc significance tests suggested that mother’s baseline levels of education did not predict π_{4jk} . Joint tests of significance of the L2 parameter estimates for $\widehat{\gamma}_{40}$, $\widehat{\gamma}_{41}$, and $\widehat{\gamma}_{42}$ indicated these terms were not needed in the models. These tests suggested that the change to the slope of children’s trajectories associated with mothers’ attainment of additional education (or the time-varying effect of *SHIFT*) did not differ by mother’s baseline levels of education. As such, I removed these terms from the model and refit a more parsimonious option, retaining the indicators for mothers’ baseline levels of education in the L2 submodel for the L1 growth parameter associated with *SHIFT* only. I present this more parsimonious model in Table 6.⁹

⁹ I present complete results for these models for all outcomes in Appendix table A.3. Some trends from these results are noteworthy, though lacking sufficient statistical evidence to confidently make substantive inferences. There is some evidence to suggest that mother’s baseline levels of education may moderate the relationship between mother’s attainment of additional education and children’s vocabulary and reading ability. In the fully moderated models for both reading and vocabulary (where mothers’ baseline levels of education predicted both the L1 parameters associated with *SHIFT*, π_{3jk} , and *SHIFT*×*TIME*, π_{4jk}) the L2 parameter estimate associated with *SOMESPSE* in the L2 equation for π_{4jk} was negative and statistically significant, suggesting that the association between mother’s attainment of additional education and the slope of children’s trajectories was smaller in magnitude and potentially negative for children whose mothers had some post-secondary education at baseline. In addition, the L2 parameter estimate associated with *SOMESPSE* in the L2 equation for π_{3jk} was positive and statistically significant, suggesting that the relationship between mothers’ attainment of additional education and the elevation of children’s growth trajectories (at baseline) was larger in magnitude

As shown in Table 6, the L2 growth parameter associated with *HSDEGREE* ($\widehat{\gamma}_{31}$) and *SOMEPSSE* ($\widehat{\gamma}_{32}$) for the mathematics outcomes were negative and statistically significant— $p < .10$ for the former, and $p < .05$ for the latter. These estimates indicate that the positive shift in the elevation of children’s mathematics growth trajectories associated with their mothers’ attainment of additional education was smaller for children whose mothers had a high school degree, or some post-secondary education at baseline, as compared to children whose mothers had no high school diploma at baseline. When looking across the other outcomes, these parameters were also primarily negatively signed, but imprecisely estimated and thus not statistically significant. As such, I will focus the interpretation on children’s mathematics trajectories only.

The model results suggest that children whose mothers had the lowest levels of education to start (i.e., mothers without a high school diploma or GED) experienced the largest benefit to their mathematics skill from their mother’s attainment of education. Indeed, as I describe in more detail below, the positive relationship between mothers’ attainment of additional education and children’s mathematics trajectories was concentrated only among children whose mothers had no high school degree at baseline, with mostly null effects for the other groups.

Note that I retained the L1 interaction term between *SHIFT* and *TIME*; similar to the results established in the section prior, the parameter estimate was positive and statistically significant, indicating that the relationship between mothers’ attainment of

for children whose mothers had some post-secondary education at baseline. Despite these statistically significant individual point estimates, joint tests of significance suggested that set of indicators of mothers’ baseline education was not needed in the L2 equations for π_{3jk} nor π_{4jk} . In addition, post-hoc tests recovering the effect of *SHIFT* on child’s reading and vocabulary at different waves were not distinguishable from 0. As such, I chose not to interpret these effects in the main results.

additional education and children's trajectories differed depending on when the educational transition was recorded. Together with the moderation by mothers' baseline level of education results, these results suggested that when mothers reported attaining a higher level of education, children's early mathematics trajectories showed a positive change in elevation that was greater for children whose mothers were the least educated to start, *and* when the educational transition was reported longer after baseline. I display this pattern of results graphically in Figure 4. Similar to Figure 3, each panel displays a fitted growth trajectory for a prototypical child whose mothers reported attaining a higher level of education at various time points (waves 3-5). To illustrate the moderation by mothers' baseline education, the first row of panels (row i) represents children whose mothers had no high school degree at baseline, while the second row (row ii) displays fitted trajectories for children whose mothers had a high school degree at baseline.

Similar to the process described in the previous section, I recovered, and conducted post-hoc significance tests on the effect of *SHIFT* at various waves for children whose mothers fell in each of the baseline education categories. Specifically, I recovered a linear combination of the fitted parameter estimates associated with the main effect of *SHIFT* ($\widehat{\gamma}_{30}$), the indicators of mothers' baseline levels of education ($\widehat{\gamma}_{32}$ and $\widehat{\gamma}_{33}$), and the interaction term between *SHIFT* and *TIME* ($\widehat{\gamma}_{40}$). The results for children whose mothers had no high school degree at baseline were similar to those presented in the previous section. Soon after baseline (.5 years at about wave 2) the relationship between mothers' attainment of additional education and children's trajectories was indistinguishable from 0 ($t_{\text{stat}} = .41, p = .34$). However, for waves 3-5 (1.5-3.5 years after baseline) results indicate that, for children whose mothers did not have a high school diploma at the start of the study, their mathematics trajectories showed a vertical shift upwards when their mothers reported

attaining a higher level of education. At wave 3 the effect size was .08 ($p < .05$), at wave 4, the effect size was .14 ($p < .01$), and at wave 5, the effect size was .22 ($p < .001$). The increasingly large effects are displayed in the increasingly large jigs in children's trajectories. Of note, these effect sizes are larger than those reported in the previous section, as those estimates were averaged across all children whose mothers' baseline education levels fell into various categories. In addition, I find a positive effect of *SHIFT* at wave 3 for children whose mothers had no high school degree at baseline, whereas this estimate was not statistically significant when looking across the whole sample.

The negatively signed growth parameters for $\widehat{\gamma}_{31}$ and $\widehat{\gamma}_{32}$ served to dampen the relationship between mothers' attainment of additional education and children's mathematics growth for those children whose mothers had a secondary degree or some post-secondary education at baseline. As displayed in the bottom row ii of Figure 4, the changes to the elevation of children's trajectories were smaller for those whose mothers had a high school degree at baseline. For wave 2-4 the effect of *SHIFT* was indistinguishable from 0. However, when recovering the effect of *SHIFT* 3.5 years after baseline (wave 5), a post-hoc significance test indicated a positive and significant association between mothers' educational transitions and children's mathematics scores ($\widehat{\gamma}_{30} + \widehat{\gamma}_{31} + \widehat{\gamma}_{40} * 3.5 = 2.47$; $t_{\text{stat}} = 2.19$ $p < .05$). Specifically, the average mathematics' skills growth trajectory for children whose mothers had a high school degree at baseline showed a vertical shift upward (an effect size of 0.12) when their mothers reported an educational transition 3.5 after baseline (i.e., when children who were in the study for 5 waves had transitioned into first grade).

I do not display a set of trajectories for children whose mothers had some post-secondary education at baseline, as post-hoc tests suggested that the relationship between mothers' attainment of additional education and children's growth trajectories was not

statistically significant at any wave for this group. The relatively large, and negatively signed parameter estimate for $\widehat{\gamma}_{32}$ “canceled out” the positive effect of *SHIFT*. Post-hoc tests suggested that the effect of *SHIFT* at all waves was small and always statistically indistinguishable from 0.

Sensitivity Analyses

Lagged effect. The potential for reverse causality—children’s improved cognitive ability causing mothers to acquire additional education—poses a threat to the validity of the estimates associated with *SHIFT*. To test whether the above results were robust to this threat, I refit all models using the lagged coding for *SHIFT* (as described in the Analytic Strategy section). In nearly all cases this alternative specification produced almost identical results to the primary models. The effect of mothers’ attainment of additional education on children’s early reading trajectories (as measured by the Letter-Word Identification assessment) was the one exception. In the primary analyses, I estimated a positive, statistically significant effect of *SHIFT* on the elevation of children’s early reading skills growth trajectories. However, in this alternative lagged specification, the parameter estimate associated with *SHIFT* switched signs and the p-values increased such that the estimated was no longer statistically significant.

In addition to this empirical evidence, theory and prior research suggest that the primary models are specified correctly. Existing work on parents’ pursuit of education does indeed indicate that the general well-being of their family can affect parents’ decisions to pursue further schooling (Sommer et al., 2012). However, research suggests that multiple complex factors and circumstances in an adult’s life—including financial stability, the perceived utility of schooling, family health, and access to child care—influence a parent’s decision to pursue or not to pursue additional education (Astone et al., 2000; Bozick &

DeLuca, 2005; Sommer et al., 2012). It is less likely that a child's increase in skills would be the primary driver of a parent's decision to go back to school.

HSIS design subgroups. To test whether the primary results were biased by a failure to adequately account for the HSIS' complex design, I refit the primary models above in 4 different subgroup-specific samples: the treatment group only, control group only, 3-year-old cohort only, and 4-year-old cohort. When fitting the final model across the two experimental groups (treatment and control groups), the majority of results were consistent with the primary models, with a few exceptions. In some cases, particularly the models predicting children's mathematics and writing developmental trajectories, the parameter estimates associated with the effect of *SHIFT* were smaller in magnitude and had larger standard errors than in the models fit to the full sample. This may suggest that in the treatment group, the association between maternal educational attainment and child outcomes is less strong. Or the larger standard errors may simply be due to the smaller sample size. However, the results for the models fit to the control group mirror those in full sample; this suggests that the estimated relationship between of mothers' attainment of additional education and children's cognitive growth trajectories cannot be solely attributed to a confounding relationship between treatment status and *SHIFT*, and treatment status and the child outcomes.

When fitting the final models to the cohort-specific sub-samples, I found few differences in the results for the vocabulary, reading, and writing outcomes. However, this was not the case for mathematics. When fitting the models for the three research questions to the cohort specific subsamples, the parameter estimates suggest that the effects reported from the full sample are driven by the children in the 3-year-old cohort. In Appendix Table A.2, I present results for all final models fit to the full sample, and separately for each

cohort. In all cases, the parameter estimates associated with the effect of *SHIFT* are smaller and not statistically significant in the 4-year-old cohort, while, in the 3- year-old cohort, the parameters of interest are statistically significant and larger in magnitude than the estimates from the models including the full sample. These models indicate that all results pertaining to children's early mathematics skills may apply to the 3-year-old cohort only.

Tobit analyses. The Woodcock-Johnson outcomes were measured with a floor effect. As such, the univariate distributions of these outcomes, and their bivariate distributions with time may violate the assumptions of individual growth modeling (Singer & Willett, 2003), and introduce bias into the estimates. To test the robustness of the primary results to the presence of the floor effect, I refit the hypothesized models using a multi-level tobit analysis that accounts for the censored data in the lower end of the outcome distributions. The results of the tobit analysis were quite similar to the primary results, with the exception of the models for children's reading ability (for research question (a)). The primary results suggested children's early reading trajectories (as measured by Letter –Word Identification) experienced a shift upward when mothers reported attaining additional education, this result was not maintained in the tobit analyses. The estimated effect of *SHIFT* was smaller in magnitude than the primary results and not statistically significant.

Discussion

In this study, I explored the nature of the relationship between mothers' transitions across four policy-relevant educational categories, and their young children's cognitive growth trajectories. I found that approximately 23% of mothers reported attaining additional education over the course of the study. Most mothers who reported an educational transition attained a GED (or high school diploma), or transitioned from having a high school degree to attaining some post-secondary schooling. Using individual growth

modeling, a novel methodological approach in this literature, I found that when mothers report attaining additional education, their children's early mathematics, reading, and writing developmental trajectories experienced a small upward shift, on average (effect sizes ranging from .04-.07). In contrast, I found no evidence of a relationship between maternal shifts in education and children's vocabulary development. The estimates describing the relationship between maternal educational attainment and children's early mathematics trajectories and early writing skills trajectories, were particularly robust to sensitivity analyses, though one set of robustness checks suggested that the effect on early math skills may be limited to the 3-year old cohort only. The timing of maternal shifts in education appeared to matter for children's early mathematics and writing trajectories as well. The shifts in elevation to children's trajectories were largest when mothers reported attaining additional education 2-3 years after data collection began (when children had transitioned into elementary school). In addition, the linear slopes of children's early mathematics and writing trajectories became slightly steeper after mothers reported attaining additional education. Finally, tests of moderation by mother's baseline levels of education suggested that—for mathematics only—the change to the elevation of children's trajectories, (but not the slope) differed by mothers' levels of education at the start of the study. Post-hoc tests suggested that children whose mothers had no high school degree at baseline benefited the most from their mothers' attainment of additional education, with the effects becoming progressively larger when the educational transitions occurred later in the early childhood period (between waves 3-5). Children whose mothers had a high school or GED at baseline showed a statistically significant change in the elevation to their growth trajectories only when mothers' educational transitions were reported at the end of the study (i.e., when children who were in the study for 5 waves were in first grade). Finally, the mathematics trajectories of children

whose mothers had some post-secondary education did not show any statistically significant change in elevation when their mothers reported attaining additional education at any wave.

The results I present here are consistent with those of other studies in the literature that address similar research questions. For example, similar to Gennetian and colleagues (2008) quasi-experimental study, my results suggest an overall positive relationship between maternal educational attainment and child outcomes. Similar to Magnuson's (2007) study on the effect of increases in maternal education on the slopes of children's growth trajectories in middle childhood, I find that slopes of children's growth trajectories (for writing and mathematics) became steeper when mothers reported attaining additional education.

Magnuson and colleagues (2009) also found a positive relationship between increases in mother's education and children's cognitive development, but only for children whose mothers had a high school degree or less. Their results are similar to the findings I present suggesting that the effect of maternal educational attainment on children's early mathematics trajectories was strongest for children whose mothers did not have a high school degree at baseline. This pattern is consistent with the idea that a mother's schooling experiences may change the ways she interacts with her children. Magnuson et al. (2009) suggested that mothers with the lower levels of education (i.e., mothers who had not attended any post-secondary education) may have had less knowledge about supportive parenting practice, and thus stood to learn the most, or experienced the most drastic change to their parenting behavior, as result of being in school.

One previous study provides an important point of comparison for the results presented here: Harding (2015) used the same dataset I employ, but different a different analytic strategy, to address similar research questions. By conducting a propensity score analysis, Harding found that an increase in a mother's education between the start of the

study and the end of her child's kindergarten year was related to increases in child outcomes at the end of first grade. Overall Harding's findings are similar to those presented here, suggesting that even when applying different methods, the positive relationship between the mothers' attainment of additional education and child outcomes is robust. The discrepancy between the results presented here and Harding's work pertain only to questions of moderation. Harding found no evidence that mothers' baseline levels of education moderated the effect on child outcomes, whereas I do for one of the cognitive outcomes. Additionally, Harding found no differences in effects between the two age cohorts, whereas my analyses suggest that the effects on children's early math skills were entirely driven by the 3-year-old cohort. These differences may be due to the lack of similarity in sample size, and thus statistical power, in our studies. I used a much larger portion of the HSIS dataset (75% compared 36%) as individual growth models allow for the flexible use of cases that are missing data on some but not all waves of assessment. The larger sample size likely improved the ability to detect these moderated effects.

Differential Effects by Time

In this study I made a unique contribution to the small literature on the relationship between maternal pursuits of education and child development through an exploration of how these effects differ across developmental time. My results suggested that the positive relationship between mothers' educational attainment and some child outcomes (mathematics and writing ability) might be largest when mothers increase their education later in the early childhood period (i.e., after children transitioned to elementary school). The literature provides some hypotheses to explain this pattern.

Using data from the ECLS-K, Domina and Roksa (2012) found that mothers who attained more education during their children's early elementary years increased their

engagement in their children's education during the same time period. Mothers who improve their own education may become more familiar with schooling processes, or develop a greater level of comfort communicating with teachers and administrators (Harding et al., 2015). Existing work suggests that in low-income communities with a history of educational inequity and injustice, parents are sometimes distrustful of, and thus hesitant to engage with, the schools educating their children (Warren, Hong, Rubin, & Uy, 2009). Mothers' pursuit of their own education may serve to build their trust in schools, leading to more positive relationships with their children's teachers and administrators.

Mothers' engagement with their children's schooling may be particularly important in the later part of the early childhood period when children transition into elementary school. The kindergarten transition is an important time in children's development and marks a shift in children's relationship to schooling. As children transition to elementary school, educators tend to have increased expectations for children's academic skill (Rimm-Kaufman & Pianta, 2000). The literature suggests that parents' engagement in the transition to elementary school is critical to children's success (McIntyre, Eckert, Fiese, DiGennaro, & Wildenger, 2007). In their analysis of cross sectional data, Schulting, Malone, and Dodge (2005) found a positive link between parents' engagement in the kindergarten transition and children's outcomes at the end of the kindergarten year. If parents' engagement in their children's schooling is one pathway through which children benefit from their mothers' educational pursuits, then mothers who attain more education when their children are relatively older may be better able to support their children's learning during this important school transition. The results presented here are consistent with this idea, as the findings indicated maternal pursuits of additional education were most beneficial to children 2+ years into the study, when children were in kindergarten and first grade.

Academic socialization, or the process by which parents socialize their children into behaviors, values, and expectations that encourage success in school, is another pathway through which mothers' attainment of additional education might lead to benefits for children, and particularly large benefits for children near the end of early childhood (Harding et al., 2015; L. C. Taylor et al., 2004). Parents who attain more education may act as role models for their children by illustrating academic behaviors at home (like regular reading, studying, or planning for school) (Sommer et al., 2012). Parents' own experiences in school may influence their perceptions of educational intuitions, which may affect the messages parents communicate to their children. In her 1997 study of low-income women enrolled in adult education programs, Luttrell found that women's positive experiences in school as adults served to alter some the negative perceptions of educational institutions they had developed due to injustices they had experienced in school as children. A mother who feels positively about schooling in general may be better able to communicate positive messages to her child. This process might be particularly important as children transition to elementary school, when they start to more actively develop their identities as student (Puccioni, 2015).

The differential effects by time might also be explained by different child care needs for older and younger children. The transition to elementary school not only comes with new academic expectations, but it also marks a transition into stable, full-day "care" for children (administered by the public school system). For this reason, parents who experienced an educational transition later in their children's early childhood years may not have needed extra child care arrangements while attending school. By contrast, parents who pursued schooling when their children were younger—that is, still in preschool—may have had to piece together multiple sources of care, and/or struggled to find high quality child care options for their children while they are in school (Adams & Heller, 2015). Research

suggests that children who experience lower quality child care (Love et al., 2003) and multiple care arrangements (Morrissey, 2009; Tran & Weinraub, 2006) may have lower scores on measures of early childhood cognitive ability (e.g. early language development), and social emotional development. If mothers' pursuit of more education is generally associated with improved cognitive development for children, but multiple care arrangements, and/or low quality care is associated with poor outcomes for children, younger children may have benefited less from their mothers' educational attainment than older children if the potential downfalls of poor child care arrangements dampened the otherwise positive effect of mothers' educational gains.

Finally, the differential effects by time should be interpreted with some caution based on the limitations of the data. I found larger associations between mothers' educational transitions and children's mathematics and writing trajectories when mothers' transitions were reported later in the study, particularly in waves 4 and 5. While mothers' reports of attaining additional educational were relatively evenly spread across the waves, the smallest number of transitions ($n=116$) were reported in wave 5. In addition, only mothers and children who contributed 5 waves of data (that is, families in the 3-year-old cohort) could report a transition in wave 5. As such, the largest associations between mothers' attainment of additional education and children's outcomes were estimated based on the smallest number of cases. It is possible that the nature of the results would differ had all children been in the study for the same amount of time and contributed 5 waves of data.

Differences Across Learning Domains

I found the most robust effects of maternal education on children's early math skills (for the 3-year-old cohort only) and early writing skills. Both of these domains of early learning are thought to develop through explicit instruction. While children's basic number

sense develops naturally early in infancy (National Research Council, 2009), the ability to apply mathematics knowledge to everyday life and solve mathematical problems requires that young children have explicit opportunities to engage with mathematical concepts (Clements & Sarama, 2011; Schoenfeld & Stipek, 2011). Similarly, research on early childhood instruction indicates that young children need authentic opportunities to use and produce text during play to develop writing skills (Hall, Simpson, Guo, & Wang, 2015; Zhang, Hur, Diamond, & Powell, 2015). This sort of explicit teaching behavior between parents and their children has been observed in play-based activities in the home among low-income families. There is some evidence to suggest that, in certain subgroups, mothers with higher levels of education engage in more instruction having to do with school-related skills (Tamis-LeMonda, Sze, Ng, Kahana-Kalman, & Yoshikawa, 2013). The estimated positive relationship between early writing and mathematics development and maternal pursuits of education is consistent with the hypothesis that when mothers attain more education they may become better able to support their children's development through their engagement in learning activities (Magnuson, 2007).

Given the well-documented relationship between parents' levels of education (and other indicators of socio-economic status) and children's vocabulary (Pan et al., 2005; Westerlund & Lagerberg, 2008), the lack of effect on the PPVT (and the positive, yet unstable, effect on early reading) is surprising. In the analysis featured here, I estimated the concurrent effect of mothers' educational attainment on their children's outcomes. The mechanisms at play are likely processes activated while parents are in school, or immediately following the attainment of additional education. It is possible that the mechanisms that affect children's vocabulary take longer to have an effect on child outcomes. For example, increases to parent income might be a pathway through which maternal educational

attainment affects children's outcomes, but it is likely to take some time for a mother to use her degree, new skills, or new knowledge to find more lucrative employment. In addition, increases in vocabulary may require longer or more intensive cumulative changes to the inputs in children's language environment. In the broader early childhood intervention literature, positive effects on children's vocabulary are found most consistently after year-long and intensive exposure to enriched language environments (e.g., intensive classroom interventions), but not in less enriched environments (Weiland & Yoshikawa, 2013; Wong, Cook, Barnett, & Jung, 2008). Any changes in a mother's language use with her child following her attainment of additional education may not reach a level needed to have an effect on children's vocabulary development.

Implications for Practice and Policy

My work has policy implications for interventions and services aimed at improving the educational outcomes of low-income families. In recent years, there has been renewed energy in the early childhood world to not only provide services for children, but to develop services that allow parents to build their skills as well (Shonkoff & Fisher, 2013). Shonkoff and Fisher (2013) argue that just as young children develop and change over time, it is important to recognize that adults (parents in particular) also have the capacity to build new skills. Further, supporting the capacities of caregivers, from encouraging supportive parenting (Grindal et al., 2014), to improving parent mental health (Boxmeyer, 2015), to providing opportunities for parents to engage in workforce development (Sabol et al., 2015), has the potential to influence children as well.

My results provide empirical evidence to support the idea that increasing parents' human capital through training and education may lead to benefits for children. Two-generation interventions, those that provide educational opportunities for parents and

children simultaneously, draw from this theory (King, Chase-Lansdale, & Small, 2015). Early evaluation results of a two-generation program in Tulsa, OK suggests that pairing workforce development training for parents with Head Start services for children can improve parents' abilities to persist through educational programs and help parents earn credentials at higher rates than single-generation efforts (Sabol et al., 2015). The results of in-process experimental evaluations will help to determine if these two-generation strategies lead to benefits for children as well.

Currently, scholars argue that early childhood programs like Head Start are promising platforms from which to create two-generation interventions (King et al., 2015; Sommer et al., 2012). Many early childhood programs have existing services (i.e., case management, access to community resources) that can help parents succeed in programs aimed at building their skills. In addition, parents' existing trust in early childhood staff may encourage them to participate in, and persist through, educational programs (Sommer, Sabol, Chase-Lansdale, & Brooks-Gunn, 2016). However, the findings from this study suggest that parents' educational attainment might be most beneficial to children whose parents pursue additional schooling toward the end of the early childhood period. Creating two-generation programs for parents of children who have aged-out of early childhood services and/or programs based in elementary school may be an important addition to the field.

Limitations and Future Research

Magnuson and colleagues (2009) suggest that much of the research on the relationship between parents' education and child outcomes is limited by the problem of selection bias and the possibility of unobserved variables confounding the relationship of interest. This study is no exception. While I include important demographic controls in all statistical models, I cannot rule out the possibility that other differences between the

children whose mothers did, and did not, increase their education are responsible for the observed relationship.

The coarseness with which I measured shifts in maternal education is also a weakness of the study. First, I do not know exactly when mothers attained their additional education. The recorded increase to maternal education in any given wave may have occurred months before, or possibly only days before, data collection. Similarly, the variable *SHIFT* records mothers' movement between formal categories of education, but does not track the length of time mothers participated in schooling. Some research suggests that the extent of mothers' participation in school may explain differences in parenting practices. Specifically, Alamuddin (2015) found that, in a sample of low-income families, the number of years a mother had spent in post-secondary education, controlling whether or not she had received a degree, was related to positive parenting practices. Given this, it is possible that the length, or even the quality of parents' educational experiences might influence the relationship estimated here between children's growth trajectories and maternal education. This lack of information on the time parents spent in school is an important weakness.

My measure of maternal attainment of additional education did not differentiate between all types of educational experiences. While the moderation by mothers' initial levels of education helped to distinguish between the types of transitions mothers could make, the 4 educational categories were quite broad. For example, the "some post-secondary education" category likely included experiences in community college, 4-year institutions, for-profit colleges, and non-profit institutions etc. In part due to limitations in the data, I did not explore whether these different types of educational experiences for mothers had different implications for children's development. Additional research can address this limitation using more detailed data on parents' schooling experiences. The HSIS data were

not collected for these purposes, but future work might prioritize collecting information regarding the length, extent, and quality of parents' schooling experiences along with data on child and family outcomes. Doing so will provide an opportunity to test the hypothesis that the nature of parents' educational experiences in school might moderate the effect on children's development.

I have discussed many hypothesized mechanisms through which maternal education might increase child outcomes. A natural next step in the research process is to test these hypotheses through empirical research. Harding and Morris (2015) have begun to explore whether different parenting practices, such as engagement in learning activities with children, change when mothers attain additional education. It will also be important to test whether other factors—changes in income, employment, or academic socialization, for example—also play a role.

Conclusion

Despite these limitations, this research makes important contributions to the literature. The observed relationship between mothers' pursuits of additional education and their children's developmental growth trajectories furthers the field's understanding of the ways parents' experiences—particularly with reference to their human capital development—may influence their children's development and well-being. While observational, these findings help to generate hypotheses regarding how changes to policy and practice that offer educational opportunities for parents might play a role in improving cognitive outcomes for low-income children and providing opportunities for social and economic mobility in disadvantaged communities.

Tables and Figures

Table 1

Descriptive statistics on selected mother, child and family demographic covariates ($n=3263$)

Variable	Mean(SD) or %
<u>Child Characteristics</u>	
Age at Baseline	4.112 (0.57)
Female	50.40%
Special Ed	13.10%
Dual Language Learner	26.80%
Treatment Group	63.20%
3-year old Cohort	54.50%
<u>Mother/Family Characteristics</u>	
<i>Mother's Baseline Education</i>	
No HS Diploma	41.90%
HS Diploma/GED	33.20%
Some PSE	18.90%
PSE Degree	5.98%
Mothers Who Made an Educational Transition	23.96%
Mother's Age	28.72 (6.05)
<i>Mother's Race</i>	
White	34.50%
Black	29.70%
Hispanic	35.80%
<i>Mother's Depression</i>	
No Symptoms	51.30%
Mild Symptoms	25.90%
Moderate Symptoms	13.20%
Severe Symptoms	9.68%
Mother's Literacy Score	84.77 (16.64)
<i>Household Risk</i>	
Low Risk	69.80%
Medium Risk	20.80%
High Risk	9.37%
Monthly Income	1491.1 (1046.20)

Table 2

Descriptive Statistics on Mothers' Educational Transitions ($n=773$)

	N	% of Those Mothers Transitioned	% of the Full Sample
Mothers Who Made an Educational Transition	773	100.00%	23.69%
<i>Level of Education Attained</i>			
GED/ High School degree	238	30.79%	7.29%
Some Post-Secondary Education	352	45.54%	10.79%
Post-Secondary Degree	183	23.67%	5.61%
<i>Educational Trajectory</i>			
No High School Degree to GED	238	30.79%	7.29%
No High School Degree to Some PSE	74	9.57%	2.27%
GED/High School Degree to Some PSE	278	35.96%	8.52%
GED/High School Degree to a PSE Degree	39	5.05%	1.20%
Some PSE to a PSE Degree	144	18.63%	4.41%

Table 3

Descriptive Statistics on the four cognitive outcomes, and child age, overall and by wave ($n_{\text{child-level}}=3263$)

	Across All Waves	Fall 02		Spring 2003		Spring 2004		Spring 2005		Spring 2006	
	Range <i>Total SD</i>	n	Mean <i>SD</i>	n	Mean <i>SD</i>	N	Mean <i>SD</i>	n	Mean <i>SD</i>	n	Mean <i>SD</i>
Reading (<i>Letter Word Identification</i>)	264-522 <i>58.47</i>	3213	300.12 <i>24.75</i>	3078	300.12 <i>24.75</i>	2926	352.11 <i>38.19</i>	2815	404.69 <i>42.00</i>	1483	432.22 <i>35.89</i>
Writing (<i>Spelling</i>)	277- 521 <i>48.46</i>	2392	344.25 <i>27.15</i>	3081	357.37 <i>25.92</i>	2927	392.98 <i>33.08</i>	2814	433.14 <i>29.34</i>	1483	453.22 <i>24.56</i>
Vocabulary (<i>PPVT</i>)	128.54-460.55 <i>57.18</i>	3213	248.46 <i>42.87</i>	3074	272.34 <i>40.61</i>	2925	315.19 <i>43.47</i>	2817	349.70 <i>32.13</i>	1484	359.39 <i>29.32</i>
Mathematics (<i>Applied Problems</i>)	318-507 <i>38.77</i>	2392	376.60 <i>28.35</i>	3055	384.49 <i>29.14</i>	2915	412.09 <i>25.58</i>	2815	441.26 <i>24.05</i>	1483	454.56 <i>20.38</i>
Child Age (in years)	2.84-8.65 <i>1.21</i>	3263	4.11 <i>0.57</i>	3092	4.53 <i>0.57</i>	2929	5.52 <i>0.57</i>	2817	6.54 <i>0.57</i>	1484	7.12 <i>0.34</i>

Table 4

Estimated fixed effects and variance components from fitted multilevel models in which children's cognitive outcomes between the ages of 3 and 7 are specified as a function of time (linear and quadratic functions) and SHIFT, a time-invariant indicator recording mothers' attainment of additional education.

	Language and Literacy Skills			Mathematics
	Reading	Writing	Vocabulary	
<u>Fixed Effects:</u>				
Intercept	283.76*** (4.24)	327.56*** (3.97)	257.02*** (5.04)	363.34*** (3.62)
Baseline age	15.34*** (1.09)	26.21*** (2.08)	44.64*** (3.07)	20.42*** (1.18)
Mothers' Baseline Education				
HS Diploma	2.26* (0.89)	1.78* (0.79)	3.67*** (0.94)	1.37~ (0.75)
Some PSE	5.29*** (1.11)	4.81*** (0.98)	7.67*** (1.17)	4.37*** (0.94)
PSE Degree	8.06*** (1.63)	7.16*** (1.43)	7.40*** (1.72)	4.43** (1.37)
Demographic Controls	Yes	Yes	Yes	Yes
Design Controls	Yes	Yes	Yes	Yes
Time	24.92*** (0.67)	31.27*** (0.84)	56.26*** (1.66)	26.78*** (0.85)
Time×Design Controls	Yes	Yes	Yes	Yes
Time ²	5.19*** (0.20)	1.06*** (0.24)	-6.01*** (0.48)	-0.07 (0.26)
Time ² ×Design Controls	Yes	Yes	Yes	Yes
Shift in Education, <i>SHIFT</i> (γ_{30})	1.69* (0.84)	2.11** (0.70)	-0.56 (0.74)	1.57** (0.60)
<u>Variance Components</u>				
Level1: Within-Child	296.43*** (4.98)	275.22*** (4.75)	365.13*** (5.93)	231.40*** (4.02)
Level2: Between-Child				
In Intercept	247.42*** (11.11)	210.29*** (10.32)	419.54*** (16.29)	344.39*** (13.60)
In Slope	91.67*** (4.18)	29.78*** (2.37)	24.72*** (2.45)	26.12*** (2.03)
Level3: Between-Center	23.18***	20.00***	29.51***	13.24***

Constant	(5.19)	(4.42)	(6.74)	(3.37)
<i>n</i>	3263	3245	3263	3244
<i>df</i>	26	31	40	29

Table 5

Estimated fixed effects and variance components from fitted multilevel models in which children's cognitive outcomes between the ages of 3 and 7 are specified as a function of *TIME* (linear and quadratic functions) and *SHIFT*, a time-invariant indicator recording mothers' attainment of additional education, and the interaction between *SHIFT* and *TIME*.

	Language and Literacy Skills			Mathematics
	Reading	Writing	Vocabulary	
<u>Fixed Effects</u>				
Intercept	283.76 ^{***} (4.24)	327.58 ^{***} (3.97)	257.01 ^{***} (5.04)	363.38 ^{***} (3.62)
Baseline age	15.34 ^{***} (1.09)	26.22 ^{***} (2.08)	44.63 ^{***} (3.07)	20.41 ^{***} (1.19)
Mothers' Baseline Education				
HS Diploma		1.76 [*] (0.89)	3.67 ^{***} (0.94)	1.35 [~] (0.75)
Some PSE	5.29 ^{***} (1.11)	4.78 ^{***} (0.98)	7.67 ^{***} (1.17)	4.36 ^{***} (0.94)
PSE Degree	8.07 ^{***} (1.63)	7.13 ^{***} (1.43)	7.39 ^{***} (1.72)	4.46 ^{**} (1.37)
Demographic Controls	Yes	Yes	Yes	Yes
Design Controls	Yes	Yes	Yes	Yes
Time	24.90 ^{***} (0.68)	31.42 ^{***} (0.84)	56.23 ^{***} (1.66)	26.98 ^{***} (0.86)
Time×Design Controls	Yes	Yes	Yes	Yes
Time ²	5.20 ^{***} (0.21)	0.98 ^{***} (0.24)	-5.99 ^{***} (0.48)	-0.17 (0.26)
Time ² ×Design Controls	Yes	Yes	Yes	Yes
Shift in Education, <i>SHIFT</i> (γ_{30})	1.91 (1.33)	0.12 (1.28)	-0.16 (1.47)	-0.78 (1.22)
<i>SHIFT</i> ×Time (γ_{40})	-0.14 (0.64)	1.04 [~] (0.56)	-0.19 (0.61)	1.13 [*] (0.51)
<u>Variance Components</u>				
Level1: Within-Child	296.43 ^{***} (4.98)	275.17 ^{***} (4.75)	365.15 ^{***} (5.93)	231.39 ^{***} (4.02)
Level2: Between-Child				
In Slope	91.67 ^{***} (4.18)	29.74 ^{***} (2.37)	24.71 ^{***} (2.45)	26.05 ^{***} (2.03)
In Intercept	247.39 ^{***}	210.41 ^{***}	419.44 ^{***}	344.72 ^{***}

Level3: Between-Center	(11.11) 23.19*** (5.19)	(10.32) 20.03*** (4.42)	(16.29) 29.51*** (6.74)	(13.62) 13.26*** (3.37)
<i>n</i>	3263	3245	3263	3244
<i>df</i>	27	32	41	30

Table 6

Estimated fixed effects and variance components from fitted multilevel models in which children's cognitive outcomes between the ages of 3 and 7 are specified, at level 1, as function of *TIME* (linear and quadratic functions) and *SHIFT*, a time-invariant indicator recording mothers' attainment of additional education, and (in cases where needed) the interaction between *SHIFT* and *TIME*. These models test whether the L2 parameter for *SHIFT* is predicted by mother's baselines of education.

	Language and Literacy Skills			Mathematics
	Reading	Writing	Vocabulary	
<i>Fixed Effects:</i>				
Intercept	283.79*** (4.24)	327.46*** (3.98)	256.76*** (5.04)	363.02*** (3.62)
Baseline age	15.34*** (1.09)	26.22*** (2.08)	44.65*** (3.07)	20.42*** (1.18)
Mothers' Baseline Education				
HS Diploma	2.28* (0.90)	1.96* (0.81)	4.10*** (0.97)	1.76* (0.79)
Some PSE	5.13*** (1.12)	4.77*** (1.00)	7.79*** (1.20)	4.91*** (0.97)
PSE Degree	8.02*** (1.63)	7.20*** (1.44)	7.58*** (1.72)	4.75*** (1.38)
Design Controls	Yes	Yes	Yes	Yes
Demographic Controls	Yes	Yes	Yes	Yes
Time	24.94*** (0.67)	31.44*** (0.84)	56.25*** (1.66)	26.97*** (0.86)
Time×Design Controls	Yes	Yes	Yes	Yes
Time ²	5.18*** (0.20)	0.97*** (0.24)	-6.00*** (0.48)	-0.17 (0.26)
Time ² ×Design Controls				
Shift in Education, <i>SHIFT</i> (γ_{30})	1.34 (1.26)	0.73 (1.48)	0.65 (1.12)	0.59 (1.39)
<i>SHIFT</i> ×HS Diploma (γ_{31})	-0.37 (1.76)	-1.55 (1.48)	-2.66~ (1.55)	-2.17~ (1.27)
<i>SHIFT</i> ×Some PSE (γ_{32})	2.92 (2.29)	0.35 (1.91)	-0.69 (1.99)	-3.37* (1.63)
<i>SHIFT</i> ×Time (γ_{40})		1.02~		1.19*

		(0.56)		(0.51)
<i>Variance Components</i>				
Level 1: Within-Child	296.43 ^{***}	275.13 ^{***}	365.09 ^{***}	231.31 ^{***}
	(4.98)	(4.75)	(5.93)	(4.02)
Level 2: Between-Child				
In Intercept	247.28 ^{***}	210.42 ^{***}	419.15 ^{***}	344.46 ^{***}
	(11.10)	(10.32)	(16.28)	(13.60)
In Slope	91.56 ^{***}	29.72 ^{***}	24.66 ^{***}	25.94 ^{***}
	(4.17)	(2.37)	(2.44)	(2.03)
Level 3: Between-Center	23.22 ^{***}	20.04 ^{***}	29.37 ^{***}	13.02 ^{***}
	(5.20)	(4.42)	(6.73)	(3.35)
<i>n</i>	3263	3245	3263	3244
<i>df</i>	28	34	42	32

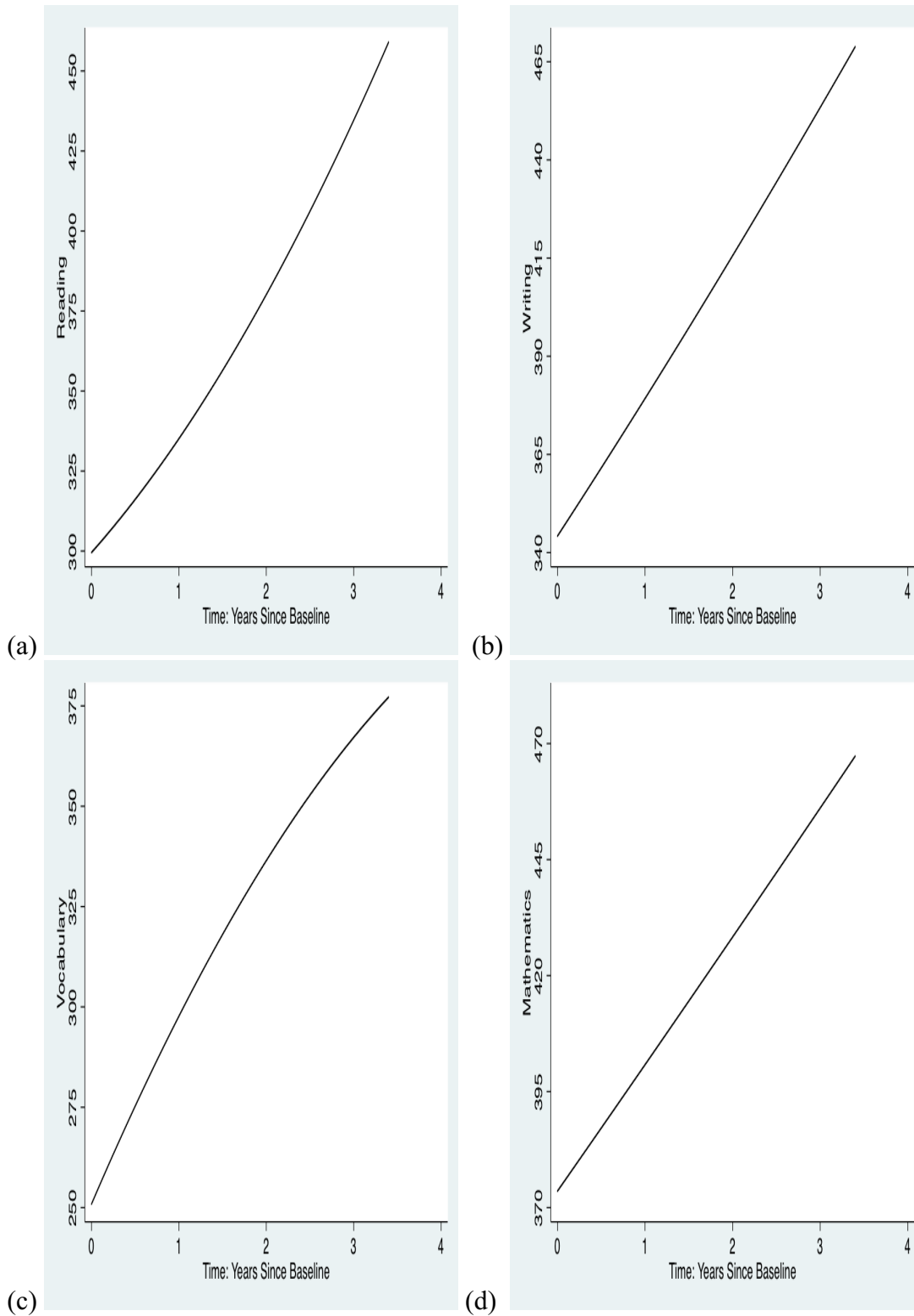
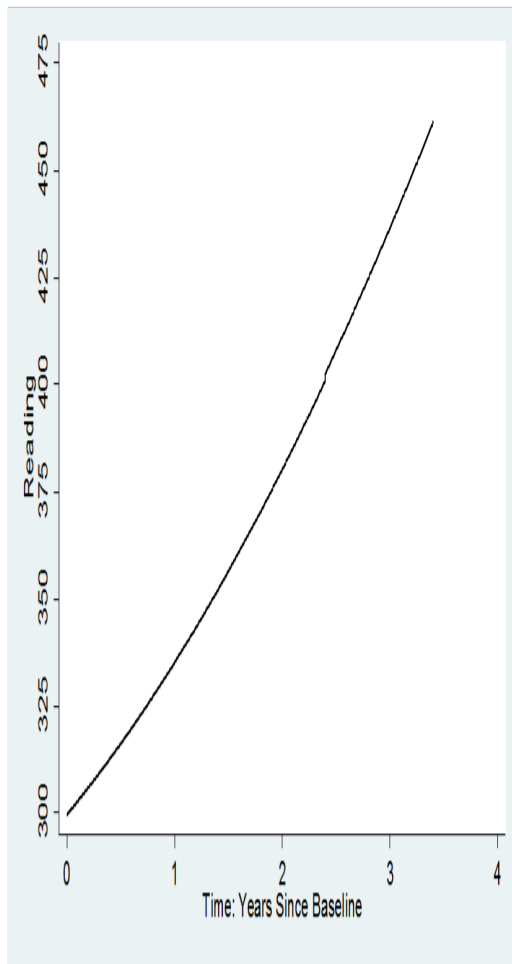
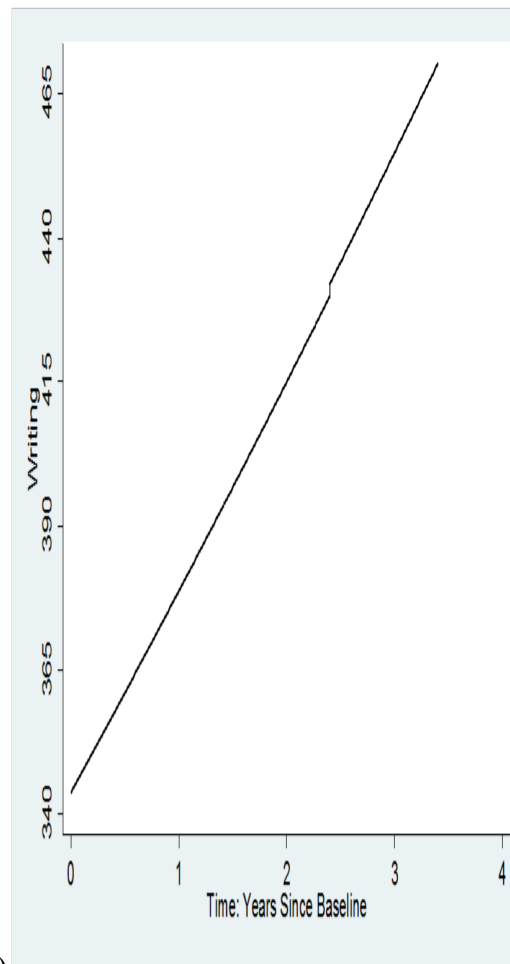


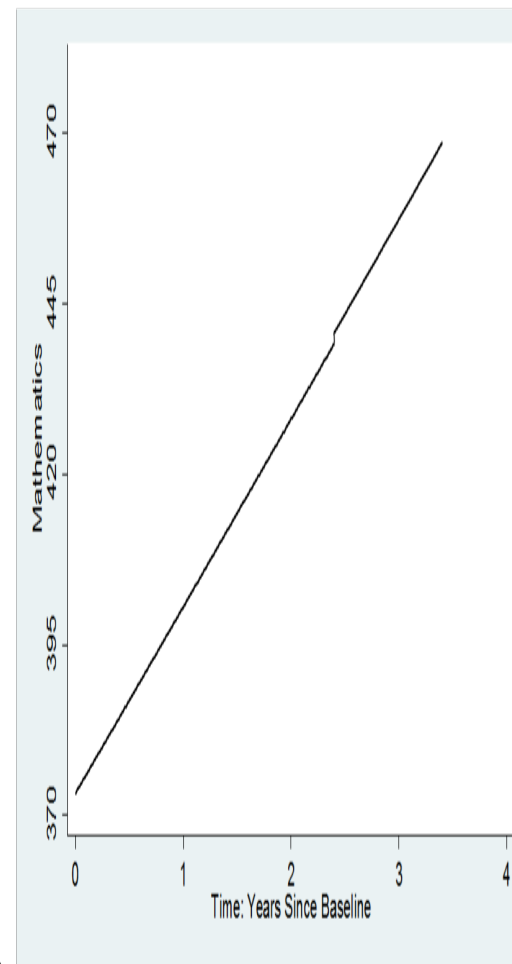
Figure 1. Average growth trajectories for four cognitive outcomes: (a) Reading (*Letter-Word Identification*) (b) Writing (*Spelling*); (c) Vocabulary (*PPVT*); and (d) Mathematics (*Applied Problems*)



(a)



(b)



(c)

Figure 2. Fitted growth trajectories for (a) Reading; (b) Writing and (c) Mathematics for a prototypical child who was 4 years old at baseline and whose mother reported attaining a higher level of education 2.5 years after the start of the study (at approximately age 6.5, and the fourth wave of data collection). The upward shift in each of the plots represents the effect of the mother's attainment of additional education on their children's developmental trajectories.

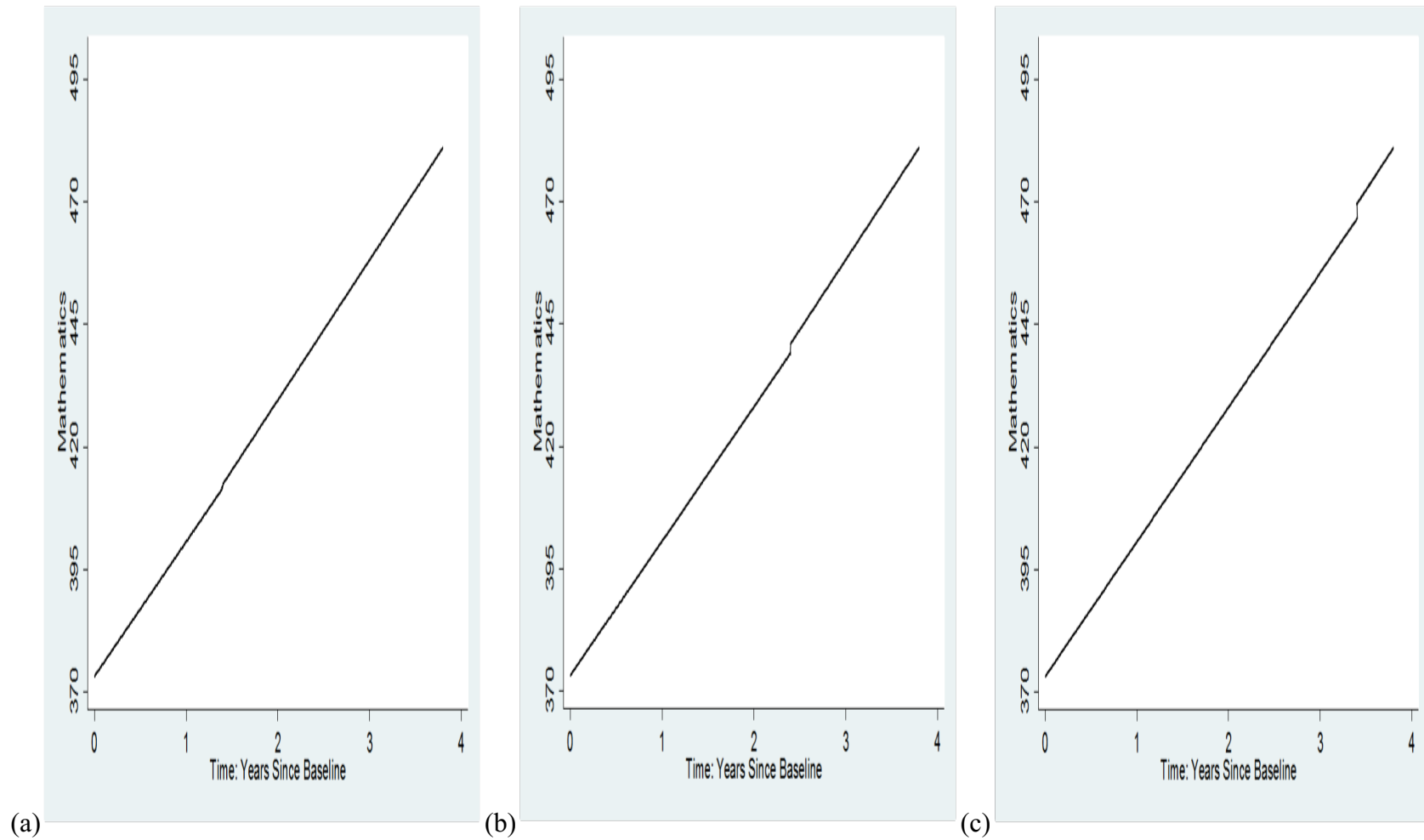
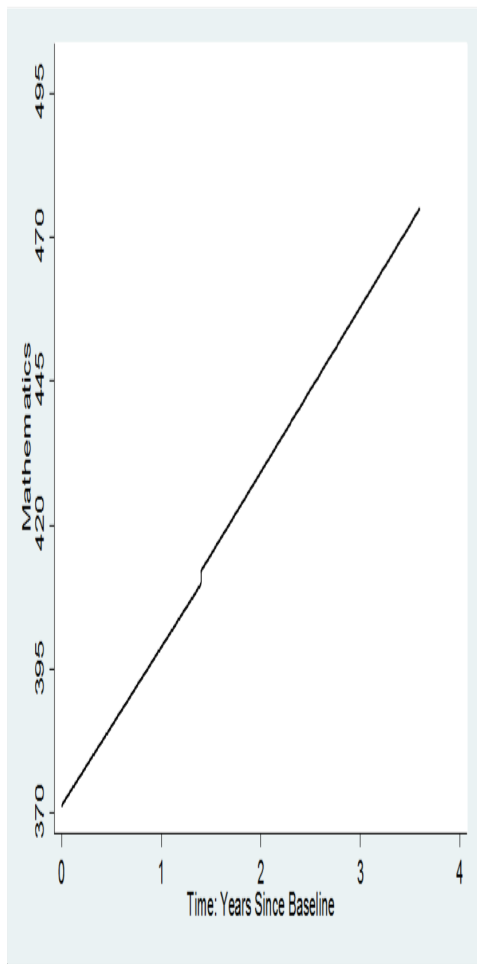
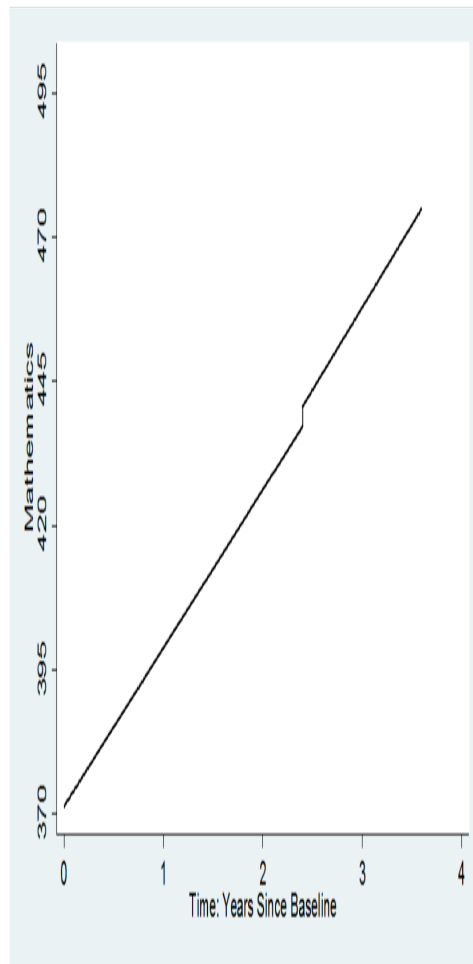


Figure 3. Fitted early mathematics growth trajectories for three prototypical children, all of who were 4 years old at the start of the study. The fitted trajectory in panel (a) is for a child whose mother reported attaining an additional level of education 1.5 years after

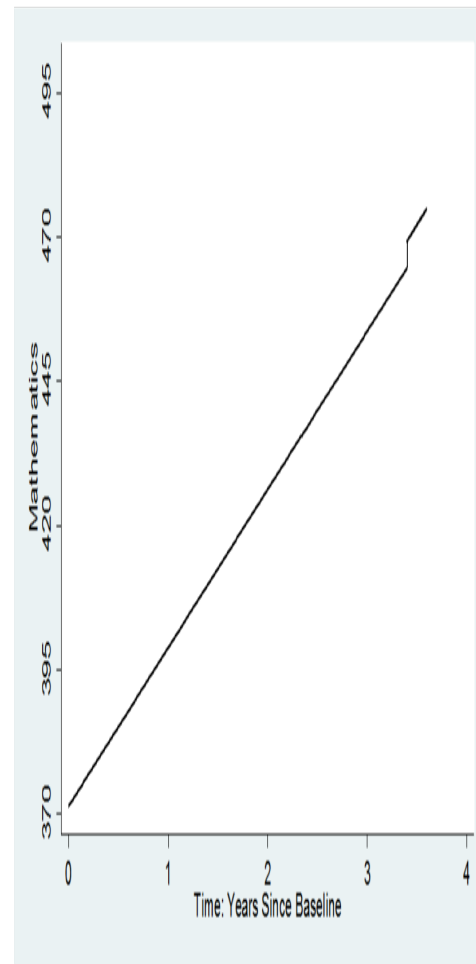
the start of the study (around the third wave of data collection). The fitted trajectory in panel (b) is for a child whose mother reported attaining an additional level of education 2.5 years after the start of the study (around the fourth wave of data collection; and the fitted trajectory in panel (c) is for a child whose mother reported attaining an additional level of education 3.5 years after the start of the study (around the fifth wave of data collection). In panels (b) and (c) the upward shift in these fitted growth trajectories represents the positive and statistically significant effect of the mother's attainment of additional education on their children's outcomes.



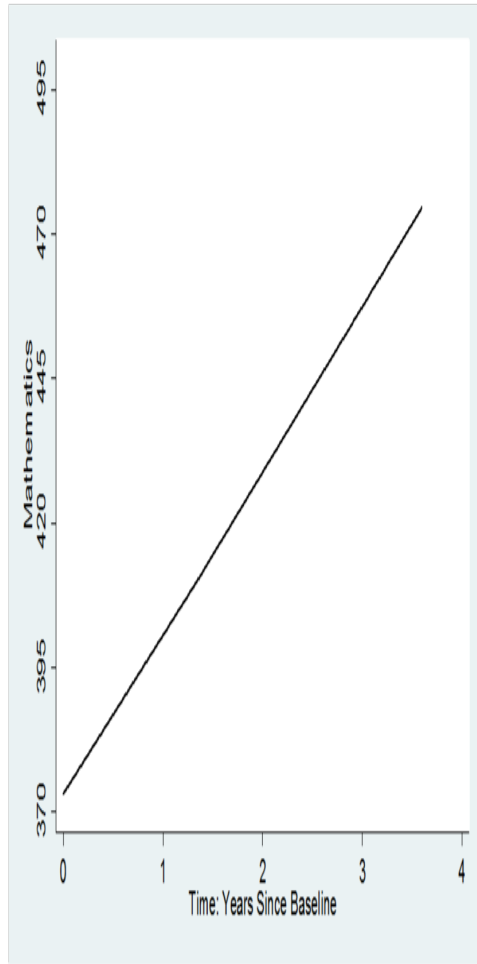
Row i : (ai)



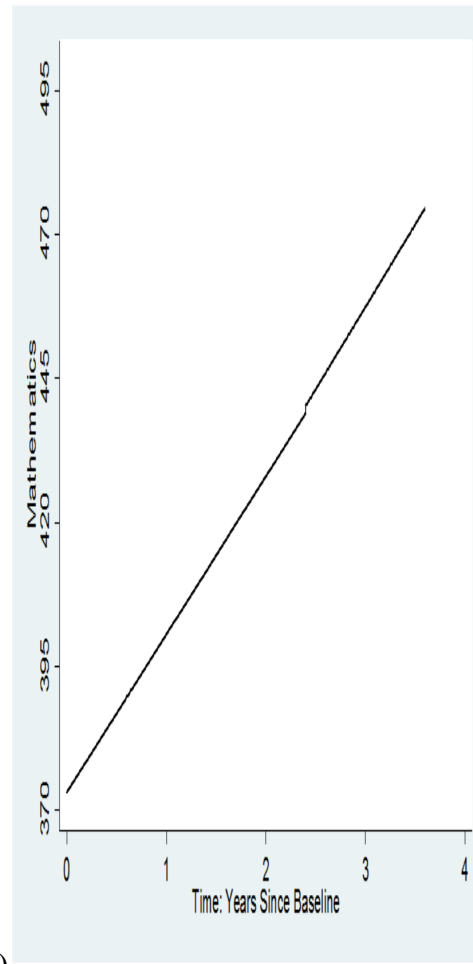
(bi)



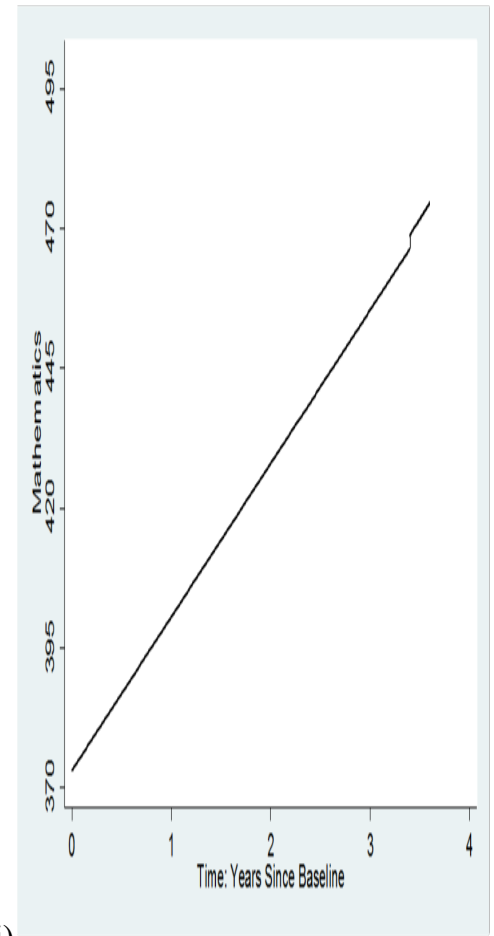
(ci)



Row ii: (a)



(b)



(c)

Figure 4. Fitted early mathematics growth trajectories for six prototypical children, all of who were 4 years old at the start of the study. The first row (row i) displays trajectories for children whose mothers did not have high school degree at baseline, whereas the

second row (row ii) displays fitted trajectories for children whose mothers had earned a high school diploma or GED at the start of the study. The fitted trajectories in panels (ai) and (aii) are for children whose mothers reported attaining an additional level of education 1.5 years after the start of the study (around the third wave of data collection). The fitted trajectory in panels (bi) and (bii) are for children whose mothers reported attaining an additional level of education 2.5 years after the start of the study (around the fourth wave of data collection; and the fitted trajectories in panels (ci) and (cii) are for children whose mothers reported attaining an additional level of education 3.5 years after the start of the study (around the fifth wave of data collection). The difference between the trajectories in rows i and ii, specifically the larger jigs in row i for children whose mothers had no high school degree at baseline illustrates the moderation by mothers' baseline level of education.

Appendix

Tobit Analysis

The basic Tobit Model for non-hierarchical data is:

$$y_i^* = x_i\beta + \epsilon_i$$

$$y_i = y_i^* \text{ if } y_i^* > 0$$

$$y_i = 0 \text{ if } y_i^* \leq 0$$

Where y_i^* is the latent dependent variable and y_i is the observed realization of the construct.

In this general specification, y_i has been censored at 0, such that any true values on the latent construct y_i^* that fall below 0 will be observed as 0 for y_i and any values of y_i^* that are above 0 will be observed as such on y_i ; x_i represents a vector of independent variables, β is a vector of slope parameters and the ϵ_i 's are assumed to be independent and normally distributed (McDonald & Moffitt, 1980). As the value of the true latent construct is not observed, the statistical models are estimated with the observed value y_i . While Tobin's original conception of the model assumed censoring occurred at 0, additional research suggests that the same phenomenon can also occur at other censoring values (Sigelman & Zeng, 1999); this is the case for the dependent variables in this study. The three Woodcock Johnson outcomes, Letter-Word Identification, Spelling and Applied Problems were censored at values of 264, 277 and 318, respectively, the lowest values on the original assessment scale

The tobit models that I fit are not identical in form to the primary analyses. A few key differences are present, due to constraints in the statistical software. First, the multi-level tobit model routine available in Stata (xttobit) only allows for the specification of a random

intercept, no random slopes. As such, in the fitted models, I allow the intercepts of children's growth trajectories to vary around a population mean however, the slopes of the trajectories are fixed across children, given the values on the covariates. The exploratory fitted models suggest that there was substantial variation in the slopes of children's trajectories, and so the lack of random slopes in the hypothesized models is a notable weakness of this sensitivity analysis. Second, the xttobit routine only allows for a random intercept at one level. Thus, this sensitivity analysis does not include a random intercept for Head Start Centers. While a weakness, this limitation poses less of a threat to the findings. For instance, I fit all of the primary models without the level 3, random center-level intercept; the primary results were substantively unchanged. Finally, the xttobit routine cannot be used in the multiple imputation framework. As such, I fit the tobit models in a reduced sample in which I employed listwise deletion ($n=2110$ for Letter Word Identification; $n=2100$ for Spelling; $n=2098$ for the PPVT; $n=2099$ for Applied Problems).

Appendix Tables and Figures

Table A.1

Estimated fixed effects and variance components from fitted “preliminary” multilevel models in which children’s cognitive outcomes between the ages of 3 and 7 are specified as a function of *TIME* (linear and quadratic functions) at level 1 and the “Design Controls” at level 2.

		Language and Literacy Skills			Mathematics
		Reading	Writing	Vocabulary	
Fixed Effects					
Initial Status,	intercept	297.39 ^{***}	342.67 ^{***}	246.93 ^{***}	369.34 ^{***}
π_{0jk}		(0.94)	(1.22)	(2.11)	(1.03)
	Treatment Group	3.34 ^{***}	0.56	-0.36	3.70 ^{***}
		(0.75)	(1.41)	(2.29)	(0.92)
	4-Year-Old Cohort	-0.03	1.88	9.43 ^{**}	3.83 ^{**}
		(1.29)	(1.90)	(2.94)	(1.39)
	Baseline Age (centered)	14.45 ^{***}	26.30 ^{***}	44.86 ^{***}	19.83 ^{***}
		(1.15)	(2.18)	(3.53)	(1.25)
	Treatment Group×4-Year-Old Cohort		0.16	-1.97	
			(2.13)	(3.60)	
	Treatment Group×Baseline Age		-5.16 [*]	-4.23	
			(2.60)	(4.42)	
	4-Year-Old Cohort×Baseline Age		-6.67 [*]	-17.88 ^{***}	
			(2.94)	(4.97)	
	Treatment Group×4-Year-Old Cohort×Baseline Age		8.48 [*]	10.89 [~]	
			(3.71)	(6.28)	

Inst. Slope (TIME), π_{1jk}	intercept	25.12*** (0.67)	31.38*** (0.84)	56.13*** (1.66)	26.76*** (0.85)
	Treatment Group		-1.49*** (0.36)	-2.76 (2.08)	-1.90~ (0.97)
	4-Year-Old Cohort	10.56*** (1.12)	2.36~ (1.35)	-6.07~ (3.13)	-1.32 (1.34)
	Baseline Age	12.60*** (0.75)	8.69*** (1.70)	-7.99* (3.46)	3.65*** (0.54)
	Treatment Group×4-Year-Old Cohort			16.13*** (4.28)	
	Treatment Group×Baseline Age			-11.88** (3.94)	-2.92* (1.46)
	4-Year-Old Cohort×Baseline Age			14.88** (5.75)	
	Treatment Group×4-Year-Old Cohort×Baseline Age			-10.43 (7.22)	
Curvature (TIME ²), π_{2jk}	intercept	5.17*** (0.20)	1.07*** (0.24)	-6.00*** (0.48)	-0.03 (0.26)
	Treatment Group	-0.62*** (0.14)		0.55 (0.60)	0.24 (0.31)
	4-Year-Old Cohort	-2.53*** (0.32)	-1.58*** (0.41)	-0.05 (0.90)	-0.23 (0.44)
	Baseline Age		-0.85 (0.56)	2.75* (1.28)	
	Treatment Group×4-Year-Old Cohort			-5.82*** (1.59)	
	Treatment Group×Baseline Age			2.81* (1.12)	0.92~ (0.54)

4-Year-Old Cohort×Baseline Age			-6.22 ^{**}	
			(2.10)	
Treatment Group×4-Year-Old Cohort×Baseline Age			5.86 [*]	
			(2.64)	
Variance Components				
Level1: Within-Child	296.50 ^{***}	274.60 ^{***}	365.42 ^{***}	230.63 ^{***}
	(4.98)	(4.73)	(5.93)	(4.00)
Level2: Between-Child				
In Intercept	290.16 ^{***}	235.33 ^{***}	609.32 ^{***}	396.48 ^{***}
	(12.20)	(10.86)	(21.37)	(15.16)
In Slope	91.52 ^{***}	30.22 ^{***}	24.50 ^{***}	26.49 ^{***}
	(4.17)	(2.39)	(2.44)	(2.04)
Level3: Between-Center	46.61 ^{***}	23.23 ^{***}	329.15 ^{***}	37.78 ^{***}
	(7.36)	(4.81)	(32.20)	(5.85)
<i>n</i>	3263	3245	3263	3244

Table A.2

Estimates of fixed from individual growth models for child's early mathematics skills (outcome: Applied Problems) from research questions 1 and 2 fit to the full sample and separately on the 3-year-old and 4-year-old cohort subsamples.

	Research Question 1 (a)			Research Question 1 (b) & (c)			Research Question 2		
	Full Sample	3-year old cohort	4-year-old cohort	Full Sample	3-year old cohort	4-year-old cohort	Full Sample	3-year old cohort	4-year-old cohort
<i>Fixed Effects:</i>									
Intercept	363.34*** (3.62)	362.53*** (4.98)	368.70*** (5.61)	363.38*** (3.62)	362.62*** (4.98)	368.70*** (5.61)	363.02*** (3.62)	362.20*** (4.99)	368.36*** (5.63)
Baseline age	20.42*** (1.18)	20.76*** (1.73)	20.49*** (1.74)	20.41*** (1.19)	20.78*** (1.73)	20.49*** (1.74)	20.42*** (1.18)	20.79*** (1.73)	20.51*** (1.74)
Mothers' Baseline Education									
HS Diploma	1.37~ (0.75)	0.89 (1.02)	2.21* (1.12)	1.35~ (0.75)	0.87 (1.02)	2.21* (1.12)	1.76* (0.79)	1.42 (1.07)	2.53* (1.17)
Some PSE	4.37*** (0.94)	3.91** (1.25)	4.90*** (1.41)	4.36*** (0.94)	3.90** (1.25)	4.90*** (1.41)	4.91*** (0.97)	4.57*** (1.30)	5.42*** (1.45)
PSE Degree	4.43** (1.37)	5.21** (1.87)	3.67~ (2.00)	4.46** (1.37)	5.26** (1.87)	3.67~ (2.00)	4.75*** (1.38)	5.65** (1.88)	3.89~ (2.00)
Demographic Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
Design Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
Time	26.78*** (0.85)	28.41*** (1.39)	30.01*** (2.28)	26.98*** (0.86)	28.67*** (1.39)	30.00*** (2.29)	26.97*** (0.86)	28.61*** (1.39)	30.05*** (2.29)
Time×Design Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
Time ²	-0.07 (0.26)	-0.54 (0.40)	0.23 (0.89)	-0.17 (0.26)	-0.65 (0.41)	0.23 (0.90)	-0.17 (0.26)	-0.64 (0.41)	0.22 (0.90)

Time ² ×Design Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
Shift in Education, <i>SHIFT</i> (γ_{30})	1.57** (0.60)	2.68*** (0.81)	-0.13 (0.88)	-0.78 (1.22)	-0.47 (1.71)	-0.06 (1.81)	0.59 (1.39)	1.51 (1.97)	0.97 (2.02)
<i>SHIFT</i> ×HS Diploma (γ_{31})							-2.17~ (1.27)	-2.94~ (1.73)	-1.62 (1.83)
<i>SHIFT</i> ×Some PSE (γ_{32})							-3.37* (1.63)	-3.82~ (2.11)	-3.56 (2.59)
<i>SHIFT</i> ×Time (γ_{40})				1.13* (0.51)	1.34* (0.64)	-0.04 (0.92)	1.19* (0.51)	1.37* (0.64)	0.02 (0.92)
<u>Variance Components</u>									
Level 1: Within-Child	231.40*** (4.02)	253.29*** (5.52)	191.32*** (6.01)	231.39*** (4.02)	253.25*** (5.52)	191.32*** (6.01)	231.31*** (4.02)	253.15*** (5.51)	191.16*** (6.00)
Level 2: Between-Child									
In Intercept	344.39*** (13.60)	353.88*** (18.85)	343.75*** (21.07)	344.72*** (13.62)	353.72*** (18.85)	343.72*** (21.08)	344.46*** (13.60)	353.85*** (18.83)	343.35*** (21.05)
In Slope	26.12*** (2.03)	24.63*** (2.39)	34.87*** (4.68)	26.05*** (2.03)	24.58*** (2.39)	34.88*** (4.68)	25.94*** (2.03)	24.43*** (2.38)	34.90*** (4.67)
Level 3: Between-Center	13.24*** (3.37)	14.70*** (4.87)	17.58*** (6.31)	13.26*** (3.37)	14.76*** (4.87)	17.58*** (6.31)	13.02*** (3.35)	14.48*** (4.84)	17.34*** (6.28)
<i>n</i>	3224	1771	1473	3224	1771	1473	3224	1771	1473
<i>df</i>	29	29	29	30	30	30	32	32	32

Table A.3

Full results for research question 2: Estimated fixed effects and variance components from fitted multilevel models in which children's cognitive outcomes between the ages of 3 and 7 are specified, at level 1, as function of *TIME* (linear and quadratic functions) and *SHIFT*, a time-invariant indicator recording mothers' attainment of additional education, and (in cases where needed) the interaction between *SHIFT* and *TIME*. These models test whether the L2 parameter for *SHIFT* and the interaction term between *SHIFT* and *TIME* are predicted by mother's baselines of education. There are two models per outcome, the second of each pair a more parsimonious version of the first, excluding terms that were not needed.

	Language and Literacy Skills						Mathematics	Mathematics
	Reading	Reading	Writing	Writing	Vocab.	Vocab.		
<u>Fixed Effects:</u>								
Intercept	283.89*** (4.24)	283.79*** (4.24)	327.46*** (3.97)	327.46*** (3.98)	256.76*** (5.04)	256.76*** (5.04)	363.01*** (3.63)	363.02*** (3.62)
Baseline age	15.33*** (1.09)	15.34*** (1.09)	26.21*** (2.08)	26.22*** (2.08)	44.64*** (3.07)	44.65*** (3.07)	20.42*** (1.18)	20.42*** (1.18)
Mothers' Baseline Education								
HS Diploma	2.22* (0.91)	2.28* (0.90)	1.97* (0.81)	1.96* (0.81)	4.10*** (0.97)	4.10*** (0.97)	1.79* (0.79)	1.76* (0.79)
Some PSE	5.00*** (1.12)	5.13*** (1.12)	4.76*** (1.00)	4.77*** (1.00)	7.82*** (1.21)	7.79*** (1.20)	4.93*** (0.97)	4.91*** (0.97)
PSE Degree	7.97*** (1.63)	8.02*** (1.63)	7.20*** (1.44)	7.20*** (1.44)	7.58*** (1.72)	7.58*** (1.72)	4.76*** (1.38)	4.75*** (1.38)
Design Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Demographic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time	24.90*** (0.68)	24.94*** (0.67)	31.43*** (0.84)	31.44*** (0.84)	56.25*** (1.66)	56.25*** (1.66)	26.98*** (0.86)	26.97*** (0.86)
Time×Design Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time ²	5.20*** (0.21)	5.18*** (0.20)	0.97*** (0.24)	0.97*** (0.24)	-6.00*** (0.48)	-6.00*** (0.48)	-0.17 (0.26)	-0.17 (0.26)
Time ² ×Design Controls								
Shift in Education, <i>SHIFT</i> (γ_{30})	-0.01 (1.94)	1.34 (1.26)	0.93 (1.88)	0.73 (1.48)	-0.34 (2.14)	0.65 (1.12)	-0.89 (1.80)	0.59 (1.39)
<i>SHIFT</i> ×HS Diploma (γ_{31})	1.69 (2.73)	-0.37 (1.76)	-2.48 (2.63)	-1.55 (1.48)	-1.99 (3.00)	-2.66~ (1.55)	0.19 (2.50)	-2.17~ (1.27)
<i>SHIFT</i> ×Some PSE (γ_{32})	9.42* (4.03)	2.92 (2.29)	1.88 (3.85)	0.35 (1.91)	7.54~ (4.38)	-0.69 (1.99)	0.14 (3.64)	-3.37* (1.63)
<i>SHIFT</i> ×Time (γ_{40})	0.82 (0.93)		0.92 (0.81)	1.02~ (0.56)	0.47 (0.90)		1.90* (0.74)	1.19* (0.51)
<i>SHIFT</i> ×Time ×HS Diploma (γ_{41})	-1.26 (1.26)		0.47 (1.10)		-0.33 (1.22)		-1.11 (1.01)	
<i>SHIFT</i> ×Time ×Some PSE (γ_{42})	-3.39~ (1.72)		-0.66 (1.54)		-3.54* (1.70)		-1.55 (1.41)	
<u>Variance Components</u>								
Level 1: Within-Child	296.13*** (4.97)	296.43*** (4.98)	275.10*** (4.75)	275.13*** (4.75)	364.82*** (5.92)	365.09*** (5.93)	231.28*** (4.02)	231.31*** (4.02)
Level 2: Between-Child								
In Intercept	247.51*** (11.11)	247.28*** (11.10)	210.51*** (10.32)	210.42*** (10.32)	419.44*** (16.29)	419.15*** (16.28)	344.20*** (13.59)	344.46*** (13.60)
In Slope	91.75*** (4.18)	91.56*** (4.17)	29.73*** (2.37)	29.72*** (2.37)	24.71*** (2.45)	24.66*** (2.44)	25.90*** (2.02)	25.94*** (2.03)
Level 3: Between-Center	23.20*** (5.19)	23.22*** (5.20)	20.04*** (4.42)	20.04*** (4.42)	29.35*** (6.74)	29.37*** (6.73)	13.00*** (3.35)	13.02*** (3.35)

<i>n</i>	3263	3263	3245	3245	3263	3263	3244	3244
<i>df</i>	31	28	36	34	45	42	34	32

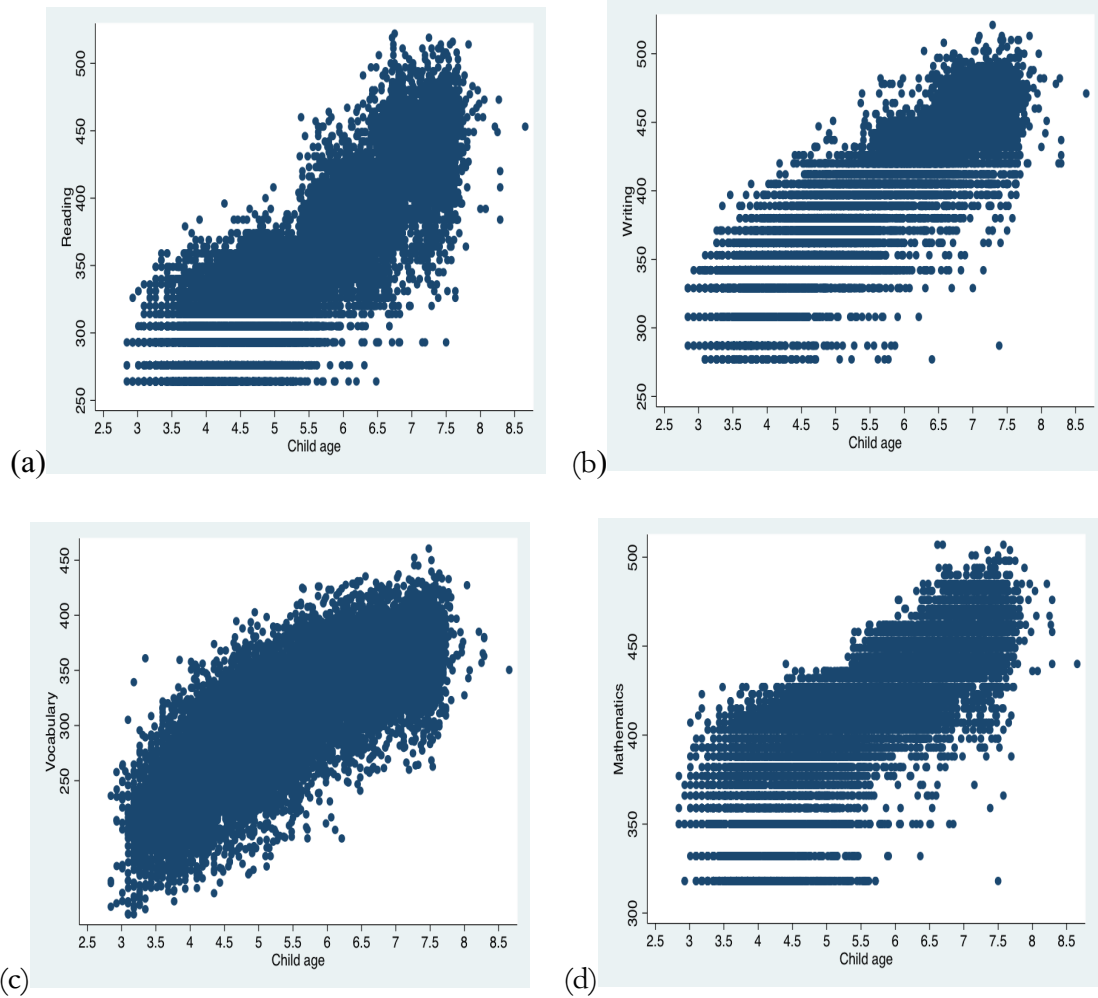


Figure A.1. Children's scores on 4 cognitive outcomes: (a) Reading (Letter-Word Identification); (b) Writing (Spelling) (c) Vocabulary (PPVT) (d) Mathematics (Applied Problems), plotted against child age (in years), $n=3263$. The blunt bottom of the point cloud in plots a, b and d are evidence of a floor effect.

Chapter 3: Study 2

Negotiating Motherhood and Education:

Low-Income Mothers' Motivation for Attending School while Parenting a Young Child

Researchers and policymakers have suggested that providing opportunities for low-income mothers to increase their educational attainment is a promising policy strategy for improving the economic standing of poor families (Chase-Lansdale & Brooks-Gunn, 2014). A lack of technical skills and/or low-levels of education are often the primary barriers low-income parents face when trying to find employment that pays a family-sustaining wage (Danziger & Seefeldt, 2003). Indeed, a recent analysis of data from the 2008 Survey of Income and Program Participation suggested that over half (58%) of parents identified as low-income (i.e., living at or below 200% of the poverty, or receiving public assistance, such as Temporary Assistance for Needy Families) had not earned a high school credential (Adams et al., 2014). Given the potential returns to both a high school degree and post-secondary education (Hout, 2012), many low-income mothers stand to benefit from access to continued education. For example, recent data on community college students suggests that individuals with an Associate's degree can expect to earn over \$200,000 more in a 40-year work-life than those with only a high school degree (de Alva & Schneider, 2013). In addition, adults who face the largest barriers to furthering their education—individuals whose parents do not have a high school degree, or who come from low-income families, for example—experience the largest economic returns to post-secondary education (Brand & Xie, 2010).

Low-income mothers' attainment of additional education may also serve to support their children's cognitive development. It is well documented that children from low-income

families start school lagging behind their more affluent peers on measures of cognitive ability and school readiness (Currie, 2005; Magnuson, Meyers, Ruhm, & Waldfogel, 2004; Reardon & Portilla, 2015). Although Reardon and Portilla's (2015) recent work suggested that socioeconomic gaps in some dimensions of school readiness (i.e., mathematics and reading ability) have narrowed in recent years, on average, children from different social classes do not begin school with equal levels of skills (Quinn, 2015). Further, these gaps persist into elementary and secondary schooling without much attenuation (Reardon, 2011). Research suggests that a mother's attainment of additional education can have a positive effect on her children's cognitive development (Gennetian et al., 2008; Harding, 2015; Magnuson et al., 2009). As I showed in Study 1, young children's cognitive skills—including early mathematics and writing skills—begin to develop more quickly when their mothers report attaining additional education.

Evidence indicates that many mothers, particularly those from low-income communities, return to school while raising their children. MacGregor's (2009) analysis of data from the Fragile Families and Well-being Study, which includes a large national sample of low-income families with young children, indicated that almost 50% of mothers in the sample engaged in some form of schooling within five years of giving birth to their first child. In addition, the proportion of undergraduates who are single parents has doubled over the last 20 years (Bound, Lovenheim, & Turner, 2010; Goldrick-Rab & Sorensen, 2010). However, this increase in enrollment in post-secondary education has been accompanied by a *decline* in completion rates, with single mothers among the least likely students to earn a degree (Bound et al., 2010; Goldrick-Rab & Sorensen, 2010). If low-income families are to benefit from mothers' educational pursuits, it is critical that we understand how to better support their persistence through school.

Most research on parents' schooling focuses on the structural aspects of their educational experiences, highlighting, for example, financial barriers to completion, or the importance of child care (Austin & McDermott, 2007; Goldrick-Rab et al., 2011; Yakaboski, 2010). In recent years, post-secondary institutions and social services for low-income families have responded to these challenges by providing additional supports and targeted interventions for student-parents, including access to child care, additional financial assistance, and education and career guidance (Bone, 2010; King et al., 2015). Yet even with these supports, not all parents interested in pursuing education are able to enroll or persist to degree completion (Bone, 2010; Sabol et al., 2015). This suggests that structural supports are not the only important component of parents' educational success.

Despite theory hypothesizing that motivation is linked to educational persistence (Covington, 2000; Robbins et al., 2004), a discussion of parents' motivation for schooling is largely absent from the research literature and policy discourse on low-income parents' pursuit of additional education (see Sommer et al., 2012 for an exception). As evidenced in the literature above, low-income mothers' educational pursuits are most often framed with regard to potential economic benefits for their families (Cerven, 2013). Far less attention has been devoted to how mothers describe and make meaning of their reasons for pursuing school beyond the economic returns. A large literature on mothers' motivation for employment—a related aspect of human capital development—suggests that a woman's labor force participation is influenced by the complex relationship between the experience of motherhood, a woman's responsibility to her children, her families' economic need, as well as the personal satisfaction she does (or does not) experience from working (Hattery, 2001; Hays, 2003; Johnston & Swanson, 2007). Drawing from the literature on mothers' decision to work, in this paper I explore low-income women's motivation for additional schooling

while parenting a young child. I focus on how mothers understand their motivation for schooling in relation to their role and responsibility to their children, as well in relation to their own personal development. This work aims to contribute to the literature on low-income mothers' educational pursuits by focusing on women's understanding of their own motivations and experiences in order to better understand factors that lead to educational success.

Background Literature

Low-Income Parents' Educational Experiences

Traditional narratives of educational attainment and family formation assume that young adults spend 12-16 uninterrupted years acquiring education before starting to raise a family. Indeed, K-12 and post-secondary educational systems reflect these assumptions in that education policy and educational institutions are not typically designed to serve students with children (Goldrick-Rab et al., 2011; Sadler et al., 2007). This narrative, however, does not represent the experiences of many American families, particularly those in low-income communities. Some parents acquire their education in a discontinuous fashion, spending time in school after they have begun to have children (Bozick & DeLuca, 2005; Duquaine-Watson, 2007; Goldrick-Rab et al., 2011; MacGregor, 2009). A recent report using data from a nationally representative sample of American adults suggested that, in 2009, 10% of low-income parents were engaged in some sort of training or education (Eyster et al., 2014). The majority of these parents (93%) were pursuing post-secondary education, but approximately 7% of the sample were preparing to take the GED exam, or engaged in other forms of adult basic or secondary education (Eyster et al., 2014). Reflective of this trend, most of the extant literature on the educational experiences of low-income parents' focuses on post-secondary education. However, in 2011-12 (the last year for which data are available), almost two

million adults—many of whom are likely parents—were enrolled in federally-funded adult education programs, including basic skills education, secondary education, and English Literacy (or English as a second language) programs (U.S. Department of Education, Office of Career, Technical, and Adult Education, 2015). In the current study, to better reflect the diversity of parents' schooling experiences, I take an inclusive view of parents' educational pursuits by exploring parents' experiences across different educational settings, including GED preparation and adult education, vocational training, and post-secondary education.

The current literature on parents' experiences in furthering their own education focuses primarily on the barriers adults with children face in pursuing and persisting in school. For example, finding and securing child care that is affordable and available during the odd or late hours when classes take place can often pose a problem for parents attempting to further their education (Matus-Grossman & Gooden, 2002). While additional schooling comes with a large financial burden for all students, the cost of an education (at the post-secondary level) is often prohibitive for low-income parents given their existing financial constraints (Goldrick-Rab & Sorensen, 2010). The combined costs of child care, housing for a family, and tuition and fees can put an enormous strain on low-income parents pursuing schooling (Yakaboski, 2010). While expanded Pell Grants, a source of financial aid for low-income individuals attending college, have made post-secondary education more feasible, and while many school districts and community-based organizations offer GED preparation and adult basic education at no fee to the participants (U.S. Department of Education, Office of Career, Technical, and Adult Education, 2015), the opportunity costs of enrolling in school remain high (Eyster et al., 2014). For some adults, going to school requires that they stop working, or cut down on previous full-time hours. Some parents cannot forgo the income they would receive working to attend school (Sommer et al., 2012).

While Eyster et al.'s (2014) research indicated that about 50% of low-income parents who enroll in schooling are also working, the other half earns no income while increasing their education.

In addition to these structural barriers, the nature of parents' experiences at school may also pose a challenge to their educational attainment. In her study of mothers who received federal cash assistance while attending community college, Halem (2004) found that some of the women's teachers and classmates made them feel unwelcome, out of place, or undeserving of the educational experience. The mothers felt that the pervasive negative stereotypes of low-income women and women on welfare contributed to how the community treated them. Duquaine-Watson's (2007) interview study with single-mothers enrolled in post-secondary education found that some low-income women reported that the specific needs of single mothers were ignored by their institutions, while other women were singled out, sometimes receiving unwelcome invitations from professors to share personal information in front of a class about their life experiences.

Policy Trends and Discourse Related to Low-Income Parents' Educational Opportunities

Different aspects of federal policy related to parents' human capital development, including welfare policy, workforce development initiatives, and child care policy, may discourage low-income parents' educational pursuits. For examples, scholars argue that in the 20 years since the passage of The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA)—typically referred to as welfare reform—it has become increasingly difficult for low-income parents, especially those who receive cash assistance from the government, to pursue education (Adair, 2001; Polakow, Butler, Deprez, & Kahn, 2004). For example, Kahn, Butler, Deprez, and Polakow (2004) argue that the

“work first” approach to Temporary Aid to Needy Families (TANF), the current welfare system put in place by PRWORA, discourages low-income parents’ participation in education by creating a culture in which parents are expected to find and take any job available to them, as opposed to acquiring more training before seeking employment (Hays, 2003; Kates, 2004). And, although the original policy proposal for welfare reform increased opportunities for training and education, the version of PRWORA signed into law allocated no additional funds to support continued education for welfare recipients (Edin & Shaefer, 2015).

In addition, policies that fund workforce development and training programs for low-income individuals may similarly discourage parents from low-income communities from attaining additional education. While the 2014 Workforce Innovation and Opportunity Act (the successor to the Workforce Investment Act of 1998) was designed to better target training and educational services to disadvantaged workers (including low-income parents), insufficient funds continue to make it difficult for service providers to meet the needs of adults with children (Spaulding, 2015). Specifically, Spaulding (2015) suggested that, in some cases, workforce training organizations may have reasons to avoid serving adults with children given the added costs of child care, and for fear that parents’ relative barriers to employment may negatively affect the performance statistics (i.e., clients’ rates of employment) service providers must report to the government.

Similarly, child care policy targeting low-income families may inadvertently discourage parents from seeking out education or succeeding once enrolled (Adams & Heller, 2015; Adams et al., 2014). In most states, low-income parents’ pursuits of education and training make them eligible for federally-funded child care vouchers. However, some states place time limits on parents’ voucher benefits when they enroll in training programs.

Given that many low-income parents who attend adult education or post-secondary education have low skill levels and/or require remediation, they often require more time to degree completion than the voucher limits allow (Adams & Heller, 2015). As such, some parents lose their child care benefits before completing a program and are unable to persist to completion (Adams & Heller, 2015; Adams, Spaulding, & Heller, 2015; Spaulding, 2015).

The policies that influence low-income parents' educational attainment are largely focused on supporting parents labor market and economic outcomes—e.g., increased income, stable employment, and financial self-sufficiency (Cerven, 2013). While these are important—arguably necessary—goals for families in poverty, the attention to economic outcomes leaves little room for a discussion of the personal satisfaction or fulfillment women might receive from their schooling or employment. For example, some states only allow certain educational programs—namely programs thought to lead to immediate employment paying a family-sustaining wage—to qualify parents for child care vouchers (Adams et al., 2014). Though justified in their attempt to encourage positive workforce outcomes, the paternalistic nature of such policies communicates that low-income parents should not have the freedom to select an educational program of their choice, and that their educational pursuits are only meant to serve employment goals, not their personal interests, growth or fulfillment. The “work first” approach to welfare policy also implies cultural values and beliefs regarding schooling for low-income mothers. The notion that poor women were better off working (as opposed to acquiring more skills) suggests implicitly that continued education will do them little good for their future employment prospects and thus is not worth the public investment (Kates, 2004).

This discourse reflects what Wendy Luttrell (1997) described as the denial of a “complicated psychology” or multidimensional “selfhood” (pg.8) to people from low-

income communities. In the case of their employment and schooling, the existing policy context does not create the circumstances for low-income mothers to seek out a career driven by their own goals nor encourage women to go to school so that they might attain a career of interest. Although theories of career development, and research on post-secondary education success, suggest that an intellectual connection to a field of study or career path, and the personal fulfillment individuals experience at work are important to schooling and workplace success (Lent & Brown, 1996), such considerations are not always afforded to the poor.

Understanding Motivation for Education

To counter these dominant trends in the literature, in this study I explore how low-income mothers describe and understand their motivation to pursue and persist in continued education. Despite theory indicating that educational persistence is linked to motivation (Covington, 2000; Robbins et al., 2004), discussion of parents' motivation for schooling is largely absent from the research literature and policy discourse on low-income parents' educational experiences. In their study of low-income parents' work decisions and trajectories, Weisner, Yoshikawa, Lowe and Carter (2006) argued that few scholars focus on how cultural and internal psychological processes—such as goal setting, motivation, and cultural beliefs and values—are related to low-income families' experiences for fear that this research will be viewed as “blaming the victim” for being in poverty. Weisner and colleagues made (2006) clear, however, that understanding the role of culture, goals, and motivation does not preclude a study of the structural factors that also contribute to families' social and economic circumstances. Indeed, the study of individuals' goals and motivations is complementary to the study of structural constraints; together both lines of research provide

a complete picture of the factors that might influence a mother's human capital trajectory (Gomez & Yoshikawa, in press).

In addition, evidence from existing programs designed to serve low-income parents in school indicates that only addressing the structural barriers to education that parents face does not always lead to success; understanding how parents make meaning of their motivation to pursue and persist in school may lead to new understanding of parents' educational choices and experiences. For example, in 1997 the Maine legislature funded the Parents as Scholars program (PaS), which offers cash and in-kind assistance (including tuition support, transportation, and services and child care for children) to TANF-eligible parents when they pursue degrees in two- and four-year colleges (Bone, 2010). By many metrics, this program has been successful; parents who graduate with a degree through PaS have higher incomes, on average, than Maine welfare leavers without a degree. Yet, PaS has a documented recruitment and retention problem. Despite research indicating high demand for the program, a 2010 report suggested that, at the time, the program's active enrollment was usually around 700 participants, less than 50% of full capacity (Bone, 2010). In addition, many students lose their PaS benefits (which have a time limit of 60 months) in the middle of the program and are unable to persist to degree completion. These recruitment and persistence challenges are not unique to the Maine program, but representative of other educational policies and programs that have the potential to support student-parents (Costello, 2014; Goldrick-Rab et al., 2011; Goldrick-Rab & Sorensen, 2010). These figures suggest that there are complexities in the experiences of low-income parents' education beyond the child care and financial constraints highlighted by the literature. With this in mind, I turn to an exploration of mothers' motivation for schooling.

Key concepts related to education and motivation. Social-cognitive theorists

describe motivation as the underlying psychological processes that cause and explain human behavior (Bandura, 1991; Weiner, 1992). Broadly, research on motivation explores how and why individuals regulate their behavior to set goals, and persist to reach those goals (Dweck, 1986). Scholars describe how motivation is not solely an individual-level characteristic, but is the product of a dynamic interaction between an individual and their social environment (Dweck & Leggett, 1988; Wlodkowski, 2008). For example, Eccles and colleagues' theory of expectancy-values (Eccles & Wigfield, 2002; Wigfield & Eccles, 2000) suggests that an individual's motivation toward a task is dependent on whether s/he expects to succeed (i.e., the belief that one is capable of completing the task), and the value the task holds for the individual, including the potential benefits—social, economic or otherwise—that might accompany completing the task. That is, goals and motivations are affected by one's beliefs about one's own ability, and the associated cultural values, beliefs, and local context (Ahl, 2006).

The distinction between intrinsic and extrinsic motivation may be relevant for pursuit of education. Intrinsic motivation refers to an internal goal-directed process, one that is driven by the “principal source of enjoyment” derived from the task (Ryan & Deci, 2000, p. 70). The latter refers to goal-directed processes driven by external stimuli or instrumental value, such as a monetary reward. The relative value and necessity of these different types of motivation for students' learning and educational pursuits (primarily in K-12 settings) has been debated in the literature for years (Hidi, 2015), with one line of research suggesting that extrinsic motivational stimuli undermine intrinsic motivation (Deci, Koestner, & Ryan, 2001; Hidi, 2015) in educational pursuits. That is, providing some sort of external reward (such as a financial incentive to achieve) will decrease a student's internal drive to learn. However, other models of motivation suggest that the two forms of motivation work in concert to

drive behavior (Vallerand & Ratelle, 2002).

Like the work cited above, most of the research studies on motivation, education, and achievement focus on children in K-12 educational settings. While the ideas and empirical evidence from this work maybe broadly applicable to adults and their schooling, some key differences exist. Namely, American children in K-12 settings are required to go to school by compulsory educational laws; most adults, by contrast, chose to pursue their education. Adult students—broadly defined as those older than 25 (Hadfield, 2003)—return to school with specific goals and purpose (Hough, 1984; Wlodkowski, 2008) . Many adult students return to school with the goal of advancing their employment and increasing their income (Wlodkowski, Mauldin, & Gahn, 2001). For this reason, educators who teach both younger and older students in secondary and post-secondary settings often perceive their adult students as being more motivated than their younger counterparts who may not yet know how they intend to use their education (Woldowski et al., 2001).

Parents’ motivation for education. Motivation among parents, rather than among adults more generally, to pursue, or not to pursue, schooling remains understudied. However, some important exceptions exist in the literature exist. For example, Sommer et al. (2012) found that, among a sample of low-income mothers with preschool-age children, for some women their motivation to return to school was connected to their children’s enrollment in an early childhood center. Watching their young children thrive in a supportive early childhood education setting, and interacting with early childhood center staff members, helped the mothers to see what was possible for their own education, and how more schooling would enable them to better support their children’s development (Sommer et al., 2012). In addition, studies of the experience of welfare recipients enrolled in post-secondary education also suggests that achieving financial stability for their families, as well as

providing an example of educational success for their children, motivated mothers to persist through schooling.

A small set of studies suggests that parents' motivation and goal setting in relation to their human capital development, are linked to their future labor market participation and their young children's developmental outcomes. Among their sample of low-income families, Weisner et al. (2006) found that mothers who had higher educational goals for themselves at the start of a longitudinal study experienced larger wage growth over a 5-year period. Gassman-Pines, Godfrey and Yoshikawa (2013) also found in their analysis of a large-scale welfare-to-work and welfare-to-education experiment that parents' goals moderated impacts of the welfare-to-education program on later teacher-rated child behavior. When parents expressed higher levels of goals to pursue their own education and then were assigned randomly to a human capital development (or "education first") condition rather than a "work first" condition, their children were observed to have more teacher-rated positive behaviors, reductions in acting-out behaviors. This suggests that understanding mothers' motivation for schooling may also shed light on not only their educational experiences, but their children's outcomes.

Despite an interest in attaining more education, parents may also be motivated *not* to enroll or persist in their schooling. For example, when Sommer and colleagues (2012) categorized the 51 low-income parents in their sample into 3 groups with different levels of preparedness for post-secondary education, some parents felt that pursuing more schooling was not the right choice for their families. A subset of parents who fell in the middle of the "preparedness" distribution described a general desire for more education, but also felt emphatically that it was in their, and their children's, best interests for them to work. Specifically, maintaining their household income via their employment earnings was the

primary reason some parents did not want to enroll in school, despite the possible benefits. Cerven's (2013) inquiry into the experiences of 60 single mothers enrolled in community college indicated that familial expectations and cultural values contributed to women's decisions not to pursue schooling. For some women, the pressure to fulfill traditional gender roles by being a stay at home mom, or their ex-partners' disapproval of their educational pursuits, kept them from enrolling the past. Divorcing their partners—all women were single at the time of the study—allowed some women to finally act on their desire to go to school (Cerven, 2013).

Theories of Motherhood and Human Capital Development

While extant research on the educational pursuits of low-income adult students with children often refers broadly to student-*parents* (Goldrick-Rab et al., 2011; Goldrick-Rab & Sorensen, 2010; Matus-Grossman & Gooden, 2002), the majority of empirical work focuses on *mothers*. This is logical, given the high prevalence of female-headed households in low-income communities (Entmacher, 2003), and the fact that mothers tend to bear the brunt of child-rearing responsibilities in two-parent homes (Bianchi, 2000; Parker & Wang, 2013). In this way, theories of motherhood can provide a useful framework for understanding women's experiences in school, particularly how their decisions to return to school relate to their responsibilities to their children. Indeed, theories of motherhood have been applied widely to understand women's motivation for, and decision to work—a related aspect of women's human capital development. I draw on this scholarship to better understand women's decision for schooling.

Hays' (1996) description of an "intensive mothering" ideology dominates the cultural framework for "good" mothering in the modern United States (Ennis, 2014; Hattery, 2001). Intensive mothering is "child-centered, expert-guided, emotionally absorbing, labor-intensive

and financially expensive” (Hays, 1996, pg.8). Prescribing to this ideology involves believing that child-rearing work should fall solely on the mother, and that her work as a caregiver is more valuable than any work she might perform outside of the home. Scholars suggest that under this ideology, women are made to feel that their children will not develop properly, nor will women have fulfilled their role as caregivers adequately, unless they engage in intensive mothering (Ennis, 2014).

Intensive mothering is not just a theoretical construct, but is evident in families’ daily lives. The ideals of intensive mothering are reflected in results of recent research studies describing how parents expend resources—including time and money—on their children. For example, Kornrich and Furstenberg (2012) found substantial increases in families’ financial investment in children between the 1970’s and early 2000s. Similarly Bassok et al.’s (2015) comparative analyses of two Early Childhood Longitudinal Study datasets—the 1998-99 and 2010-11 kindergarten cohorts—found marked increases in the number of enriching learning experiences parents provided for their young children over the 12 year period. While both Bassok et al. (2015) and Kornrich and Furstenberg (2012) reported these trends for families across all social classes, for some measures the increases were most pronounced among affluent families. These patterns are consistent with extant literature describing differences by social class in the ways parents approach child-rearing, with middle-class families spending more time on activities that build children’s knowledge and skills actively (Lareau, 2003). Indeed, these trends speak to the fact that the origins of intensive mothering reflect primarily the lived experience of middle and upper-middle class, two-parent households, as engaging in this sort of mothering requires that another adult provide the family income (Hays, 1996). However, research also suggests that low-income families prescribe to and try to live up to these ideals (Edin & Lein, 1997; Manoogian, Jurich, Sano,

& Ko, 2015).

A large body of research describes the ways in which women across social classes negotiate the ideals of intensive mothering, including the time and energy they desire to devote to their children, when making workforce decisions (S. Duncan & Edwards, 1999; Hattery, 2001; Johnston & Swanson, 2006). For example, Hagelskamp et al. (2011) posited a five-fold typology based on an ethnographic study of a multi-ethnic, low-income sample of mothers, to describe how women negotiate their role as mothers and workers to make employment decisions. Despite substantial financial constraints, some mothers chose not to work, citing the desire to be the primary caretaker of their children, an ideal reflective of intensive mothering. Still other mothers described their employment as an integral component of being a good mother. These women saw the benefits of their job—e.g., increased income and the social resources they could provide their children as result of the work—as a way to facilitate their role as mothers (Hagelskamp et al., 2010). Johnston and Swanson (2006) research with a sample of primarily upper-middle class women, described how working moms construct notions of good mothering to better align with the nature of their employment choices. For example, mothers who were full-time caregivers of their children communicated the ideals of intensive mothers and the value of the time they spent with their children. Working mothers, by contrast, stressed the importance of the quality of the time they had with their children, not the quantity (Johnson & Swanson, 2006). The same may, or may not, be true of mothers' schooling choices and their beliefs about motherhood.

Yet scholars also describe the ways an intensive mothering ideology does not, and frankly cannot, reflect the experience of low-income women, women of color, or more broadly, any woman who works outside of the home. Patricia Hill Collins (2000) and other

feminist scholars of race have argued that dominant theories of motherhood often exclude the experiences of women of color, and women living in poverty. Due to economic disparities between white families and the families of ethnic minorities caused by structural inequity and racial discrimination, many women of color throughout modern history have not had the option to remain at home full time with their children; work was an economic necessity (Amott & Matthaei, 1996). Collins (2000) argued that women of color have long acted as economic providers for their families, and that work has been an integral and valued aspect of motherhood for generations of working-class Black women. These ideals also extend to women living in poverty from diverse racial and ethnic backgrounds. Christopher's (2009) study of welfare recipients' employment and education decisions suggested that the mothers in her sample actively resisted the ideologies of intensive mothering and instead aligned with the idea of "mother as provider." She described how women in the sample (which included White and Black mothers) were motivated to pursue additional education, and ultimately employment, as a way to provide for their children. Indeed, most women in the sample stressed the importance of financial stability over the importance of the time spent with them (Christopher, 2009).

Christopher's attention to motherhood and women's decisions to pursue more schooling is distinct in the literature. Discussions of women's human capital decisions and mothering responsibilities are limited primarily to decisions about work. Here, I extend this literature, and build from Christopher's work, by exploring how low-income mothers described their motivation for additional schooling in reference to their children and their role as mothers. My work contributes to the literature by privileging the voices of low-income mothers, and by focusing on mothers needs and motivations, not only their labor market goals. In doing so, I provide an additional perspective on mother's educational

choices and experiences.

Based on these literatures in the fields of human capital development, motivation, and motherhood, my guiding research questions of this study are: 1) How do low-income mothers of young children describe and make meaning of their motivation to pursue, or not to pursue, additional education? 2) In what ways do these motivations relate to their personal goals and their role and responsibilities as mothers?

Research Design

Data

To address the above research questions, I utilized data from the CAP Family Life Study (CAP FLS), the on-going, quasi-experimental evaluation of *CareerAdvance*[®] a two-generation intervention for low-income families that combines Head Start services with educational opportunities and workforce development for parents (Sabol et al., 2015). The program was launched in 2008 by the the Community Action Program of Tulsa (CAP Tulsa). Any parent (or primary caregiver) whose child was enrolled in CAP Tulsa's Early Childhood Education Programs (including center-based Early Head Start and Head Start services, as well as a home-visiting program), was eligible to apply for and, if accepted, enroll in *CareerAdvance*[®]. Between 2008 and 2010, the program only offered post-secondary education and training in healthcare careers (in partnership with a local community college). However, starting in 2010 the program expanded, and over the next six years began to offer career training in manufacturing, secondary education, referrals to GED preparation and testing services, college preparatory courses, and an English as a second language course. In 2010, the CAP FLS began to document the short- and long-term effects of the program children's, parents', and families' social, economic, and developmental outcomes. The study sample includes families enrolled in the intervention, as well as families selected to be in a

statistically-matched-comparison group (i.e., families receiving early childhood services, but no adult education). The on-going data collection includes direct child assessments with a focal child; in-home observations; and a detailed demographic survey with a focal adult (98% of whom were mothers, 2% were fathers or grandparents). Finally, a subset of parents within the larger study (sampling process described below) were selected to take part in a longitudinal qualitative interview study. These parents took part in three in-depth qualitative interviews administered over a period of three to four years. In this study, I use the qualitative and demographic data from members of the matched-comparison group only.

Sampling Process, Participants, and Interview Procedures

Sampling process and participants. As of the spring of 2015, the CAP FLS had followed a total of 337 families, 157 enrolled in Career*Advance*[®] (early childhood education services plus workforce development for parents) and 178 families in the matched-comparison group (early childhood education services only). Parents were selected for the intervention group based on a variety of criteria, including their scores on a selection interview and scores on the Tests of Adult Basic Education (TABE), a common entry exam used by community colleges. The matched-comparison group was selected from a population of CAP Tulsa families using a propensity score matching procedure. CAP Tulsa families were eligible for selection into the matched-comparison group if they had a child enrolled in an early childhood program, had key demographic data used in the propensity score procedures, and had not participated previously in Career*Advance*[®]. Demographic data and information on parents' interest in, and motivation for, continued education in the health care field were used to estimate the propensity scores (see *Appendix A* for a detailed discussion of the propensity score matching procedures).

The qualitative sub-study was limited to those participants who entered the CAP

FLS in 2011, 2012, and 2013 (163 parents in total, across the intervention and matched-comparison groups). Fifty-four families from the intervention ($n=26$) and matched-comparison ($n=28$) group were selected at random to take part in the qualitative study¹⁰. Because this study is designed to explore mothers' motivation for a range of schooling activities, I excluded the intervention group members from my analyses. *CareerAdvance*[®] is a very specific, time-intensive intervention that includes services and benefits (such as career counseling, additional child care, and financial incentives) not common in most parents' educational experiences. For this reason, parents' motivations to attend *CareerAdvance*[®] are likely not representative of the experiences of parents who did not have access to this program. In addition, this study is not designed to evaluate the effects *CareerAdvance*[®]. For these reasons, I only included members of the matched-comparison group in my analytic sample.

In total, the qualitative sub-study included three data collection waves that occurred between winter of 2011 and fall of 2015, with an average of 18 months between each wave. When I began these analyses, only two waves of data had been collected in full; as such, I included the first two waves of data only, collected between November 2011 to April 2014. The full qualitative matched-comparison sample includes 28 mothers; however, I chose to exclude ten women from my analyses. Nine women completed only one interview (wave 1) and thus it was not possible to follow them longitudinally across time. I excluded the final participant because she was the only grandmother in the study. I drew heavily from theories of motherhood that do not necessarily apply to the experience of "grandmothering." This grandmother had the previous experience of raising her biological children; as the primary

¹⁰ The final qualitative sample represents 87% of parents who were selected at random to participate. Those not in the sample either declined the opportunity for an interview, or took part in the interview and then declined to take part other research activities (e.g., the parent survey) and were thus dropped from the sample.

caregiver of her grandchild, she was, in a sense, mothering for the second time. Research suggests that the caregiving experiences of custodial grandparents may differ from those of first time mothers and fathers (Bachman & Chase-Lansdale, 2005). For these reasons, this participant's experiences were likely not comparable to the others in the sample.

The remaining 18 mothers constituted the sample for this study. I present descriptive statistics on the final sample in Table 1. Participants ranged in age (at the first interview) from 20 to 45 years old, with a mean age of 29. The sample was racially and ethnically diverse with 50% of mothers ($n=9$) identifying as white, 39% ($n=7$) as African-American, and the remaining 10% as Hispanic ($n=1$) or Native American ($n=1$). Less than half of the mothers were in a steady romantic relationship (either a marriage or partnership) at wave 1, but the majority of mothers were living with at least one other adult. All mothers had at least one preschool-aged child, and the average family had between three and four children under the age of 18 in the household. All families were Head Start eligible, and 61% ($n=11$) had an income-to-needs ratio less than 1.

At their first interview, most of the mothers had either a secondary education degree (a high school diploma or GED credential) or had completed some vocational training. Six mothers were enrolled in school at wave 1; however, by wave 2, this number had increased to nine. Between wave 1 and wave 2, one mother left school (without a degree), five mothers who were in school at wave 1 were still in school at wave 2, and four mothers started a program between wave 1 and wave 2. Of the nine mothers enrolled in school at wave 2, two mothers were pursuing GED preparation or adult basic education, and seven were enrolled in a post-secondary education program.

Interview procedures and protocols. For 16 mothers in the sample, 10-14 months passed between their two interviews; for two mothers in the sample 20 months elapsed

between the two waves. All interviews were conducted by a team of trained graduate-level researchers. When possible the same researcher conducted both the wave 1 and wave 2 interviews; on average, the interviews lasted between 60 to 120 minutes.

The interviews were semi-structured and guided by interview protocols containing questions that addressed a variety of topics such as family structure and circumstances (e.g., housing arrangements, financial stability, other family members in the home); child development (e.g., health, social-emotional, and cognitive development); parents' schooling experiences (from middle school through educational experiences as an adult, including GED courses, vocational education, and post-secondary experiences); employment experiences; reflections on parenting; balance among family, work and/or school responsibilities; and sources of social support. The section of the interview protocols that focused on mothers' education included questions about mothers' motivation for schooling (in the past and present), questions to elicit detailed accounts of educational pursuits as an adult, reasons for enrolling, and—when applicable—reasons for dropping out. The wave 1 and wave 2 interviews differed slightly from each other. The wave 1 interviews included substantial fact gathering to establish the participants' educational and employment history. The majority of the wave 2 interview protocol focused on the events in the participants' lives that had occurred since the last interview. However, the wave 2 interviews also included time devoted to clarifying or discussing information gathered at wave 1. As the researchers and mothers spent substantial time in both interviews discussing the mothers' schooling, the same educational experiences were sometimes described in both interviews. As such, wave 2 often provided an opportunity to go into more detail about an experience that may have only been touched on briefly in wave 1.

To conduct my analyses, I drew primarily from mothers' responses to questions regarding their educational experiences and motivations, balance among family, work and/or school, and reflections on parenting. (See *Appendix B* for a list of relevant interview questions from the wave 1 and wave 2 protocols).

Analytic Plan

All 36 interviews (2 for each of 18 participants) were transcribed by a professional transcription service. In addition, all interviewers took detailed notes after each of the interviews. Following the completion of wave 2, the research team used the transcribed interviews and field notes to create memos (Maxwell, 2013) summarizing the details of each participant's narratives over the two waves in the following areas: family circumstances, child development, employment and education. The primary data for this study included the interview transcripts, the interview notes, and the summary memo.

I used grounded theory coding methods to code all data sources (Charmaz, 2003; Strauss & Corbin, 1998; Willig, 2013) using the Nvivo software (Version 10; QSR International Pty Ltd, 2012). I began by reading through all the transcripts, notes, and memos to become familiar with each participant's narrative. I then identified the sections of the transcripts in which mothers directly or indirectly described their motivations for pursuing schooling. For those mothers who had been enrolled in school in the past (as adults, i.e., after graduating from or leaving high school), or who were enrolled at the time of interviews, I also identified sections in which mothers discussed their motivation for persisting in their educational endeavors¹¹. I included all educational experiences following

¹¹ As part of the larger CAP FLS analysis of these data, the research team indexed the wave 1 and wave 2 transcripts. All the data (both intervention and matched-comparison cases) were indexed using 8 broad categories 1) Family Circumstances and Well-being; 2) Children's Well-being & Schooling; 3) Financial circumstances; 4) Employment; 5) Parent's Schooling Experiences; 6) Social Support; 7) Parenting; and 8) Balance Between Employment, Schooling, Family, and Life Circumstances. To ensure that I did not miss

high school, including vocational education and college courses. For women who did not complete high school, I also included their experiences preparing for the GED exam (if applicable).

To code the data, I applied both theoretically-driven etic codes, and data-driven emic codes. For example, I drew from theories of motherhood and coded broadly for instances in which women's motivation for schooling was in reference to their children's needs, their roles as mothers, or their understanding of motherhood. However, I also engaged in what Strauss and Corbin (1998) refer to as "open coding," or a line-by-line exploration of the transcripts to identify themes and ideas that emerged from the data. (See the Appendix C for a selection of codes and definitions.)

Following Strauss and Corbin (1998) and Glaser and Strauss (1999), I engaged in a constant process of comparison across, and within, codes that emerged from the opening coding process to identify patterns and refine the categories that emerged. This led to a stage of "selective or focused coding" (Charmaz, 2003, p. 516) in which I returned to the data with only those codes that appeared frequently and identified reoccurring ideas throughout the participants' narratives (Strauss & Corbin, 1998). By continuing to compare codes and ideas within, and across, participants, the themes and patterns described below emerged. I compared data within participants over the two waves to understand if, and how, participants' motivations changed over time. But, as noted above, the structure of the interviews did not always support valid longitudinal analysis. That is, participants often described the same experiences in both interviews. The two data points often provided more in-depth information on the participants' experience, as opposed to documenting change

important information about the participants' schooling, I also reviewed and coded all information the research team categorized as "schooling experiences," "parenting," and "balance between employment, schooling, family and life circumstances."

over time. I also compared across participants who did, and did not, enroll in schooling during the data collection to explore the relationship between mothers' motivation for schooling and their educational decisions.

Throughout the coding process I wrote analytic memos (Maxwell, 2013) to organize the emerging themes and track the analytic process. I shared these memos with members of the larger research team who were close to the data (i.e., they had either indexed or collected the data). Discussion with these team members helped to improve the validity of the findings as they brought new perspective to the themes, confirming or questioning the ways my emerging patterns were, or were not, consistent with their understanding of the data (Charmaz, 2003).

Results and Discussion

Consistent with previous literature (Duquaine-Watson, 2007; Haleman, 2004; Yakaboski, 2010), all but one of the mothers described being motivated to attend more school in order to improve their ability to find a well-paying job and increase their family's income. "I don't want to live paycheck to paycheck anymore..." one mother said when describing what motivated her to enter a nursing program. However, the focus of this study was on understanding mothers' motivation for schooling beyond these labor market and financial outcomes. Indeed, two other topics were most salient in mothers' description of their motivation for education: their children and their personal development. I organize the findings below based on these two topics.

"We're All Adults. We Have Kids": The Push of Motherhood Toward, and the Pull of Motherhood Away from, More Schooling

When describing their motivation to pursue and persist through school, the women's relationships with their children were central. The experience of motherhood—including the

need to provide financially for their children, their caregiving responsibilities, and their hopes for their children's future—featured in nearly every mother's narrative regarding her educational choices. However, the relationship between motherhood and women's decisions to pursue, and persist through school was complex, and contradictory in nature. Indeed, motherhood was simultaneously one of the primary reasons women cited for pursuing and persisting in their educational goals, *and* one of the primary reasons cited for either forgoing school altogether, or leaving a program before earning a degree.

The ways in which motherhood both pushed women toward, and pulled them away from, schooling are evident in Caitlin's¹² narrative. Our research team first met Caitlin, a 20-year-old mother of two boys (ages 2 years and 10 months, respectively) in the spring of 2012. She is a soft-spoken young woman who, as her interviewer described, was "sincere and earnest" while sharing her reflections on herself and her family's life. At the time of her first interview she and her sons had recently moved out of the house she shared with her mother and grandmother—which Caitlin said "wasn't a very happy place"—into a new apartment. Her grandmother was mentally disabled and her mother had abused drugs for most of Caitlin's life; Caitlin felt confident that living in a place of her own would provide a new sense of stability for her sons. Similar to 7 other women in the sample, Caitlin was in a steady relationship with the father of her boys at wave 1; while she and her partner did not live together, they split the financial and care responsibilities for their children. By wave 2, however, the relationship had ended.

Caitlin faced a number of barriers to educational success. At the end of 10th grade, her mother, the family's breadwinner, began a prison sentence; at that point Caitlin left high school to hold two jobs in fast food restaurants so that she could contribute to the

¹² All names are pseudonyms.

household income. Two years after leaving high school, she enrolled in a number of adult education programs, but had trouble keeping up with the work; she attributed her academic difficulty in these programs to having left high school early. Her lack of education constrained her employment options, making it difficult to save for, and pay, her tuition fees. Despite these barriers, however, Caitlin's desire to attain her GED and eventually an Associate's and Bachelor's degree was palpably strong. Her primary motivation to attain more education was her children:

[My sons] are really the only things that keep me going because I can't quit. Quit is not on my mind and I'm never giving up. No matter if this program don't work, I'm still going to try again and try again and try again and even if nothing works, I'm not going to stop... Looking at my kids each and every day, that's what keeps me going... I just look at them and I see me when I was a kid and I don't want them to ever, ever, ever go through what I went through... We're going to own our own house. My kids are going to be able to have friends over, sleepovers without having us worried about getting robbed or anything like that. If he wants a horse, my God he can put a horse in the backyard as long as he takes care of it. That's why I keep doing these programs

Caitlin's desire to provide for her children—to create a safe home, to buy them gifts, to provide “stable things” as she described later—was her primary motivation for more schooling. Indeed, this motivation led her to pursue a variety of different options to obtain her GED “...You name it, I've tried it,” she said when recounting the various programs she had inquired about and/or enrolled in during the 3-4 years preceding her interview.

However, as of her second interview, Caitlin had yet to earn a degree, or find a program in which she felt she could be successful. In almost all instances, Caitlin evoked her role as a mother as the primary reason she could not follow through with her educational goals. At her first interview, Caitlin had recently left a joint GED preparation and Associate's degree program in criminal justice. To receive financial aid, Caitlin had to go to school 5 days a week; this proved to be too much time away from her children. She could not balance her schoolwork with the needs of her kids. “I was a full-time student and with two kids

that's a lot to ask for so I couldn't do it anymore. I got overwhelmed, tired, my kids needed me. I just said look, I have to be here for my kids." After approximately one year in school, she left this program without earning her GED or an Associate's degree. Caitlin was not working during this time, but found it difficult to balance her school work and her children's needs. So she revised her educational expectations. While she said studying criminal justice was her "dream," she noted in her first interview that these goals were not realistic given how much time she would have to spend in school, away from her children. "It's going to take me long. If I didn't have kids, I'd be set for [criminal justice]...But right now I have kids..." Between our two interviews, Caitlin began a medical coding degree. However, she faced substantial academic difficulty in this program—namely a mathematics class she could not pass, but needed to earn her GED. During this time, Caitlin was also working in a nightclub; the time away from her children while at school and at work caused tension at home, as her boyfriend faced some difficulty caring for the children while she was gone. After four semesters, it seemed that all of these factors combined caused Caitlin to leave the program without a degree.

Caitlin's narrative illustrated how mothers in this sample used phrases like "I have kids" or simply "my kids" to describe their reasons to both pursue, *and* stop out of, schooling. Throughout her interviews Caitlin described the way her role as a mother served as a contradictory source of motivation for her educational goals, simultaneously pushing her toward, and pulling her away from, additional schooling.

How motherhood pushes women toward schooling. Fifteen (15) women in the sample described their children, and their responsibility as mothers, more generally, as a strong motivation to pursue, rather than forgo, additional education. Two themes emerged from analyses of these women's experiences. Mothers were motivated to go to school to 1)

provide resources for their children, financial resources and those less tangible resources (e.g., time and emotional support); and 2) to be role models for their children.

“I want to give them something better”: Mothers as providers. Most of the women who described being motivated to pursue more education because of their children, saw their schooling enabling their ability to provide for their family. For example, Celine, a 25-year old mother of two described how her motivation for schooling shifted after she had her children. She first attempted a nursing program soon after graduating high school, but stopped after she faced academic difficulties in her first year. She returned three years later (approximately 2 years before we first met her) after the birth of her first child with a new sense of purpose.

[the first time I went to school]...I knew I wanted to be a nurse but...I didn't have anything to motivate me. Now going back, it's important for me because I don't want to have to struggle to give my kids what they want and what they need and so getting a better paying job is going to help me be able to better provide for them. So I think that's kind of my motivation

This second attempt at school was much more hectic—not only was she caring for her eldest (and, at this point in time, only) child, but she also working full time at an office supply store. However, Celine's desire to provide for her daughter (who was about 2-years-old when she went back to school) was a strong motivator in her decision to pursue and persist in school.

Harmony, a 30-year-old mother of 4 children spanning ages 11 months to 9 years old, was enrolled in an Associate's degree program at a local community college when we first met her. She, too, expressed that providing for her children was the primary reason she was in school. Knowing that she wanted “something better” for her children helped her to persist in her program.

[I'm doing this so] ...we can be in a better place...I want to give them something better... than they have now... a yard... stuff I think that they deserve...I can't do

that now and [if I don't get more education] things will always stay the same. Things won't get better. So I just have to keep that in my mind... You may be here for now... But if you keep at it, you know, then you'll reach your goal...

While in school, Harmony chose to rely on financial aid (loans and grants) and financial contributions from family members to support her children. She actively chose not to work, taking on temporary financial hardship so that she could focus only on school and her children. During her first interview, she described how this short-term sacrifice would allow her to better support her children in the future.

Other mothers, like Arlene, spoke in more concrete terms about how the potential for a substantial salary increase with a new job motivated her to persist through a large challenge. At her first interview Arlene, a 40-year-old mother of son Johnny, age 1, was in her second year of a nursing program. She was still enrolled in this program at her second interview, but at this point she reported a major setback: to graduate, she would have to repeat 3 prerequisite courses because her grades had since expired. When describing the situation Arlene said, without hesitation, "...if I didn't have Johnny I would have probably said screw it...I would have quit." But, Arlene did not quit. She described how the salary she could make without the nursing degree was enough to support herself, but not enough to provide for her son.

For Jacy, a mother of twin 7-year old-girls, a 4-year-old, and a 2-year-old, her schooling was a means to give her children the experiences that she felt she lacked growing up:

Sometimes the girls they want to play a sport. Before I'd have to say I don't have enough money to pay for that. [Or they'd say] we're having a book fair at school so can I have money? And I'm like well I don't have it right now. Whenever I finish school it will be like okay. You want pictures done? Okay. You want books? Okay. You want to join the cheerleading team? Okay. Just to be able to live comfortable...I know when I was growing up I always wanted to but I couldn't because we didn't have the money and I know how I felt and I don't want them to be left out.

Jacy not only wanted to provide her children with material goods (books, cheerleading gear, etc.), but also a sense of inclusion in a middle-class lifestyle and social experiences. More schooling was a way to accomplish this goal. Notably, the gifts and experiences that Jacy wanted to provide her children were all related to their education, or their personal and academic development. That is, she saw her schooling and academic development as a means to support her children's schooling and academic development.

Sally too described the ways that pursuing education was not only about the finances she could provide for her children, but also the benefits for her family's daily routine and schedule. At her second interview, Sally, a mother of three (ages 6, 2, and 4 months) had just begun a GED program that would transition into an Associate's degree in the healthcare field. She chose this career path in part because of the schedule she believed a career in healthcare would provide. "I want to work 3 days a week, and be able to enjoy my kids for the 4." She described not wanting to be "that parent" who missed her children's activities because of work. She saw more education as a way for her to secure the job and lifestyle that would allow her to be there for her children.

"Leading by example": Mothers as role models. "...Children need [you] to lead...by example and me quitting... [someday he'll ask] 'why didn't you finish school mommy?' Even though he doesn't understand it [now]. He will someday." Here Arlene—the mother who, in the face of a substantial academic setback, chose to stay in school—described how her desire to provide an example of perseverance for her son motivated her to stay in school. Arlene's sentiment echoed that of other mothers who were motivated to go to school by a desire to provide an example of success for their children. For example, Harmony, a mother of four, hoped that her schooling would push her children to follow a

different educational trajectory than her own. She wanted her kids to go straight through to college after graduating from high school.

...I made the decision [to go to school because] getting an education would help me in the long run...[and] help my kids... by them seeing me go to college, it puts ideas in their mind, you know. If she did it and she had four kids, you know, I should be able to do it right out of high school. You know?

Importantly, Harmony's aspirations for her children's level of educational attainment (i.e., a college degree) mirrored the level of education toward which she herself was working.

Cabrina, a mother of two boys under the age of 2, described similar motivation.

During her first interview, she expressed an interest in pursuing more education, and by her second interview she was enrolled in an Associate's degree program, training to be a physical therapist. Knowing that she was acting as a role model for her sons not only motivated her to continue schooling, but made her feel a sense of pride in her actions. She said, "[When I leave for school they say] 'well mommy you have a good day at school or my mommy goes to school.' They tell everybody I go to school...I think they enjoy it... they're kind of excited about it" And later she explained simply, "I'm just...their role model right now."

Other mothers described how they were motivated to stay in school to teach their children specific lessons about what it takes to be successful in one's education. Scarlett, a mother of 2 boys, expressed this idea. At the time of her second interview, she was enrolled in a medical assistance program with the longer-term goal of working as an assistant to a dermatologist. Both she and her husband experienced financial hardship and family turmoil, as children that kept them from graduating from high school. In addition, neither of them had many family members with education beyond the 12th grade. Not only did Scarlett want her sons to, in her words, "see an education" by way of her experiences, she wanted them to see that the experience was difficult.

...what I like is that my sons are seeing that even though it's stressful, even though it's hard, mommy and daddy are going to school. And mommy and daddy are doing better things. Mommy and daddy are trying to be better parents. You know I mean we're just – we're so honest with them.

Scarlett felt that her children would be better for the experience of watching her and her husband work toward their educational goals. At both her wave 1 and wave 2 interviews, Scarlett was juggling her schooling with part-time weekend employment as an esthetician. Managing her employment and schooling, along with her role as parent, was often difficult. But, she did not hide her stress from her children; she wanted them to see that getting ahead in life takes hard work. Although her husband was not working at either interview so he could be home with their sons, in the years prior to the study, he had gone to school and successfully earned a vocational certificate. Completing this degree did not come without its fair share of challenges; before earning a degree, he first left a different program after failing the final graduation requirement twice. Scarlett felt her children might face similar challenges in life, but hoped that having watched her and her husband persist through school would help them to succeed in the future.

How motherhood pulls women away from schooling. The same mothering responsibilities that pushed some women to want to pursue more education factored into other women's decisions to stop programs they had begun, or to forgo schooling all together. Although all of the women in the sample communicated a general desire for more education, some decided ultimately that more schooling was not an option. Eleven mothers in the sample described how their need to care, and provide for, their children kept them away from school in the past and at the time of the interviews.

Dynasty, a mother of two, described her reasons for stopping out of a nursing program in which she had enrolled approximately two years prior to the interview. She was

excited about training to be a nurse, but the schedule of the program proved too demanding for her family responsibilities.

... I had a problem with the fact that [the teachers and administrators] treated us like teenagers... We're all adults. We have kids. You can't be absent more than [2 times] or you get dropped from the program ...that's ridiculous. We have kids... This one girl who...had...three children... She said my house is a wreck. She says I'm barely am able to cook for my kids and they're telling me, oh if my kids get sick you're telling me I can't come in and if I do I get dropped from the program. [The administrator told me] if things get too much...you have to just go ahead and leave. I said okay so I took a [leave].

Both referring to her own experiences, and those of a fellow classmate, Dynasty described the conflict between her school responsibilities, and her ability to take care of her children. In repeating the phrase “we have kids” she highlighted the importance of her and other students’ roles as a mothers; her kids, and the need to care for them, ultimately motivated her to leave her program.

The difficulty that mothers faced in balancing school and the needs of their children was a common theme throughout the interviews. Celine described how her apprehension about her ability to manage these various responsibilities kept her from enrolling in school.

[I haven't enrolled yet because] I just worry that I won't be able to juggle it all, that I'll struggle with one aspect of it. I don't know which aspect that would be but obviously my kids are going to come first so I'm not going to struggle there but I just worry about like juggling work and school.

Celine made clear that her children *would not* be the ones to suffer. Prioritizing her children, in part, kept her from enrolling in school. Importantly, she described how her stable 9-5 office job allowed her ample time for her children and family. The income from this job, along with her partner's (unspecified) employment, provided the family with just enough funds to “make ends meet.” While, at both waves, Celine described her aspiration to go back to school to better support her children (see previous section for a specific example), the relatively stable life her employment allowed, and the fear that schooling would upset this

balance and take time away from her children, in part motivated Celine to forgo further education.

In some cases, children with special needs motivated mothers to forgo additional schooling. Mary Lou, a 31-year-old mother of two children, had a long-time goal of working in the healthcare field. She had pursued a number of programs, but had yet to earn a degree. In 2010, she was enrolled in a degree program in communications when her son (approximately 3 years old at the time) began experiencing behavior problems, and was eventually diagnosed with an autism-spectrum disorder. Addressing her son's needs and caring for his typically-developing younger sister, caused Mary Lou to stop out of the communications program before earning a degree; these responsibilities continued to keep her out of school in subsequent years. "It was just too hard with the two kids only 18 months apart and one being autistic. I just couldn't do it." Although, at her first interview, she was motivated to become a nurse, she had tempered her goals by the time we saw her the second time. When asked what her her work or education-related goals were, Mary Lou said:

Right now... [I] just [want] to find a job. Eventually if...I can get [my son] settled to a place where I feel safe and I know [my daughter] safe, I want to be an RN, I want to get...my Bachelor's of Science in Nursing but if I ever get to do it, that's a few years off.

In the same way that some mothers felt that being in school was the way to ensure their ability to meet their children's needs, Mary Lou could not consider going to school until her children were "settled." Mary Lou's case is perhaps extreme, given the needs of a child with autism. However, we heard the same sentiments from mothers whose children did not require special care. Kristen, for example, explained at her first interview that she had stopped her general education classes recently so that she could be available to pick up and drop off her children at school. Although she had planned to go back, she told us—at her

second interview a year later—that she again chose not enroll so that she could home-school her daughter, something she had been considering for years. “I’ve... been devoting my time this year to [my daughter],” she explained, while describing what motivated her to forgo her schooling.

Similar to Celine, Kristen’s financial and employment circumstances provide important context for how she considered her children in her schooling decisions. Kristen cleaned houses part-time and her husband owned his own business. While they were income-eligible for Head Start services (as were all families in the sample), Kristen reported that the family was relatively financially stable. As a result, she did not see her schooling as a financial necessity. “I didn’t need [a degree],” she noted at her second interview, when explaining why she had not re-enrolled in school. Her decision to “devote” herself to her daughter, as opposed to going to school, must be seen within the context of having adequate financial resources. That is, it may have been possible for her to respond to the “pull” of motherhood away from schooling, in part, because she did not feel the financial “push” of motherhood to toward schooling to better provide for her children.

Context is also key to understanding why Scarlett left her cosmetology program she had begun soon after the birth of her first son:

So I had a really good [social] support group when I had [my first son]...And so that was REALLY, really helpful. [So I decided to go] back to school when he was three months old [but I] dropped out. I couldn’t do it... I was missing him rolling over ... I missed all kinds of things like his first laugh. I missed all of that. I was like okay I’m done.

Experiencing her son’s “firsts” took precedent over her educational goals. At the time, Caitlin was living with her in-laws. She had a steady partner and a host of extended family members supporting her as she raised her first child. All of them worked to help her balance her family and school responsibilities. Unlike some of the other mothers described, it was

not necessarily a lack of balance that motivated her to forgo schooling, but a desire to be present completely with her son.

Discussion: Understanding the push and pull through theories of motherhood.

McCormack (2005) described the conundrum poor mothers experience as they negotiate the cultural narratives of economic self-sufficiency along with cultural narratives of motherhood. On the one hand, an “American Dream” narrative communicates that the poor are expected to dedicate an inordinate amount of time to human capital development—education and/or paid labor—to pull themselves out of poverty. However, the cultural ideal of motherhood suggests that “good” mothers forgo work outside of the home so that they can devote their time to raising their children. It may be impossible for women to live up to both norms (McCormack, 2005). These conflicting ideologies were also reflected in the ways that women in this sample described motherhood, and caring for their children, as equally strong motivations to both pursue *and* to forgo more schooling. These contradictions were best represented by Caitlin, the mother whose narratives opened this section. Her children were simultaneously the reason she had pursued numerous education options, and the reason she had yet to earn to a degree. As echoed by other women in the sample, she evoked an “American Dream” narrative in her desire to provide a better life for her family, while also believing that she needed to be home to devote more time to her children.

In negotiating these competing demands, mothers in the sample described their motivation to pursue, and not to pursue, additional schooling, by evoking different ideologies of motherhood. In describing why they had left school, or decided not go, some women in the sample ($n=11$) relied on the tenets of intensive mothering (Hays, 1996). For

example, both Scarlett and Kirsten described forgoing school to devote time to child-rearing activities (e.g., home-schooling, and experiencing a child's developmental milestones); their decisions and motivations reflected the belief that mothering is time-intensive, child-focused, and should be a woman's first priority (Hays, 1996).

And yet nearly all of the women in the sample ($n=15$) also described the ways that engaging in more schooling would be beneficial for their children. These mothers spoke of being motivated to go to school to provide for their children financially, and to give them an example of educational success. These motivations reflect an alternative view of motherhood that contrasts the ideas of intensive motherhood in important ways. Namely, these mothers' beliefs suggest that "good" mothering can include time spent on education and employment, and thus time *away* from children. Other scholars have documented the ways that low-income mothers believe their human capital development is good for their children, despite the time it takes from their families. For example, Haleman (2004) found that among a small sample of single mothers enrolled in post-secondary education, all the women felt as if they were acting as positive role models for their children. Perceiving their schooling in this way helped the women compensate for the time away from their children. The mothers in this sample echoed the desire to set an example for their children, and they also evoked the idea of "mother as a provider" (Christopher, 2009; Hagelskamp et al., 2011), when suggesting they were motivated to attend more schooling to give their children "something better." In this way, women's labor market and financial goals (steady employment and higher income) were tied to their responsibility as parents.

In addition, the general financial and employment circumstances women faced provided important contexts within which mothers managed the push and pull of motherhood toward and away from schooling. No clear explanatory patterns emerged, as

women's financial need, particularly with reference to caring and providing for their children, seemed to inform their schooling decisions in a variety of ways. Take Celine, for example, whose decision to prioritize her children by forgoing more schooling seemed connected to the sense of family-work life balance, and financial security her stable job provided. By contrast, Harmony decided to forgo employment while in school and endure temporary financial hardship to better provide for her children in the long run. The importance of family's economic needs to mothers' human capital decisions is consistent with evidence in the extant literature. Hattery's (2001) in-depth study of how women from different social classes balanced employment and parenting indicated that economic need and women's motherhood ideology were two of the most salient forces influencing women's decision to work. As was true in this sample, Hattery's (2001) work revealed substantial diversity in the ways women responded to their circumstances.

Finally, it is noteworthy that the description of schooling as something that helped mothers work toward "good mothering" was more prevalent than the descriptions of schooling working against the idea of good motherhood. On the one hand, this may simply be an artifact of the sampling process as women were selected into the study based in part on their interest in continued schooling. Women with this sort of interest may be more likely to see their education as generally positive for their children. Yet, even given the sampling frame, this trend may represent evidence of what other scholars have described as a possible cultural shift in the relationship between motherhood and human capital development (including both employment and schooling). In their (1997) study of the experiences of low-income women receiving federal cash assistance, Edin and Lein found that nearly all women in their sample of over 200 mothers interviewed in the late 1980's to the early 1990's expressed the idea that going to work conflicted with their conception of good mothering.

The low-wage work most women in the sample had access to came with few benefits, meager salary, and variable schedules that made it difficult to provide consistent, adequate financial or social resources for their children (Edin & Lein, 1997). However, Halpern-Meekin, Edin, Tach, and Sykes (2015) described a starkly different pattern in their more recent study of working families interviewed in early 2007. Among this sample of families (all of whom were income-eligible for the Earned Income Tax Credit, a federal tax credit for lower-income working adults), Halpern-Meekin et al. (2015) found that few mothers described a fundamental conflict between working and motherhood. While many discussed their difficulties balancing work and family, the women in the sample stressed the benefits of employment for their children, far more than the challenges. Employment was described as central to good mothering. Indeed, the authors noted the “sharp change in the view of work in relation to parenthood” (Halpern-Meekin et al., 2015, p.120) when comparing the interview responses of the interview sample from the late 1980’s/early 1990’s to those from 2007.

The narratives of the mothers in my sample may suggest that this shift in perceptions of motherhood and work may also extend to women’s views of motherhood and schooling. Although the sense of contradiction was clear in the ways that women saw motherhood as both a reason to pursue, and to forgo, schooling (and many mothers decided ultimately that they could not combine motherhood and education), nearly all of the mothers believed that getting an education would benefit their children in one way or another. This suggests, as Halpern et al. (2015) asserted, that the belief that a woman’s human capital development is fundamentally in conflict with core values of motherhood may have changed.

However, important differences exist regarding the policy and cultural contexts surrounding low-income women’s work and low-income’s women’s schooling. Namely, the

“work first” mentality of welfare reform created a policy context in which low-income mothers were encouraged to be employed. The shift in ideology Halpern-Meekin et al. (2015) identified may be a cultural response to the conditions created by PRWORA. However, while PRWORA incentivized work, it discouraged low-income parents’ educational pursuits. In this way, women’s inclination for work might be *because of* the policy context, while this sample’s penchant for education is *despite* the policy context. This phenomenon begs the question of whether new policies encouraging or supporting low-income parents’ continued education might further shift cultural values and beliefs regarding the necessity of education for low-income adults with children.

The Importance of Mothers’ Personal Motivation for Schooling

While nearly all mothers in the sample evoked motherhood in describing their motivation for schooling, children were not the only driving force in their educational pursuits. Over half of the sample ($n=11$) listed *themselves*, or what I will refer to as “personal motivation” for going back to school. In addition to citing their children, and increased income and financial stability as reasons for pursuing more schooling, these women communicated the importance of their own personal fulfillment in the educational process. Specifically, women described (a) how going to school would make them “better”; (b) how they were motivated to go to school by a desire to learn, or to strive for academic excellence; and (c) how they were motivated by their dedication to a particular career field.

What is most striking about women’s personal motivation for schooling is that it appears to be connected to the success with which they were able to act on their interest in pursuing more education. Ten women in the sample pursued additional education successfully during the data collection period. This includes women who were enrolled in school at wave 1 only ($n=1$), enrolled at both interviews ($n=5$), and women who enrolled in a

program between their first and second interview ($n=4$). All but one of these women evoked personal motivation for schooling; only two mothers who articulated a personal motivation for education were not in school. By contrast, only 1 of the 7 women who did not cite personal motivation enrolled in schooling during the study. This pattern suggests the importance of women's personal motivation to their school success. I discuss how women described their motivations in more detail below.

“School would make me better.”

I always felt like school would make me better...so I always felt like everything is going to be okay. I always say I know it's hard now but just think about when you're done, you can do whatever you want. *(Tamia, 28-year-old mother of 2 (ages 4 and 6); enrolled in an associate's degree program at both interviews)*

...If anything, [going to school] made me feel more confident about myself and like I'm doing something right... *(Cabrina, 26-year-old mother of 2 (ages 3 and 4); not enrolled in school at her first interview; enrolled in an associate's degree program by her second interview)*

[Getting a GED] just makes you look like a better person, like you got it done...it made me look like a stronger person because of what all happened at that time in my life that I went out and did it all on my own... made me feel more confident in myself that I could do it on my own. *(Suzanna, 21-year-old mother of a 2-year-old son; not enrolled in school at her first interview, enrolled in a college-prep educational program by her second interview)*

Tamia, Cabrina and Suzanna all described how attaining more education made them feel “better”, or more “confident”, as people. These quotes are representative of these women's experience and others who described similar personal motivations for schooling. As is seen in Tamia's words, some mothers' descriptions of their desire to feel, or to be, “better” were non-specific. That is, these mothers did not articulate specific goals for their learning or education (as will be described below), but rather their desire to be “better” seemed to be related to a general sense of self, or beliefs about how their lives should be.

Kristen, a 40-year-old mother of five children, spanning in age from 3-20 years-old, connected her lack of college education to broader assessment of her life in general. “I just

decided that I wanted to go back to school...I wanted to get a college education...That's one of the things I regret is never going to college and kind of just wasting my life." She implied that going back to school made her feel as if her life had not been "wasted." Indeed, Kristen had overcome a very turbulent past. Early in her adult life she struggled with drug addiction; she described the 15 years following her high school graduation as her chaotic "party-life" that took a toll on her three eldest children (all teenagers at the time of the study). She turned her life around 5-6 years prior to our first interview, including overcoming her addiction and meeting her husband. She spoke at length about her desire to provide a stable, happy, "good" life for herself and her family. Enrolling in college, a long-time goal, was an important part of her transition. Her words suggested that continuing her education was a key component of achieving the "good" she was working toward, and no longer feeling as if her life had been "wasted." Her schooling was a way of undoing past mistakes.

Caitlin, the mother who we met at the start of the previous section, also recounted how positively she felt about herself when she entered her first Associate's degree program. "I was so excited to go. Everyone was telling me I couldn't do it and when I walked into that building with my backpack, I felt awesome. I felt awesome. It didn't turn out to work but I'll try another one." As she indicated, this attempt at school was not successful (she left after a few semesters), but that "awesome" feeling of pride was a strong motivator, and contributed to Caitlin's decision to continue to pursue additional education programs, even after multiple failures.

When describing how she defined success in education, Harmony revealed that she was motivated to persist in her degree by a desire to "finish what she started." Doing so would help her to feel successful:

Interviewer: How do you define success in education?

Harmony: Education, finishing what you start...this is why I'm still hanging in there. In education...as long as you finish what you've started...Then it's successful. Even if you finish with all C's, if you finished it, you know, even if you never get a job in that field, as long as, you know, you set out to do it and you did it. So, finishing what you begin is what I've been trying [to do] ...

Similar to Caitlin, Tamia, Suzanna, and Cabrina, Harmony evoked a non-specific sense of success that was connected to seeing her program through to the end. She communicated that, even in the face of academic or labor market difficulties, finishing school would still lead to a sense of pride in her accomplishment.

Desire to learn and achieve academic success. For some mothers, their personal motivation was tied explicitly to a desire to learn and achieve academic excellence. For example, Scarlett, a mother enrolled in a medical assisting program at both waves talked at length about her desire for "more knowledge." Before enrolling in the program she was employed as an esthetician. While in this job, she realized she was curious about the science behind her work. "Once I started doing facials [and I thought] I want more knowledge. I want to do more." She described how her cosmetology certificate (which she had earned previously) was "not enough;" Her desire for more skills and knowledge was driven both by her internal curiosity and her dedication to her profession.

Harmony's academic success in school not only pushed her to persist in schooling but played a role in her setting new goals for herself.

...What I like about my time [in college] is it has taught me to not underestimate myself because at first I was going into it like what if I'm not as smart as everybody else, what if I can't keep up and then when I got there, I was like I'm smarter than a lot of people...It's like the first semester when I got all A's... So it's like I've proven to myself... [that I] can do this. You are smart enough. You can do whatever it is you want to do. I never looked at myself as going to college for four years after I had children because it just didn't seem logical [but], I enjoy going to school so... I don't mind going ... longer than I initially thought I would want to go.

As her quote indicates, she had never planned on working toward a 4-year degree, but her good grades motivated her to set longer-term goals, specifically an Associate's degree that

would transition into a Bachelor's program. Her experiences in the Associate's degree program stood in contrast to her past schooling. She described a lack of confidence in her academic ability while in high school, and her repeated failed attempts at attaining her GED as an adult. Her current success in school seemed to change what she thought was possible for herself and improved her academic self-efficacy.

For Celine, achieving academic success gave her a much needed boost of confidence and motivated her to continue working toward her degree. She recounted how she did in her last attempt at earning an Associate's degree.

When I went back to school I [got] 98% in [my government] class... and then in elementary statistics I had gotten 105%. So that was a really big [deal], especially since the first time I went to college, I just bombed it...I think it was a lot more difficult for me coming back because... once you quit school it's hard to get back into it to be motivated to do it and then working and having the kid. Everyone's like it's going to be really hard, you're going to struggle, you know?... [But] it really wasn't that hard... [doing so well]...was really motivating

Celine is an interesting case in that she was not a mother who enrolled in school during the study. In the quote above, she was recounting her experience in a past program that she did not complete due to becoming pregnant with her second child. Celine was not enrolled in school at wave 1, nor wave 2. Although Celine had the experience of being motivated by achieving academic success, other priorities—namely raising her children and full-time employment—kept her out of school. While mothers' academic success was a clearly motivating factor for some, it was not enough, in all instances, to enable all women to persist in school.

Personal fulfillment. Finally, some mothers described being motivated to pursue their schooling based on a desire to feel a sense of fulfillment and purpose in their career. As documented by other researchers, individuals who go into nursing and other careers in the medical field often do so in part because they feel called to care for others, citing the

satisfaction derived from this sort of work (Eley, Eley, Bertello, & Rogers-Clark, 2012).

Some women in my sample evoked these same ideas. For Arlene, nursing was a part of her family legacy. “[Nursing is] something I always wanted to do. My great-grandmother was a nurse ... My cousin was a nurse. My grandmother before my great-grandmother was a nurse...there’s nurses in our family.” And yet her motivation to be a nurse extended beyond her desire to follow in her relatives’ footsteps. She had a particular idea of the kind of nurse she wanted to be:

[I want to be] able to care for people...Because people when they’re sick they’re vulnerable. So a lot of them don’t have options, they’re out of options... we’ve all had bad nurses. Bad doctors...I want my patients to leave thinking oh my gosh she was such an awesome nurse. Thank you for caring for my mom. Thank you for caring for my son. Thank you.

Arlene was motivated to go to school so that she could be a caregiver for people in need; working toward this goal helped her to persist through school. Similarly, Scarlett, who was enrolled in a medical assistant’s Associate’s degree program at both of her interviews, hoped to use her degree to provide dermatological services for low-income women. Although she made clear in both interviews that going to school and attaining a career would help her to better support her children, she also described being motivated by the social value she saw in her future career:

I’m not in it for the money. I don’t want to drive a Mercedes. I don’t need all of that. I want to cater to the people who deserve it. I want women, single women who are raising their children or low-income families...That’s...where my heart is...

In addition to the women’s desire to help others, some mothers in the sample described being motivated to go to school to attain a career they would enjoy. Some mothers spoke at length about their dissatisfaction cycling through various low-wage jobs in which they had no interest, and how schooling as a pathway to employment that would bring a sense of fulfillment. As Cabrina put it when describing her degree in physical therapy, “I’m

working toward my passion...I finally found what I wanted to do and go to school for it...”

When our research team first met Cabrina, she had recently spent a month in jail; as a result, she lost her family’s apartment and her sons spent the month bouncing between different family members’ homes. She described the hardship this put on her family and how eager she was to provide her boys with a renewed sense of stability. In addition, her involvement with the justice system had caused her to lose a job in healthcare, a position she enjoyed. She liked “helping people” but, at wave 1, she was only able to secure a job in fast food. Her enrollment in school was a first step toward returning to the type of career that brought her a sense of fulfillment while also allowing her to care for her sons.

For Harmony, the mother of 4 we met earlier, seeing the connection between her schooling and the ability to have a job she would enjoy doing motivated her to pursue, and finally attain her GED after many previous failed attempts. During her first interview, Harmony described an incident a few years prior when she was interested in applying for a teacher’s assistant position in her son’s Head Start classroom. At that time, she did not have a GED and was ineligible to submit an application:

...All you had to do was have a GED and they were going to train you and I just felt so bad. I just wanted to cry right there on the spot. I’m like all I need is a GED and I don’t even have that. So at that point I was like no.... I can’t just keep... working at the [Fast food restaurant...Not knocking anybody that does because if it pays the bills, it pays the bills...but...I wanted to be able to do something that I would’ve enjoyed doing and I know teacher’s assistant wouldn’t have made me a millionaire but it was something that I would’ve enjoyed...

Harmony made clear that her interest in the teacher’s assistant position was not only about her take-home pay, but about how the position would make her feel. Similar to the mothers who felt that going to school would make them “better,” Harmony’s lack of a GED seemed to make her feel a sense of shame. Specifically, not having the credential kept her from being able to pursue work that for her felt worthy of her time. Harmony had attempted to get her

GED three times prior with no success; after this incident, however, she found a program that worked for her and she attained her GED in 3 months. She attributed some of her motivation to realizing that more education was the clearest path to employment would satisfy her.

Discussion: Personal motivation in context.

Personal motivation as counter narrative. The personal motivations of the women in this sample present an important counter-narrative to the prevailing research and policy discourses surrounding low-income women's human capital decisions. As described in the literature review, 1996 welfare reform took a "work first" approach to moving low-income parents off public assistance. Scholars argue that the legislation, and resulting policy changes, not only made it more difficult for low-income parents to engage in schooling while receiving benefits (Kahn & Polakow, 2000; Polakow et al., 2004), but it communicated an ideological stance toward the human capital development of low-income mothers that devalued their educational pursuits (Adair, 2001). Further, the human capital development of low-income parents—including opportunities for training, education and employment—is justified primarily by the potential for improved labor market outcomes, and increased income (Polakow et al., 2004). Of course, improving the financial standing of low-income parents is a necessary goal, yet little attention has been paid to their personal motivations, and interests in developing their skills. The voices of parents are largely absent from this literature.

Despite this policy context, and the financial and logistic constraints of their own lives, the women in the sample resisted the notion that they were not worthy of fulfilling educational experiences and employment endeavors. The mothers in this sample were, indeed, motivated to go school to achieve financial stability and provide for their children,

yet they also spoke at length about motivations for schooling that went beyond financial gain. Women were driven to attend and persist in school by an intrinsic desire to learn and by their belief that attaining more schooling would help them develop the personal character to which they aspired. Many of the women in the sample were also motivated by a sense of mission in their desired careers. The prevalence of this theme in the response of mother sample is certainly related to the fact that mothers were selected into the study based on their interest in nursing. Yet, there were also mothers whose personal motivations were not only tied to a desire to help others, but to honor their own interests. Mothers' perseverance in the name of a fulfilling career is counter to the notion that low-income women should take the first job available to them in order to improve their economic standing. The mothers in this sample wanted to improve their financial stability, but were committed to the idea of a career of their choosing, and believed they could accomplish this goal by cultivating their skills through continued education.

Given the literature on motivation and achievement, it is not surprising the mothers who evoked these counter narratives via their personal motivation, along with being motivated by their children, were more likely to show progress toward their educational goals. Intrinsic and extrinsic motivation are thought to be critical for educational success (Ryan & Deci, 2000; Vallerand & Ratelle, 2002); mothers in the sample described both. Some women, like Harmony and Scarlett, expressed a strong desire for more knowledge, highlighting the importance of intrinsic motivation for schooling. And, nearly all mothers in the analytic sample described how they were motivated to use their education to find stable employment and earn more income, making clear that extrinsic factors were important as well.

Personal motivation as redemption. The words of the women in this sample echo those in Wendy Luttrell's (1997) study of low-income mothers enrolled in adult secondary education classes in both Philadelphia and South Carolina. The women Luttrell met described how they had enrolled in schooling to “become somebody” (p.1), and explained the ways that receiving a high school diploma was somehow “self-defining” (p.1). Luttrell discussed how the mothers she interviewed saw their adult education as a way of building a new sense of self by counteracting the negative schooling experiences they had endured as children in K-12 education systems—including attending schools with poor resources, outright discrimination from teachers, and discouraging parents.

The women in my sample also seemed to engage in a process of reworking or re-establishing their relationship with school after a previous experience of educational failure or life hardship. Mothers’ return to school served as a way for women to re-write the negative “scripts” or narratives, of their lives. Indeed, all but one of the women who articulated personal motivation for schooling had the experience of dropping out of high school due to turmoil at home, quitting a past post-secondary education program due to lack of preparation, or a life hardship (e.g., substance abuse, or prison time) that derailed their human capital development. In this way, mothers’ personal motivation for education—and the positivity and personal growth associated with their schooling—took on a redemptive quality (McAdams, 2006; McAdams, Reynolds, Lewis, Patten, & Bowman, 2001), serving to “right” the past “wrongs” in their educational and life experiences.

In research on how individuals use narratives to develop and understand their identity, McAdams (2006) described the prevalence of redemption themes or “deliverance from suffering to an enhanced status or position in life” (p.81) in the ways some adults make meaning of their life stories. In this study, the idea of redemption was evident in the ways

that women described how school would make them “better” after a past struggle, or in the motivation that derived from new-found academic success after previous failed attempts at school. For example, Suzanna, the mother of a two-year-old son whose words opened this section, described how earning her GED made her feel like a stronger person after her unstable family life caused her to leave home and quit high school. There is also Cabrina, who saw her enrollment in school, and long-term goal to be a physical therapist (a career about which she was passionate) as a means to get her life back on track after a stint in jail. In evoking these personal motivations for schooling, the mothers in this sample not only asserted themselves as worthy of fulfilling educational experiences, but made sense of, and overcame, past negative experiences in their lives.

Implications

The mothers in this sample described varied and complex motivations for additional schooling while raising a young child. These analyses suggest that their responsibility to their children and personal motivation for schooling, were two salient factors in their decision to pursue, or not to pursue, additional schooling. These two broad sources of motivation likely work in concert to influence women’s educational pursuits. For example, women’s personal motivations may be important as they negotiate the push and pull of motherhood toward, and away from, schooling. Mothers in the sample believed that enrolling in continued education had potential benefits for their children, yet they also described the worry that schooling can (and in many cases did) result in substantial time away from their families. It is possible that when mothers saw their schooling as beneficial to themselves, as well as being positive for their children, they were better able to reconcile the time spent away from the home, and ease the tension between the push and pull factors. This may be why mothers who articulated personal motivations were likely to have been enrolled in school by their

second interview. Similar hypotheses have been presented with regard to mothers' employment decisions. Both Hagelskamp et al.'s (2011) work with a sample of low-income women, and Hattery's (2001) investigation of women from a range of social classes suggested that the extent to which mothers found employment personally fulfilling helped to resolve the conflict some women felt when working and raising children.

The potential benefits of integrating what mothers want for themselves along with their responsibility to their children may have implications for policies and programs aimed at increasing the educational opportunities for parents in low-income communities. In recent years, there has been renewed attention to the creation of two-generation interventions in low-income communities (Chase-Lansdale & Brooks-Gunn, 2014; Shonkoff & Fisher, 2013). Typically, these programs pair high-quality early education services for children, with educational and/or workforce opportunities for parents. Some of these programs are built on the premise that early childhood services are “an ideal context for recruiting parents into postsecondary education and training programs and promoting their success over time” (Sabol et al., 2015, p.1).

The findings from this study that mothers' success in school is related to both their personal fulfillment, and the extent to which they see their educational pursuits as good for their children, provide further evidence of the value of pairing early childhood centers with education for parents. Specifically, early childhood education centers may have the unique ability to support both parent and child simultaneously. As described in Sommer et al.'s (2012) work with mothers of young children enrolled in preschool, some women feel a strong sense of motivation to build their own skills after seeing their children thrive in an educational setting. As such, early childhood programs may foster parents' interest in school, providing an opportunity for parents to identify their sources of personal motivation, and

see a positive connection between their own schooling and their children's development (Sommer et al., 2012). In addition, extant research also describes the ways that early childhood centers can serve as a setting where parents form social ties with each other, and other community members (Small, 2009). Importantly, social ties and connections have been linked to low-income students' success in post-secondary education (Wells, 2008). The bonds that parents form as a result of their engagement in an early childhood community, or a two-generation intervention, may help them to stay motivated and persist through personal and academic challenges while in school (Sabol et al., 2015; T. Smith, Douglas, & Glover, 2012).

Clearly, the provision of child care is an obvious benefit to two-generation programs. Parents' inability to find reliable, safe child care can serve as a barrier to continued education. Pairing early childhood education with parents' education may provide an important structural support, giving parents peace of mind that their children are safe and developing well while they pursue their own skills. Based on the results of this study, this peace of mind is key if parents are to see their schooling as positive for their children. Indeed, a recent evaluation of *CareerAdvance*[®], the two-generation program described in the methods section, found that the rates of persistence and degree attainment of parents in the program were substantially higher than the national averages of completion and persistence in post-secondary, education-only programs (Sabol et al., 2015). The connection to the early childhood centers, and specifically, the integration of parent and child needs, may be key to the program's success.

The ways in which mothers were motivated by both their personal fulfillment, as well as the needs of their children, also highlights the complexity of the lives of student-parents as compared to adult-students without children. Scholars argue that because of the

unique life circumstances of non-traditional students, like student-parents, educational institutions may need to provide additional services for this population to ensure their success (Tett, 2000), particularly in the form of increased college- and career-advising (Bragg et al., 2007). Tailored educational services may be particularly important, given the changing nature of, and societal feelings toward, post-secondary education. Specifically, over the last many decades, scholars have noted a shift to a “college for all” mentality (Rosenbaum, 2001). Citing the work of Max Weber and others, Goyette (2008) described how, traditionally, only the elite viewed college education as part of the process toward becoming “cultivated,” or learned and complete individuals. But, as educational expectations have risen across social classes, individuals from less economically-privileged backgrounds have also begun to see continued education as a necessary milestone in their development Goyette (2008). The personal motivations of mothers in this study may reflect this trend.

When viewed with a focus on creating equitable experiences and opportunities across social classes and life positions, mothers’ personal motivations for their educational pursuits are positive and encouraging. Mothers living at or near the poverty line should be afforded the same opportunity as affluent young adults to experience continued education as a part of their personal development. However, it would be naive to suggest that women’s personal motivations are, or should be, the only driving force behind their schooling. Economic returns are important; indeed, nearly all the women in the sample were also motivated to go to school to attain economic security and better provide for their children.

Unfortunately, adults who enroll in school do not always realize the economic returns of more education. As noted, the literature describes substantial barriers to educational completion for student-parents and low-income students. Low-income students often follow educational paths that do not lead to a degree (Goldrick-Rab, 2006), and leave

school in substantial debt (Goyette, 2008). Other work indicates that even among students who do finish, low-income individuals may be more likely to earn degrees that do not translate into employment that allows students to pay off their loans (Thomas, 2000). With these facts in mind, I return to Harmony's quote above, in which she said that she would still see her education as a success even if she "never [got] a job in the field." While the longer quote communicates the ways in which her educational experiences were a source of empowerment, whether her schooling should be considered a success if it led to no financial gain is worth discussion. Harmony faced substantial financial constraints—she is a mother of four whose only source of income, at her second interview, was her financial aid. Her education came with an investment of time and money, and represented a loss of potential income given that she did not work while taking classes. If Harmony were unable to find a job post-graduation, even if she felt a sense of pride and personal fulfillment from finishing school, would her efforts have been worth it?

It may be important for women like Harmony, and the mothers in the sample, to honor their personal motivation, while also accounting for their economic needs and family circumstances. However, low-income and non-traditional students often begin their schooling with limited information about their educational options, or how to select a program that is aligned with their goals and needs (George-Jackson & Gast, 2015). College and career advisors in high schools, adult education services, and post-secondary education institutions can play an important role in supporting students as they navigate these demands (Bragg et al., 2007). In some educational settings—those with more affluent populations—career advising focuses on helping students find their passion, or the career best suited to their interests (Brown & Lent, 2005). College and career advisors who work with low-income and non-traditional students may need to take a more context-based approach to

advising and supporting student-parents' human capital and educational decisions (E. P. Cook, Heppner, & O'Brien, 2002). Due to constrained resources, it may not be possible for low-income parents to pursue whatever degree they find most intellectually appealing (recall Caitlin who wanted to study criminology, but felt the timeline was too long given her children's needs). Instead, their choices must fit into the context of their lives and future economic goals. At the same time, however, finding a path that is aligned with parents' goals and ideals may also be key to their success. In an ideal world, mothers like Harmony will find programs they find fulfilling, while also knowing that their efforts will lead to employment and stable income; context-based advising may help parents find a balance between these different needs. Indeed, research suggests that education and workforce development programs that serve low-income adults successfully often include intensive career- and college-advising services to support students as they make important workforce and educational choices (Bragg et al., 2007; Park, Ernst, & Kim, 2007; T. Smith et al., 2012).

Limitations

These implications must be considered and interpreted conservatively given the limitations of this study. With a sample size of only 18 women, these findings are far from generalizable to a larger population of low-income mothers with young children. In addition, this sample represents mothers with children enrolled in an early childhood setting with a pre-existing commitment to improving educational opportunities for parents (i.e., a program already implementing a two-generation intervention). While the parents in this analytic sample were not part of the intervention sample, the culture of the early childhood setting may have changed the ways they thought about the feasibility of continued education. The mere presence of *CareerAdvance*[®], or seeing their peers go through the program, may have made the mothers in this sample more inclined toward schooling. In this way, the

motivations and experiences of the women reported here may differ from those in settings where the possibility of continued education is more distant.

In addition, all the women in this sample had preschool-aged children. While most ($n=16$) had more than one child, many of whom were in middle childhood or adolescence, the interview questions regarding mothers' schooling and their parenting were focused on the preschool-aged focal child. How women understand the relationship between their responsibility to their children and their human capital decisions may change as children age. In this way, the results may not generalize to women with older children.

Conclusion

Despite these limitations, this work makes an important contribution to the literature by turning attention toward mothers' motivation for schooling. By privileging women's voices and their personal reflections on their educational goals and experiences, this analysis represents a departure from the extant literature, which focuses primarily on the structural barrier mothers face to schooling. In doing so, this work offers a new perspective on understanding how to conceptualize and support low-income mothers' educational pursuits.

Tables

Table 1. Statistics Describing Selected Characteristics of Mothers in the Sample

	mean (sd) or ~%
Age (range:20-45 years)	28.05 (6.33)
<i>Race</i>	
White	50% (<i>n</i> =9)
Black	39% (<i>n</i> =7)
Hispanic	5.5 % (<i>n</i> =1)
Native American	5.5 % (<i>n</i> =1)
In a steady romantic relationship	44% (<i>n</i> =8)
Another adult in the home	67% (<i>n</i> =12)
Employed	50% (<i>n</i> =9)
<i>Education level</i>	
Less than a high school degree	11% (<i>n</i> =2)
High School Degree	22% (<i>n</i> =4)
GED	17% (<i>n</i> =3)
Technical Certificate or Diploma	50% (<i>n</i> =9)
Income-to-Needs Ratio < 1 *	61% (<i>n</i> =11)
Age of Focal Child (range: 1-5 years)	3.6 (1.18)
Total number of children in home (range: 3-8)	4.22 (1.47)
<i>Educational Involvement</i>	
Enrolled in an Education Program at wave 1	33% (<i>n</i> =6)
Enrolled in an Education Program at wave 2	50% (<i>n</i> =9)

Note: All information pertains to wave 1, unless noted otherwise; * missing data for one participant

Appendix A

Propensity Score Matching

Two sources of data were used to estimate the propensity scores: demographic information from CAP Tulsa's administrative data, and information on parents' interest in, and motivation for, additional schooling from an Education Supplemental Survey (a component of CAP Tulsa's Family Needs Assessment). The research team first created subgroups of families that were an exact match on four characteristics related to parents' human capital outcomes and family well-being: gender, race, relationship to child (parent or grandparent), and neighborhood. Within these subgroups (e.g. Hispanic mothers in neighborhood 1) the research team used a logistic regression model to predict parents' probability of participation in *CareerAdvance*[®] with demographic information from CAP Tulsa's administrative data. These probabilities became the propensity scores used in the matching process. For each *CareerAdvance*[®] enrollee, a matched-comparison group member with the closest propensity score to the enrolled (their nearest neighbor) was selected and recruited into the sample. In cases where the nearest neighbor could not be recruited (e.g. the family could not be reached or refused), the next nearest neighbor was selected.

Appendix B

Interview Protocols

Wave 1.

Focus on Family and Child

1. How many children do you have and how old are they?
 - a. Do they all live with you? Is there anyone else who lives with you or is present in your lives regularly? *[Probe for relationships with these persons]*
2. I want to learn more about CHILD that attends CAP/CENTER. How is she/she doing?
 - a. Please tell me a bit more about how things are going with CHILD at home? At school? How is his/her health?
 - b. Please describe any recent changes in CHILD's life in the last year.
[Probe for changes in health / where CHILD lives / who takes care of CHILD / where child goes to school/day care]
3. How about changes in your life or your family's life?
[Probe for changes in health / relationships / employment / school / training]

Experiences at CAP

1. How long has CHILD been attending CENTER? What led you to enroll CHILD here/there?
2. Overall, what has CHILD's experience at CENTER been like?
 - a. In what specific ways has this center helped CHILD?
 - b. How are you involved at CENTER? [Please tell me about specific events or activities you are involved in and what you do].
3. How has CHILD's enrollment at CENTER affected or influenced YOU?
 - a. Has it influenced how you think about education? How so?
 - b. What are some other advantages and disadvantages of being at CENTER?

Work Experiences

1. Are you currently working at a job? *[Choose most recent job]*
[If NO] Have you worked at any job in the last few years?
 - a. Please tell me about this job *[Probe for title and what they do]*
- What hours do/did you work? How do/did you feel about your earnings at this job?
2. *[If in training or school]* How has your work changed now that you are in school?

[Probe for working less/ different hours, doing different work]

- a. What benefits or challenges have you faced with these changes?

Educational/Training Experiences (as applicable)

1. Let's talk a little about your own school experiences in the past, from middle and high school. What were your school experiences like?
 - a. Was this in the US or another country?
 - b. What kind of student were you?
 - c. What did you like about school? What didn't you like?
 - d. Who was involved in your education or school experiences?
 - Who, if anyone, helped you with your schoolwork?
 - e. Who were your role models, or anyone you looked up to?
 - f. Please tell me a bit about what your life was like at the time. *[Probe - Were there any things going on or any people in your life that affected your schooling, positively or negatively?]*
2. *[If schooled in the US]* Did you get a high school degree?
[If schooled abroad] Did you finish school and get a degree or diploma? *[Gather information on the degree and its equivalent in the US]*
 - a. *[If NO]* What was going on in your life at the time that you left school?
 - b. Did you earn a GED [in the US]?
 - c. *[If YES]* Can you tell me a little about when you got it, and what prompted you to complete it? What was that experience like for you?

[If NO] Do you have plans to complete a GED?
 - What kinds of supports or help would you need to obtain your GED?
 - What might stop you or keep you from pursuing it?
3. Have you pursued education beyond high school?
4. *[If NO]* Are you interested in enrolling in school or training in the future?
 - a. What are the main reasons you would want to enroll in school or training?
 - b. What kinds of things or circumstances would prevent you from enrolling in school or training and what would help? *[Probe for problems with finances, transportation, child care, class schedules, personal problems, balancing with family, balancing with work].*

[If YES or about to start one -- Ask about past AND current AND upcoming programs]

5. Please tell me about the first/second/current... program.
 - a. What was/is it like? *[Probe for area of study, length of program, and type of degree/certificate]*
 - b. How did you find out about it?
 - c. What motivated you to enroll or plan to enroll in this program / course?
[Probe for role of health field in decision]
 - d. When did you/will you start this program?
 - e. How long did you attend / do you expect to attend this program?

- f. *[For PAST programs]* Did you complete it? *[If yes]* What degree or credential did you receive?
- g. Who has helped you so you could/can be in this program? How so?
- h. How did you pay/will you be paying for this program?
 - i. Do you have educational loan debt from this program?
 - If so, approximately how much?
 - Do you have plans to pay off this loan? If so, please explain.
- i. Did you earn a certificate or degree from this program? If yes, which one?
- j. In what ways do you think this program has benefited you/will benefit you?
 - i. In your work or job?
 - ii. For a career?
 - iii. For you or your family?

[For PAST programs, ask Q5 above for each one, then move to next page - Q6 about debt]

[For current or upcoming programs only]

- k. How far do you want to go in this program? *[Probe for degree/credential expected]*
 - Can you tell me a little about the steps you need to go through to get there? *[Probe for benchmarks, milestones, tests, GPA...]*
 - Do you expect any of these steps to be difficult? Why/how?
 - Do you expect any of these steps to be easy? Why/how?
 - How long do you expect it to take you? *[Probe for reasons for expectations]*
- l. How would you describe your study skills? *[Probe for strengths and weaknesses]*
 - *[If in a program]* When and where do you study? How often? With who?
 - What do you think might improve your study skills in the future?
- m. What aspects of this program, if any, are different than what you expected?
 - What would have been helpful to know about the program before now, that you didn't already know?
- n. Who or what helped prepare you for this program? *[Probe: Academically? Socially?]*
- o. What do you feel was the hardest to give up, in entering this program?

[If R already started the program]

- p. How are you doing in the program?
 - Where is CHILD during that time?
 - What are some things that have been difficult or challenging about this program?
 - What are some things that have been easy or positive about this program?
 - Have you thought of leaving the program at any point? What was that like? What kept you going?

- q. *[If R also works]* How has your work changed now that you are in a program?
[Probe for working less / different hours / doing different work – and challenges faced]

[If R did not start program yet]

- r. How do you think that starting this program will affect your work and family life?
- When and where will you study?
- s. What kind of job do/did you expect to get when you finish this program? What kind of pay and hours did / do you expect?
- t. Do you plan to go back to school again after you finish this program / Did you start any other program? When and for what degree or certificate?

[Loop back and ask these same questions about other past/current/upcoming program if relevant]

6. At present, what is your total educational/student loan debt?
- a. Does this debt prevent you from pursuing your educational or career goals?
If so, in what ways?
7. Does your partner, spouse or anyone else in your household have educational loan debt at present?
- a. If so, who and what is their relationship to you?
- b. Approximately how much loan debt do they have?
- c. Does this loan affect your financial circumstances? If so, how?
- d. If yes, are there household plans to pay off this debt? What are they?
8. In what ways does this loan debt affect your current financial circumstances?

Influences of Current or Recent Educational Experiences & Training on Family Roles and Parenting

[IF R IS NOT IN SCHOOL, ASK ABOUT WORK INSTEAD – IF NEITHER, ASK ABOUT “LIFE” AND KIDS]

1. Juggling school/work/life and young kids can be challenging. I’d like to learn more about how you do it. How well are you juggling the many responsibilities of children and everything else?
- a. What are some things that help you / would help you do it well/better?
- b. What are some things that get in the way / might get in the way?
- c. Who / who else has helped you juggle all these responsibilities? How so?
[Probe for changes in roles & effects on important relationships]
- d. What would you recommend to others in a similar situation [Describe their situation, e.g. “other mothers with a child at a place like CAP who is also going to school”]?
- e. If I may ask, how do you manage financially?

- Is there anything else that you, or someone else, do to bring in more income or to reduce your expenses? *[Probe for changes related to work or school]*
- f. How does going to school (work) affect your family's financial circumstances?
 - What have you had to do differently?
- g. What kinds of financial supports do you receive?

[IF R STARTED SCHOOL OR WORK – OR OTHER RELEVANT CHANGE]

2. Since you started school/work/other...
 - a. What changes have there been in who takes care of CHILD?
 - [Probe for changes in roles & effects on important relationships]*
 - b. How has the amount of time you spend with CHILD changed?
 - c. Do you spend the time you now have with CHILD differently than when you were not in school/working? If yes, how?
 - d. How has CHILD's behavior changed? At home? At school?
 - e. How has CHILD's school attendance changed? School achievement?
 - f. How has your involvement with CHILD's school changed, if it has? In what ways, specifically?
 - g. What are some positive aspects of going to school/work now when CHILD is young.
 - h. What are some negative aspects?
3. How have people whom you are close with reacted to you being in school/working?
 - [Probe for partner/parents/friends/children]*
 - a. What do they say or ask you about it?
 - b. How has it changed your relationships or friendships? *[Probe for family, partners, friends]*
 - How do you feel about that/these changes?

Hopes and Worries

1. What are your hopes for CHILD right now?
 - a. What are your hopes for CHILD's learning and development? *[If needed ask about "schooling" instead]*
 - b. What role have CAP programs or staff played in helping you reach these goals for your child?
 - [Probe for child's teacher / family support or advocate - ask for specifics]*
2. What are your worries for CHILD right now, if any?
 - a. What are your worries for CHILD's learning and development? *[If needed ask about "schooling" instead]*
3. What are your hopes for yourself right now?
 - a. Do you have any *educational or work-related* hopes or goals for yourself right now?
 - i. What about in 1 year? *[Probe – what do you need to do for you to get there?]*

- ii. What about in 5 years? [*Probe – what do you need to do for you to get there?*]
- iii. What about in 10 years? [*Probe – what do you need to do for you to get there?*]
- 4. What role have CAP programs or staff played in helping you reach these goals?
[*Probe for child's teacher / family support or advocate / (for CA ask about coaches) - ask for specifics*]
- 5. What are your worries for yourself right now, if any?
 - a. What are your *educational or work-related* worries for yourself?

General Life Reflections

Now I would like to ask you specifically about successes or crises/problems in the last year in family, work, and school, if they apply.

1. Please tell me about a time when you felt successful and things were going well with your family in the last year.
 - a. Specifically, what made this time successful for your family?
 - b. What strategies or things did you do?
 - c. Who or what else helped you succeed?
 - d. What's most important to you in your family life?
2. What about a time when things were in crisis or were not going well with family?
 - a. What was going on?
 - b. What strategies or things did you do to make this better?
 - c. Who helped or supported you? What did they do?
 - d. Some parents talk about wanting a stable family life, what does a stable family life look like to you?
3. Please tell me about a time when you felt successful and things were going well with work.
 - a. Specifically, what made this time successful at work?
 - b. What strategies or things did you do?
 - c. Who or what else helped you succeed? What did they do?
 - d. What's most important to you in your work life?
4. What about a time when things were in crisis or were not going well with work?
 - a. What was going on?
 - b. What strategies or things did you do to make things better?
 - c. Who helped or supported you? What did they do?
 - d. What are the characteristics of an ideal job or career?
5. Please tell me about a time when you felt successful and things were going well with school or classes.
 - a. Specifically, what made this time in school successful?
 - b. What strategies or things did you do?
 - c. Who or what else helped you succeed?
 - d. What's most important to you in a school program?
6. What about a time when things were in crisis or were not going well with school or classes?
 - a. What was going on?

- b. What strategies or things did you do to make this better?
- c. Who helped or supported you?
- d. What are the characteristics of an ideal certificate or degree program?

CONCLUDING THE INTERVIEW

1. Before we wrap up the interview, is there anything else you would like to tell me?
2. Do you have any questions for me?
3. My last question is about this interview, we're interested in knowing what it felt like for you to be interviewed like this. *[If needed, PROBE with how did it feel to be interviewed; how do you think we should do things differently in the future?]*
 - Is there anything we could've done while we were scheduling or setting up the interview to make it easier for you?

Thank you! Hopefully I will see you again for the next interview in about a year. In the meantime, our team will be in touch with you for other aspects of the study.

Wave 2.

I. FAMILY CIRCUMSTANCES

1. We'd like to catch up on what's happened in your life and your family's life over the past year. Please tell me about events or circumstances that have occurred since we last spoke about a year ago.

Probe for the following if not discussed:

- Moves
- What's happening in neighborhood
- Who lives in household
- Care arrangements for all children in household
- Parent's health, health of other family members
- Births or deaths

GENERAL PROBES for each:

How did you deal with this? What did you do?

How did this make you feel? In what ways did this affect you and your family?

2. Are there any other events or changes that happened in the last 12 months?

II. EDUCATION

At any point during the last year were you enrolled in educational classes, courses, or a program at a school, college or university?

[IF YES]

1. Please tell me about your experiences with each of these educational programs. *[Add to timeline, get start/end date, program name, completion, name of certificate or degree earned field, location]*
2. Who or what motivated you to enroll this program / course? *[Probe for role of health field in decision]*
3. How are you doing in the program/ How did you do?
4. Did you consider stopping the program at any point? If so why? Who or what helped you decide to stay?
5. I imagine that keeping track of school can be overwhelming sometimes. What did you do to keep track of things happening in your program, such as dates for classes or meetings, study dates, exams..?
 - a. What advice would you give other parents about how to manage their school responsibilities?
6. What changes did you have to make in your life to be in this program and be able to stay in it? *[Probe for work, other school/programs, child care, transportation, housing, finances/ loans, jobs]*
7. What did you lose or miss out on by being in this program? *[Probe for loss in personal/ social/ family/ career life]*
8. How much longer do you expect to be in this program? What are the next steps?
9. Were there times during the program when you were not taking any classes? What did you do during that time? *[Probe for strategies and supports: What did you do to plan for the next step in the program? Who helped?]*
10. If you don't mind my asking, how do you manage financially while going to school?
 - a. How are you paying for the program? *[Probe : Did you take out any loans to attend your program? Approximately how much loan debt? When do you plan to start paying it back?]*
 - b. Do you have loan debt from other programs in the past? If so, how much? In what ways does the debt affect future plans for your education or career? For your children?
 - c. Does your being in school influence your family's finances?

11. What degree/certificate do you expect to get at the end? In what ways do you expect this certificate/degree to affect your life?
12. How is this program associated with what you want to do in the future/for a career?
13. Some parents have reported that going to school made them feel either more or less self confident. Has this happened to you? [Probe: Do you feel more or less confident in your skills? Your ability to get a job? Your confidence in general?]
 - a. Did you learn anything about yourself while in the program? [Probe: Do you see yourself or describe yourself differently than before you went back to school?]

If R completed a program (continue on to question #2 below after asking this):

1. Congratulations! How did it feel to complete the program/certificate?

If R left before completing:

1. What led you to leave the program?
 - a. How did you feel about leaving?
 - b. Would you like to go back to this program? Back to school in general?
 - c. What would need to happen for you to go back?
 - d. What would help you stay in the program if you went back?
2. What have you been doing since then?
 - a. How did the program/degree/certificate influence your work? your life?
 - b. In what other ways was the program useful to you? Not useful to you?
3. Are you in touch still with anyone from the program? How so?
4. Did you have the option of staying in the program and going further? What made you decide not to do that?
5. Do you have plans to go back to school again in the future? [*Probe for what, why, how*]
6. What do you miss about the program?
7. What are some positive things about not being in the program anymore?
8. How does it affect your family, now that you are not in the program anymore?
9. Do you have plans to go back to school again in the future? [*Probe for what, when, how*]

If R was not in school/training in the last year

1. I know school is not for everyone, or necessarily helpful for everyone, but I'm wondering if you think about going back to school?
 - a. For what? What would be the benefits to you?
 - b. Is there anything in your life that you would change that would help you go back to school?
 - c. What prevents you from going?
 - d. When would be a good time?
 - e. How would you go about it?

III. EMPLOYMENT

- Employment over the last 12 months/reasons for not working
- Strategies/supports and challenges/barriers to entering, keeping, advancing in a job
- Financial circumstances & strategies and supports
- Influence of debt/financial circumstances on work and family decisions
- Conceptions of career development & planning
- Relationship between employment & education (influence of education on job selection and career development, influence of schooling on job performance/attendance, and vice versa)
- Social capital gained through employment

Did you work at any point during the last year, even if it wasn't a formal job or didn't last long?

[If NO]

1. What are the benefits of you not working? *[Probes: For you personally? For CHILD? For your family in general]*
2. What about the drawbacks of you not working?
3. Are there any specific/other reasons why you are not working right now?
4. Do you expect to work at a job in the future? When? Doing what?
 - a. How would you go about it?
 - b. What are some things that could get in the way?

[If YES]

Let's place this/these jobs on the timeline together. Are there any other jobs that we missed that we need to add?

[Ask for all jobs/work listed on Wave 2 timeline. If jobs overlap, ask about that]

1. You said that you worked as a XX this past year, please tell me more about it?
 - a. What led you to take/switch to this job? *[Probe for role of ed program]*

- b. Who or what helps you to be able to do this job? How do they help?
[Examples: Things or people that help you get to work, or do better at work, or deal with work situations?]
 - c. What are some things or people that get in the way of you doing well at this job?
 - d. Have you had the chance to move up in this job, or is there the opportunity for you to move up? [Probe for strategies/plans]
 - e. What did your schooling have to do with your decision to start this job?
 - i. In what ways does your schooling help you with your job?
 - ii. In what ways does your schooling get in the way of your job?
 - f. What did your job have to do with your decision to start this academic program?
 - i. In what ways does your job help you with your schooling?
 - ii. In what ways does your job get in the way of your schooling?
 - g. Do you have plans to change your job? Why?
 - i. How will you go about it?
 - ii. What would help? Who might help?
2. If you don't mind my asking, how are you managing financially?
- a. Is there anything else that you, or someone else, do to bring in more income or to reduce your expenses? [Probe for changes related to work or school]
 - b. What kinds of financial supports do you receive? What helps?
 - c. Do you have loan debt? If so, how much? In what ways does the debt affect future plans for your family, education or career?

Perceptions of Career Goals

1. Some people say there is a difference between a "job" and a "career". What do you think is the difference between the two?
2. At the moment, where do you think you are/would like to be when it comes to a job or career?

IV. INTERSECTION OF FAMILY, WORK, & SCHOOL:

1. Now we would like to learn more about your child(ren), how are they doing?
 - Child/ren's health
 - Changes in where each CHILD attended school or received child care over the past year

Child Care/ CAP/ SCHOOL Experiences and Transitions

1. What have your CHILD/REN's school/child care arrangement's been over the past year?
2. In what ways have each of your child(ren)'s attendance at [school/child care arrangement] changed over the past year? What are the reasons for the changes?
3. What is your relationship like with your child(ren)'s teacher/FSS/child care provider?
 - a. In what ways does your child's teacher help or support your education or career?
 - b. In what ways does your child's teacher help or support you in planning for your child's education?

4. In what ways are you involved at [school/child care]?

PROBE: [Please tell me about specific events or activities you are involved in and what you do]

5. In what ways has your work/school influenced your involvement in school/child care arrangement over the last year?

PROBE [In what ways has your time at the school changed as a result of your job/going to school? In what ways have your interactions with [your child's child care provider, teacher, FSS, other center staff] changed?

6. In what ways does your child(ren)'s school/child care arrangement influence your work/school choices?
 - a. In what ways has CHILD(REN)'S school/child care arrangements affected the number of hours that you work?
 - b. How has it affected the times you work?
 - c. In what ways has it affected your attendance at work/school?
 - d. What do you think about your child's current school/child care arrangements?
 - i. If you could change anything about your child(ren)'s school/child care arrangements, what would you change?
 - ii. In what ways would this change help you?

7. How has [CHILD(REN)'s] enrollment at [school/child care] affected or influenced YOU?
 - a. In what ways has being at [school/child care] affected your relationship with your child?
 - b. Has anything about your child's schooling influenced how you think about your own education?

- c. What are some other advantages/ disadvantages for you as a result of [CHILD] being at [school/child care]?

If TARGET CHILD started Kindergarten or transitioned out of one school/child care arrangement to another one during the last year:

1. What led to CHILD leaving a previous school/child care arrangement?

PROBE [Did child age out? Did you choose to change your child care arrangements? Why?]

2. How did [CHILD] handle this transition?

PROBE [Was s/he sad to leave teachers/ staff/ peers? What did you do to help [FOCAL CHILD] with the transition?]

3. In what ways did leaving [school/child care] affect you? other family members?

4. How did you choose the school/child care [CHILD] moved to?

Reflections on parenting

1. I would like to talk about your parenting experiences.

- a. What do you enjoy the most about being a parent?
- b. How has the way you parent changed over the past year? What do you think led to those changes?
- c. In what ways does going to school influence the way you parent?
- d. In what ways does your work or job influence the way you parent?
- e. What types of things do you usually do with CHILD during free time?
- f. Sometimes being a parent can be challenging. When you experience a challenge or have a hard time being a parent what do you do?
 - i. Where do you get parenting help?
 - ii. Who do you get parenting help from?

2. What do you do to support or encourage your child(ren)'s learning at home?

3. In what ways does being in school/work influence your children?

- a. In what ways has school/work influenced what you do with your children?
- b. In what ways has it influenced how you talk to your children about their education or schooling?
- c. How has it affected your thinking about your children's education?
- d. In what ways have your children responded to your being in school? What do they say? What do they do differently as a result?

4. What connections or links do you see between your education and your child's?

Balancing work, school and family

1. What happens if you need to take a child to the Dr., or attend a meeting at their school, or something else unexpected comes up, during your work/school hours? What do you do? How do you make it work?
2. Juggling school/work/life and young kids can be challenging. I'd like to learn more about what and how you are doing.
 - a. How well are juggling your many responsibilities?
 - b. What are some things that help you / would help you do better?
 - c. What are some things that get in the way?
 - d. Who helps you juggle these responsibilities? What do they do?
 - e. What changes, if any, have there been in who helped you handle your work/school/family responsibilities over the past year? What led to those changes?
3. Now please think of a day in the past few weeks that should have been a typical day, but something went wrong or something unexpected happened.
 - a. Please tell me about that day. Let's walk through what happened?
 - b. Who was involved?
 - c. What did you do to get through the things that happened?
 - d. Please describe what your child experienced that day.

VI. STRATEGIES FOR SUCCESS AND MANAGING CHALLENGES

- Specific examples of success and challenge in past year and how they managed or achieved it
- Advice to other parents about getting ahead and managing family, work, and school

We are almost done now, I just have a couple more questions.

1. Please tell me about a time during the last year when you felt successful and things were going well [*Probe specifically also for family, work, and school*]
 - a. What strategies or things did you do to make this time successful?
 - b. Who helped or supported you?

2. Please tell me about a time in the last year when you felt things were challenging or things were not going well? [*Probe specifically also for family, work, and school*]
 - a. What strategies or things did you do to make this time better?
 - b. Who helped or supported you?
3. What would you recommend to others in a similar situation [Describe their situation, e.g. “other mothers with a child at a place like CAP who is also going to school”]?
4. How do you define success for yourself?
 - a. in education?
 - b. with family?
 - c. in employment/career?

Appendix C

Excerpt from the Analytic Codebook

Code	Definition
Motivation to pursue or not to pursue schooling	Instances in which mothers stated reasons for their decision to enroll in continued education, or stated reasons for the decision <i>not</i> to enroll in continue education. Also include instances in which mothers mothers describe why school “is not right”
Motivation to persist in schooling	Instances in which mothers describe why, or how they persisted in educational programs. Include references to people (i.e. support from husband), financial in-kind supports (child care vouchers) and internal/ less tangible support (i.e. goals or “drive”)
<i>Sub-codes that emerged from two above</i>	
Motivation (to pursue or persist) connected to children and motherhood	Instances in which mothers describe a desire for school—both enrolling in school, or persisting in a program—connected to • providing financially for children • spending time with children • modeling certain behavior or goals for children • any connection between schooling, children, statements about motherhood/ caring for children
Motivation (to pursue or persist) connected to self (i.e., motivations <i>not</i> having to do with children)	Instances in which mothers describe a desire for school—both enrolling in school, or persisting in a program—connected to • personal goals or interests • career development (not related to financial gain) • self-esteem or self confidence

Chapter 4: Conclusion

Connections Across the Two Studies, and Implications for Theory, Research, Practice, and Policy

Through the two studies of this dissertation, I conducted an inquiry into the motivations for, and consequences of, mothers' attainment of additional education while raising a young child. In Study 1, I found evidence to suggest that children benefit when their mothers pursue more schooling. My results indicated that, on average, young children's reading, writing and mathematics trajectories showed a small upward shift when their mothers reported experiencing an educational transition. In addition, for children's mathematics trajectories, the effect of mothers' attainment of additional education varied depending on when the educational transition took place, and mothers' baseline levels of education. In Study 2, I found that mothers were motivated by the needs of their children, and their own personal goals and desires, when deciding whether or not to pursue additional education. The responsibility of caring for their children was a contradictory source of motivation for the women in my sample, both pushing them toward, and pulling them away from, enrolling in, and/or persisting through, school. I also found that mothers' personal motivations—including their desire for personal growth and intellectual fulfillment—may be related to their success in pursuing additional education.

In the preceding chapters, I discussed separately the importance of the results from each study. However, the connections across the findings also provide insights for the field. In this last chapter of my dissertation, I bring together the results from Study 1 and Study 2 by describing the collective implications for theory, research, practice, and policy.

Theory: The Bidirectional Relationship Between Parent and Child Development

Together, the results from Study 1 and Study 2 help to illustrate and extend the theory of a bidirectional relationship between parent and child development (Pettit & Arsiwalla, 2008). Existing within the larger tradition of ecological approaches to human development, the bidirectional parent-child relationship refers to the ways that parents and their children have simultaneous, reciprocal effects on one another's development (Sameroff, 2009). This idea has been used as a theoretical basis for study of developmental processes within the family unit, and a model for how parents and children grow and change together (Pardini, 2008; Sameroff, 2010). However, the study of the bidirectional relationship between parents and their children has often been limited in scope. Most research focuses on children's behavioral outcomes and mothers' and fathers' parenting practices (Pardini, 2008), such as the reciprocal relationship between parent discipline and children's externalizing behaviors (Pearl, French, Dumas, Moreland, & Prinz, 2014) or the relationship between maternal sensitivity and children's prosocial tendencies (Newton, Laible, Carlo, Steele, & McGinley, 2014). Far less attention has been paid to the reciprocal relationship between parents' experiences or life choices—such as mothers' attainment of additional education—and children's early childhood cognitive development.

I did not conduct an empirical test of the bidirectional relationship between parents and children in either study—indeed, I explored one side of the bidirectional arrow in each chapter. However, collectively, the results of this dissertation provide evidence to suggest the reciprocal nature of parent-child development. In Study 1, I found that mothers' educational transitions were associated with children's cognitive development; these results suggest that parents may affect child development. To complement these results, the findings from Study 2 indicated that the responsibility of raising a young child influenced mothers' motivations

for, and decision to, pursue additional education; this comprises evidence that children may affect parents' development.

In addition, my results indicate that child and parent characteristics may influence the nature of this bidirectional relationship. For example, the results of Study 1 suggested that the magnitude of the association between mothers' educational attainment and children's cognitive outcomes differed depending on children's developmental stage—specifically, whether children were in preschool or early elementary school when mothers' educational transitions took place. I hypothesized that mothers' increased ability to support children's learning in the early elementary grades may explain the larger effects for relatively older children. Children's characteristics also factored into how they influenced their mothers. For example, a subset of women in Study 2 described how attending to their children's unique developmental needs (i.e. care associated with an autism spectrum disorders or a chronic illness) kept them out of school. In addition, a *CareerAdvance*[®] (the intervention referenced in Study 2) implementation report indicated that parents who took advantage of post-secondary education opportunities were more likely to have children ages 3-years-old and up, as opposed to ages 0-3 (Glover, King, & Smith, 2012). Together with my results, this works suggests that the push of motherhood toward schooling may be stronger when children are older, while the pull of motherhood away from schooling may win out when children are younger.

Mothers' characteristics, too, may play a role in the bidirectional relationship between child development and mothers' educational attainment. I argued in Study 2 that the extent to which women felt their educational pursuits served their personal goals may have affected how they negotiated the push and pull of motherhood toward and away from schooling. Echoing past research, this work suggests that a mother's goals and motivations may

influence how she responds to her children's needs while also building her own human capital (Hattery, 2001). I explored the role of mothers' characteristics in Study 1 by testing whether mothers' initial levels of education moderated the effect of their educational attainment on their children's cognitive trajectories. Indeed, children whose mothers' had the lowest levels of education to start benefited the most (in their mathematics skills) from their mothers' educational pursuits.

In sum, the findings from Study 1 and Study 2 make a theoretical contribution to the literature by shedding light on an under-studied aspect of the reciprocal parent-child relationship. Although neither study captured the full extent of the bidirectional relationship, my work suggests the usefulness of applying this theoretical idea to the exploration of new and different aspects of children's, parents', and families' development.

Research: The Role of Mixed-Methods Research in Understanding Children's and Parent's Development

The results of each study raised new questions for future research. In Study 1, for example, the observed relationship between mothers' educational transitions and children's cognitive outcomes prompted questions about the mechanisms at play. Study 2 had limited generalizability due to my small sample—only 18 mothers in total. Further research might confirm whether the phenomena I observed regarding mothers' motivation for schooling also exist among women in other settings, facing different life circumstances.

In addition to these substantive implications for future inquiry, Study 1 and Study 2 illustrate the value of using multiple methods to address research questions regarding the developmental process of children and families. As Yoshikawa, Weisner, Kalil, and Way (2008) suggest in their essay on the importance of methodological diversity in the field of developmental science, "some aspects of individual behavior or contextual characteristics

can be difficult to understand using only quantitative or only qualitative methods.” This certainly proved to be true in my dissertation studies—quantitative longitudinal growth modeling was the most appropriate method to address my questions regarding children’s cognitive growth and mothers’ education. By contrast, a quantitative approach would have fallen short for the questions focused on mothers’ motivations in Study 2. For this work, a grounded-theory analysis was the best choice.

My application of two different methods, with two very different kinds of data, led to a richer understanding of the bidirectional relationship between parent and child development than either method or data source could have produced alone. Guided by my findings, and the insights of other researchers (Yoshikawa et al., 2008), I suggest that the continued use of multiple methods will deepen our understanding of human development generally, and the bidirectional relationship between parents and children specifically. Indeed, innovative research methods provide the opportunity to test empirically the bidirectional relationship between parent and children development in ways that my two studies did not. For example, it may be possible to simultaneously model parent and child outcomes across time and describe how their developmental trajectories covary in a structural equation modeling framework (Kline, 2011). Future research might explore how parents’ trajectories of reported preparedness or motivation for more schooling over time covary with children’s cognitive or social-emotional growth. Alternatively, cross-lagged path analysis applied to longitudinal data may be another way to estimate a reciprocal relationship between parent and child outcomes (Burt, McGue, Krueger, & Iacono, 2005). In addition, ethnographic methods have long been cited as a necessary tool to understand the cultural processes and routines that organize families’ lives and shape the contexts for development (Weisner, 1997). Multiple components of ethnographic data collection, including observation

of parent-child interactions, and interviews with parent-child dyads, may provide new opportunities to hear from children and parents firsthand about the reciprocal and mutually constitutive nature of their relationships (Mistry et al., in press).

Practice and Policy: Two-Generation Intervention Efforts to Promote Positive Development for Children and Families

Theory and research aside, I was motivated to conduct Study 1 and Study 2 by my desire to promote the healthy development of children and families in low-income communities. I believe rigorous research that is relevant to practice and policy has a role in remedying the socio-economic disparities in children's and families' social and educational outcomes. Indeed, the results of Study 1 and Study 2 have implications for how policy and social interventions might better serve children, parents, and families to promote positive development.

As I have discussed, my findings suggest a bidirectional relationship between mothers' pursuits of education and children's early childhood development. If this is the case, any social service intervention aimed at improving cognitive outcomes for children, or educational outcomes for parents, may have more success with a two-generation approach, a service-delivery model that simultaneously attends to the needs of both parent *and* child. Indeed, the idea that capitalizing on the reciprocal nature of parent and child development will promote positive outcomes for the whole family is a core component of the two-generation theory of change (Sommer et al., 2016).

A two-generation approach to service-delivery for low-income families is by no means a new idea. In 1965, Head Start was founded on the concept that providing services for parents and children together was the best way to ensure school-readiness for children living in poverty (Zigler & Muenchow, 1992). Over 20 years ago, Sheila Smith (1995) wrote a

book describing a set of two-generation interventions implemented in the 1980s and 1990s that targeted low-income families. She noted how, despite the potential benefits of this approach, organizations and policymakers faced major barriers to implementing such programs well—namely the siloed nature of adult and child service-delivery mechanisms. She suggested that more communication and active partnership between those programs that typically serve adults (e.g., post-secondary education, workforce development, conditional cash transfers) and those that typically serve children (e.g., child care and early childhood education programs) could lead to improved interventions and better outcomes for families (S. Smith, 1995). And yet, it seems little progress has been made on this front; recently, Shonkoff and Fisher (2013) and Chase-Lansdale and Brooks-Gunn (2014) argued that the same barriers exist today.

Guided by the results of my dissertation, I join these scholars in arguing that breaking down the barriers between adult- and child-focused services must remain a priority. However, as (Chase-Lansdale & Brooks-Gunn, 2014) describe, active partnerships across service delivery organizations—e.g., between Head Start Centers and post-secondary education providers—are expensive, and difficult to implement and maintain. When such partnerships are not possible, I suggest that simply altering the perspective of practitioners and service-delivery organizations in each silo to recognize, and find ways to capitalize on, the connection between parent and child development may be a first step. That is, not all community colleges may be able to offer high-quality child care for parents. However, as my results from Study 2 suggest, altering existing college and career advising services so that they help parents to balance their own goals and their children's needs may improve parents' educational outcomes. Similarly, it may not be feasible for most child-focused programs to design and implement new interventions for parents. But practitioners may be able to

develop new ways to encourage or connect parents to services that support human capital development.

In sum, this dissertation marks the beginning of a research agenda that will contribute to new, effective ways to apply our understanding of a bidirectional relationship between parents' and children's development to better promote positive outcomes for children, parents, and families.

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