The Pennsylvania State University

The Graduate School

College of Arts and Letters

DOES EARLY CHILDHOOD EDUCATION CLIMATE MATTER? THE RELATIONSHIP BETWEEN STATE POLICY, SCHOOL READINESS, AND ENROLLMENT IN ORGANIZED CARE

A Dissertation in

Sociology and Demography

by

Erin Marie Baumgartner

© 2015 Erin Marie Baumgartner

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Doctor of Philosophy

December 2015

The dissertation of Erin M. Baumgartner was reviewed and approved* by the following:

Michelle Frisco
Associate Professor of Sociology and Demography
Dissertation Adviser
Chair of Committee

Katerina Bodovski
Associate Professor of Educational Theory and Policy

Emily Greenman
Assistant Professor of Sociology and Demography

Valarie King
Professor of Sociology and Demography

John Iceland
Head, Department of Sociology and Criminology

ABSTRACT

In an era of increased emphasis on student assessment and achievement, scholars, educators, and administrators continue to look to school readiness, or students' preparedness to begin formal schooling, as the key for improving student performance and decreasing educational disparities among children. This dissertation focuses on examining student readiness for school and the early childhood educational contexts that may foster greater levels of readiness among students at kindergarten entry.

Using the Early Childhood Longitudinal Study – Kindergarten Cohorts of 1998-1999 and 2010-2011, I begin by estimating change in readiness between two nationally-representative cohorts of kindergarten students to assess whether students who are enrolled in kindergarten in 2010-2011 are more ready for school than students enrolled in kindergarten in 1998-1999. I focus this analysis on examining the between sociodemographic group differences in readiness for each cohort and observe whether all or some groups are making progress in decreasing gaps in readiness. Specifically, I examine between group differences by race/ethnicity, student gender, maternal education, family structure, and household income, finding that school readiness disparities are converging for some racial/ethnic groups and some family structure types. But unfortunately, the convergence in trends between most groups was not fast enough to eliminate disparities by 2010-2011. For most groups, including across measures of socioeconomic status, the disparities between groups has remained constant over time.

In the second part of the analysis, I examine the relationship between the educational climate created by state-level early childhood policy and two of the primary goals of early childhood policy: to increase student participation in early learning opportunities and to increase student's readiness for school. With regards to greater odds of student enrollment in organized care, living in a state with greater per pupil spending is not associated with increased odds of

enrolling in care. However, living in a state that offers unrestricted or restricted access to state-funded pre-k is associated with higher odds of enrollment than living in state that offers no access to pre-k, net of confounders. Analyses in this chapter also suggest that the relationship between living in a state that offers access to state-funded pre-k and organized care enrollment may be different for students from different racial or ethnic groups.

When examining the relationship between early educational climate, as measured by state policy, and student readiness for school, this study finds that living in a state where quality requirements of state-funded pre-k programs are high and a greater proportion of four-year-old students in the state are enrolled in state-funded pre-k are positively associated with math and verbal readiness, as students in states that have a high number of quality requirements (7+) and a greater proportion of students served by state-funded pre-k programs have higher cognitive readiness scores. But students in states where more per pupil funding is needed to reach the benchmarks of a high quality program have lower math and verbal readiness scores than their peers in states where no funding or less funding is needed. Again, these results vary between racial/ethnic groups, with some students benefiting more from these state-level policies than others.

TABLE OF CONTENTS

LIST OF FIGURES vii
LIST OF TABLES viii
ACKNOWLEDGEMENTS ix
CHAPTER 1. INTRODUCTION 1
Background 2
Overview of this Dissertation 7
CHAPTER 2. MAKING GAINS? CHANGES AND STABILITY IN SCHOOL READINESS BETWEEN 1998 AND 2010 10
Background 12
Education policy and school readiness 12
Sociodemographic differences in school readiness 14
Are recent cohorts of children more ready for school? 17
The current study 22
Methods 23
Data and sample 23
Measures of School Readiness 24
Sociodemographic Characteristics 26
Analytic strategy 28
Results 29
Sociodemographic trends in school readiness between 1998 and 2010 31
Discussion 42
CHAPTER 3. IF YOU BUILD IT, WILL THEY COME? STATE EARLY CHILDHOOD EDUCATION POLICIES AND VARIATIONS IN STUDENT ENROLLMENT 55
Background 58
Early childhood education in the United States 58
Racial and ethnic variations in enrollment in organized care 63
State-level early childhood policies and disparities in enrollment 64
The current study 67
Methods 67
Data and sample 67
Measures 69

Analytic strategy 71
Results 71
State comparisons of support of early childhood education 74
State-level support of early childhood education and enrollment in organized care 77
Racial and ethnic variations in enrollment in organized care 82
Within racial/ethnic group comparisons of enrollment in organized care 88
Discussion 90
CHAPTER 4. STATE-LEVEL EARLY CHILDHOOD EDUCATIONAL CLIMATE AND STUDENT SCHOOL READINESS: EXAMINING STATE POLICY CONTEXTS FOR EARLY LEARNING 98
Background 101
Early childhood education policies 101
Education climate and school readiness 106
The current study 112
Methods 113
Data and sample 113
Measures 114
Analytic strategy 116
Results 117
State-level variation in early childhood educational climate 120
State educational climate and school readiness 123
Racial and ethnic variation in the relationship between policy and school readiness 127
Discussion 138
CHAPTER 5. CONCLUSION 146
REFERENCES 156

LIST OF FIGURES

Figure 2.1 Predicted values of teacher-rated school readiness by cohort for each household income quartile……...58

Figure 2.2 Predicted values of teacher-rated school readiness by cohort for each level of maternal education. ……..59

Figure 2.3 Predicted values of teacher-rated school readiness by cohort for each family structure…… 60

Figure 2.4 Predicted values of teacher-rated school readiness by cohort for each racial/ethnic group…….....61

Figure 2.5 Predicted values of teacher-rated school readiness by cohort for each gender……62

Figure 3.1, Predicted log odds of enrollment in organized care by race and level of access to state-funded pre-k...…….……105

Figure 3.2, Predicted log odds of enrollment in organized care by race and level of access to state-funded pre-k, net of confounders….……....…105

Figure 4.1. Predicted values of readiness by race/ethnicity and state-level quality requirements of state-funded pre-k programs…….……151

Figure 4.2. Predicted values of readiness across estimated values of per pupil funding needed to reach NIEER quality benchmarks by race/ethnicity……...…….152

Figure 4.3. Predicted values of readiness across estimated values of proportion of four-year-old students in a state enrolled in state-funded pre-k by race/ethnicity…….……153

LIST OF TABLES

Table 2.1. Sociodemographic characteristics of students enrolled in kindergarten in 1998 and 2010……...37

Table 2.2. Estimated coefficients for weighted OLS regression models predicting differences between sociodemographic groups in math and verbal school readiness and approaches to learning in 1998-1999 and 2010-2011……. ……..…….41

Table 3.1. Demographic characteristics of students enrolled in kindergarten in 2010-2011 …..80

Table 3.2. Descriptive means of state-level early childhood education policies for per pupil funding through the CCDF, per pupil funding through state-funded pre-k, and the type of state-funded pre-k offered in 2009-2010……83

Table 3.3. Logits from weighted logistic regression models estimating enrollment in organized child care by state early childhood education policies and child- and family-level background...87

Table 3.4. Logits and odds ratios from weighted multivariate logistic regression models predicting enrollment in organized care by race/ethnicity and type of access to state-funded pre-k offered by their state. ……..……91

Table 4.1. Demographic characteristics of students enrolled in kindergarten in 2010-2011 who live in states offering state-funded pre-kindergarten. ……..……125

Table 4.2. Descriptive state-level statistics indicating mean level of indicators of state early childhood educational climate or the proportion of states fostering a particular educational climate, in states where some level of state-funded pre-k was offered in 2009-2010……129

Table 4.3. Weighted multivariate regression models of school readiness by state-level education climate indicators for ECLS-K: 2010 children who live in a state offering state-funded pre-k...132

Table 4.4 Weighted multivariate regression models of school readiness including interactions between state-level education climate indicators and race/ethnicity, for ECLS-K: 2010 students who lived in states offering some level of state-funded pre-k…….……137

ACKNOWLEDGEMENTS

Finishing a Ph.D. is a marathon, not a sprint. Without the support and guidance of a number of people, I could not have reached the finish line. First, I would like to thank Michelle Frisco, who has served as more than an advisor, but also mentor and friend. Her dedication to grad students is evident in the amount of time and effort she invested in providing me feedback as I worked to develop skills as an academic. I am forever indebted for the example she set as a scholar, showing that balancing work and life is possible in this crazy career path we have chosen.

Also, to Valarie King, Emily Greenman, and Katerina Bodovski, thank you for your feedback on not only my dissertation, but other work over the years. I appreciate your questions and corrections in helping to make my work stronger. To Duane Alwin, who only served as my official advisor for my first year, but who I have not been able to shake as a collaborator and mentor since, thank you for your trust in my measurement abilities and your continued feedback. I am grateful for your guidance and for the opportunity to learn from your experience.

As most other students can attest, without a network of other graduate students offering support, feedback, and beer, it would be nearly impossible to survive the Ph.D. process. A special thank you to Luis, Patrick, and Jacob, for going before me and reminding me that it is okay to take Saturdays off to watch football and spend time with friends. And to Marin, Adriana, Stephanie, and Aliza for their friendship that will last long beyond our days at Penn State. Long live the Friday happy hour/porch sit!

In addition, I would not be where I am today if it weren't for the constant support of my family. My mom and dad, Fran and Mike Powell, taught me the value of hard work and not to give up when things get difficult. Over the last few years in particular, they have shown me how important the support of your family can be for getting through difficult times and for these things, and so much more, I am forever grateful. I'd also like to thank my sister Nicole, for checking in on me when she knew I was particularly crazy. As a student, athlete, volunteer, sibling, and daughter, she has made me so proud over the past 20 years and I aim to make her just as proud. My grandmother (Ayako), in-laws (Flo, Trisha, Cindy, and Doug), and more family and friends than I can mention have been so supportive over the entire time I've been in grad school – and thankfully, not too often saying: "Aren't you done yet??"

Last, but certainly not least, this dissertation is dedicated to my husband. Maintaining a relationship when you live 500 miles apart is no easy feat. This has truly been a team game – from taking turns taking trips back and forth from South Bend to State College to over a thousand hours of phone calls over the years. Eddie, thank you for your love, trust, support, and doing the laundry and the dishes. I can't wait for all of our adventures and many more Notre Dame reunions to come.

CHAPTER 1. INTRODUCTION

The current era of educational reform in the United States places a strong emphasis on student assessment as a measure of accountability. Specifically, the No Child Left Behind Act of 2001 (NCLB) included reform measures where states were expected to test students as early as third grade to determine whether students were meeting appropriate grade-level standards or were making adequate progress toward these goals (U.S. Department of Education, 2001). Though young elementary school students (grades K-2) had not been subject to the standards-based assessments of their older peers, with increasing strain on schools and teachers to ensure that children had the appropriate academic skills at third grade, there has been increasing pressure on children to rapidly develop cognitive and non-cognitive skills in the earliest years of elementary school (Stipek, 2006).

Thus, teachers increasingly expect kindergarten students to arrive at kindergarten academically and behaviorally prepared to learn (Dixon and Beard, 2011). In turn, early childhood becomes important, as this is the developmental period during which children learn the skills they need to be successful upon reaching kindergarten. Ranging from the ability to sit still and follow directions, to proficiency in skills associated with early math and reading, the tools a child develops before kindergarten entry are associated with their preparedness to begin formal schooling, or school readiness (Britto, 2012; High, 2008; National Association for the Education of Young Children, 2009; Raforth et al, 2004).

This dissertation is motivated by the emphasis placed on early childhood education and school readiness over the last decade. I argue that the importance of early childhood has grown as a result of the era of accountability that students have faced since NCLB was enacted in 2001. In response to educational reform initiatives like NCLB and those that followed, federal and state

governments have looked to ways to better prepare children before they reach the critical evaluation period that occurs at third grade. These efforts have trickled down to early childhood and are reflected in the significant investments in early childhood education that have occurred in recent years. Though state departments of education once accepted responsibility for kindergarten through high school education, increasingly, states have extended their support of the education system to the years before students reach kindergarten.

Thus, this dissertation has two goals. The first goal is to examine cohort differences in school readiness, comparing cohorts of students entering kindergarten before and after significant educational reform initiatives that created the current era of accountability in the U.S. to assess whether students are more ready for school than they were in the past. The second goal is to examine how state-level early childhood education climates are associated with early learning for the cohort of students enrolled in kindergarten in 2010-2011. I evaluate the relationship between state-level early childhood educational policies, as indicators of the state-level early childhood educational climate, and students odds of enrolling in organized care, such as preschool, pre-kindergarten, nursery school, or other center-based care. I also examine the relationship between state-level early childhood education policies and student readiness for school, to understand whether students who live in environments where the educational climate emphasizes the importance of early learning are more prepared for school than their peers who live in environments that place less emphasis on early childhood learning and development.

Background

This dissertation centers on the notion that educational disparities that we observe throughout students' educational careers can be traced back to school entry. When considering

racial and ethnic disparities, for example, it is estimated that half (or more) of the difference in academic achievement that exists between Black and White students at the end of high school can be eliminated if students began formal schooling on a level playing field (Phillips, Crouse, and Ralph, 1998).

School readiness is an indicator of how prepared a child is to succeed when they enter elementary school, which is kindergarten for most students in the U.S. (Davis and Bauman, 2011). Students who are ready for school have greater academic achievement than their peers who are not ready, complete more years of education, and have fewer behavioral problems throughout their educational careers (Alexander, Entwisle, and Horsey, 1997; Duncan et al., 2007; Entwisle, Alexander, and Olson, 2005; Kurdek and Sinclair, 2001). Cognitive school readiness includes intellectual skills that serve as foundations for learning and translate into math, language, and reading skills (National School Readiness Indicators Initiative, 2005; Salkind, 2008). Non-cognitive or behavioral school readiness includes skills that make it easier for a child to learn (such as listening and following directions), and social skills that help the student relate to the teacher and other students (Campbell & von Stauffenberg, 2008; Raver, 2002). Together, these skills set students on trajectory for academic success (Bierman et al, 2008; Raver & Knitzer, 2002).

There are generally two institutions entrusted with the responsibility of helping to prepare young children for school entry: the family and non-family early childhood care. A child's family can influence their readiness in a number of ways. The most evident way is through parenting behaviors and parent-child interactions intended to foster early childhood development (Campbell and von Stauffenberg, 2008; NICHD Early Child Care Research Network, 2003). Parents who are more nurturing, engage in conversations with their children, are responsive to

their children, and use fewer harsh behaviors have children with greater cognitive and non-cognitive skills when they reach kindergarten (Brooks-Gunn & Markman, 2005; Garcia Coll, Hoffman, & Oh, 1987; Raviv, Kessenich, & Morrison, 2004). Family socioeconomic resources are also associated with how prepared a child is for school. Those families with higher levels of resources, such as parental education, household income, or household wealth, can afford to provide tools for learning during early childhood, such as books or developmental toys, as well as learning experiences for their children, such as trips to museums, plays, or the zoo (Bradley & Corwyn, 2002). Children exposed to this range of learning opportunities, both inside and outside the home, develop skills like language and literacy tools, self-direction, and executive functioning that are associated with greater likelihood of being school-ready (Caspe, Lopez, and Wolos, 2006; Institute for Museum and Library Services, 2013).

Non-parental early childhood care services are also expected to help children learn the skills they need to be successful at kindergarten entry. In particular, organized care programs, including preschool, pre-kindergarten, nursery school, or other center-based programs, are often considered a downward extension of formal schooling that serves children at younger ages. Though a number of children participate in early care by non-parental relatives or non-relatives in home care settings, these serve a significantly smaller proportion of students than organized care programs (approximately 20 percent in home care versus over 60 percent in organized care) and they are generally perceived as a setting for child *care* rather than education (County of Orange California, 2002).

Further, children who participate in organized care are on average more prepared for school than students who participate in other types of early childhood care. In organized care programs, children develop cognitive skills, including early math and reading skills, and non-

cognitive skills, including approaches to learning and socioemotional behaviors, to a greater extent than their peers who do not participate in these types of early childhood programs (Bradley & Vandell, 2007; Burchinal, 1999; Howes and Hamilton, 1993; Vandell, 2004). Often, the quality of organized care programs is considered higher than other care options (Fuller, Kagan, Loeb and Chang, 2004). Because informal care settings, such as the care that occurs in homes by either relatives or non-relatives, may be less regulated than organized care settings (National Child Care Information and Technical Assistance Center and National Association for Regulatory Administration, 2010), there are generally not requirements for highly trained teachers or regulations in place to provide developmentally appropriate learning opportunities for children.

In trying to ensure that children have equal opportunities to be ready for school, state and federal governments have increasingly invested resources in strengthening early childhood education and the availability of programs to children. Because it would be not only difficult, but nearly impossible, to regulate parenting behaviors or how families with young children spend their money, policies influencing early childhood education serve as the primary way that the government can support early learning.

Though resources to support early childhood programs come from federal, state, and local sources, the responsibility of regulating early childhood education typically falls to the state. In the United States, states are responsible for the administration of education for children in their state from kindergarten through high school (U.S. Department of Education, 2012). As states are not required to provide early learning opportunities by law, a number of states choose not to invest, or to invest a smaller proportion of their budget, in early childhood education

programs. Even among the states that do invest in early childhood education, there is significant variation between states.

Likely one of the first decisions states must make when determining whether to support early childhood education and care is to determine whether the state will offer fully-funded pre-kindergarten to all students, targeted populations of at-risk students, or offer no state-funded pre-k programs to any students. For states that choose to offer no-cost pre-k programs to students, they also must create regulations for these programs, including requirements for teacher education and continued training, student-to-teacher ratios in a classroom, and guidelines for developmentally appropriate education. State policies also determine the level of funding directed toward early childhood programs. In addition to funds allocated through state-funded pre-k programs, states distribute funds through programs like the Child Care Development Fund (CCDF). The CCDF is an initiative by the Department of Health and Human Services of the U.S. Government to subsidize some of the cost of early childhood care for families and improve the quality of early childhood education (U.S. Department of Health and Human Services, 2012).

Policies such as these contribute to the perception of the educational climate in the state. States that invest more heavily in early childhood programs, evident in per pupil funding, the proportion of students served, and the state's willingness to regulate programs, may be creating a climate that reinforces the importance of early learning and early childhood development. Families may respond to a strong early childhood educational climate in their state as they recognize that the years before children reach kindergarten are an important educational period and in turn, support their children's development during this time.

Overview of this Dissertation

Chapter 2 begins with an overview of the era of educational reform that has led to a time when school readiness is an important part of children's educational trajectories. This chapter examines the cognitive and non-cognitive school readiness of two cohorts of children, those enrolled in kindergarten in 1998-1999 and those enrolled in kindergarten in 2010-2011. I assess sociodemographic disparities in school readiness for each cohort of students in order to understand whether disparities that existed between groups in 1998-1999 exist between the same groups in 2010-2011. Additionally, I calculate rates of change over time within groups so that I can compare these rates of change between groups and examine whether disparities are converging, diverging, or remaining stable. The findings in this chapter show that a number of groups have smaller gaps in 2010-2011 than in 1998-1999. In particular, some differences in readiness between racial/ethnic groups and between family structure types are lower for the most recent cohort. But unfortunately, the convergence in trends between most groups was not fast enough to eliminate disparities by 2010-2011. Further, the disparities between a number of groups has remained constant over time. Notably, across indicators of family socioeconomic status, including maternal education and household income, the between group differences observed in the first cohort is also evident in the more recent cohort. On one hand, this stability means disparities are not growing between groups. On the other hand, it suggests that the significant policy initiatives that occurred in just over a decade span between cohorts may not have reached all students.

Chapters 3 and 4 examine the relationship between the educational climate created by state-level early childhood policy and two of the primary goals of early childhood policy: to increase student participation in early learning opportunities and to increase student's readiness

for school. Chapter 3 begins by presenting the variation in early childhood education policies between states. The significant variation between states with regards to their financial investments in early childhood education and the level of access to state-funded pre-k they offer to students in their state means that students live in widely varied contexts of early childhood education. In this chapter, I focus on the relationship between children's likelihood of enrolling in organized care and three measures of state early childhood policies: per pupil funding allocated through CCDF, per pupil funding allocated through state-funded pre-k programs, and whether states offer unrestricted, restricted, or no access to state-funded pre-k. The findings in this chapter show that living in a state with greater per pupil spending (from either source, CCDF or state-funded pre-k) is not associated with increased odds of enrolling in care. However, living in a state that offers unrestricted or restricted access to state-funded pre-k is associated with higher odds of enrollment than living in state that offers no access to pre-k, net of confounders. Analyses in this chapter also suggest that the relationship between living in a state that offers access to state-funded pre-k and organized care enrollment may be different for students from different racial or ethnic groups.

Building on the findings of Chapters 2 and 3, Chapter 4 takes the analysis of the relationship between state-level educational climate and student outcomes a step further by examining whether state policies are associated with school readiness. Specifically, this study relies on the argument that an educational climate created in a state via a variety of early childhood educational policies may be connected to greater academic outcomes for students. The findings from this chapter suggest that living in a state where quality requirements of state-funded pre-k programs are high and a greater proportion of four-year-old students in the state are enrolled in state-funded pre-k are positively associated with math and verbal readiness, as

students in states that have a high number of quality requirements (7+) and a greater proportion of students served by state-funded pre-k programs have higher cognitive readiness scores. But students in states where more per pupil funding is needed to reach the benchmarks of a high quality program have lower math and verbal readiness scores than their peers in states where no funding or less funding is needed. Again, these results vary between racial/ethnic groups, with some students benefiting more from these state-level policies than others.

CHAPTER 2. MAKING GAINS? CHANGES AND STABILITY IN SCHOOL READINESS BETWEEN 1998 AND 2010

As we look to understand ways to decrease educational inequality among children, it has become increasingly clear that examining the beginning of their educational trajectories is warranted (High, 2008). School readiness, or how prepared a child is upon entry to formal schooling, is an important first step in a child's educational career. Overall, school readiness is associated with positive future educational outcomes, such as decreased odds of grade repetition, higher achievement scores, and increased years of education (Duncan et al, 2007; Karoly et al, 2005; Peth-Pierce, 2001).

Though kindergarten was once considered the setting where social and behavioral readiness for formal schooling was learned (Gracey, 1975), increasingly, children are expected to arrive at the first day of kindergarten ready to learn so that they exit kindergarten with greater cognitive skills (Bassok and Rorem, 2014; Graue, 2009). This is particularly true for cohorts of kindergarteners who enrolled in the last decade. Significant educational policy initiatives since the early 2000s, such as No Child Left Behind, have trickled down to students entering kindergarten. These policies include significant assessment components which place pressure on schools to have children at a certain level of academic proficiency by third grade (U.S. Department of Education, 2002), which, in turn, places increased pressure on students to be proficient in the years prior, starting as early as school entry.

In part due to the growing importance of school readiness, a significant amount of state and federal financial resources were earmarked for increasing access to and quality of early childhood education over the last decade (see review in Barnett, Carolan, Fitzgerald, and Squires, 2012; Hustedt and Barnett, 2011; Smith, 2014; State of Minnesota, 2015). Currently,

forty states offer some type of state-funded pre-kindergarten program to students as a way to ensure a greater number of children arrived at kindergarten ready to learn, with eight states offering universal pre-k to all students and the rest providing the program only to targeted audiences (i.e. low income, low birthweight, limited English proficiency) (Barnett, Carolan, Squires, and Brown, 2014). A decade prior only two states offered pre-k universally (Oklahoma and Georgia) and in twenty-seven states, pre-k was only offered to at-risk populations (Barnett, Hustedt, Robin, and Schulman, 2004). In total, these changes resulted in an estimated 93% increase in the number of four-year-olds enrolled in pre-k between 2001 and 2010 (Hull, 2011). Though pre-k programs are not free to all students, many of these initiatives are meant to encourage families from all socioeconomic and demographic backgrounds to enroll their children in early educational services.

This study investigates whether children who entered kindergarten in an era of educational accountability and increased emphasis on school readiness are more prepared for school than those who enrolled before the many programs and policies described above were enacted. The study explores how readiness varies over time for students from different sociodemographic backgrounds of interest to educators and policy makers, namely, by student characteristics, including gender and race, and family characteristics, including maternal education, household income, and family structure.

Using data from the Early Childhood Longitudinal Studies (ECLS), which collected data from nationally-representative cohorts of children enrolled in kindergarten in 1998-1999 (ECLS-K: 1998) and in 2010-2011 (ECLS-K: 2010), I compare trends in cognitive and non-cognitive school readiness of the demographic and socioeconomic groups outlined above. By examining between and within group change from 1998 to 2010, I can assess whether disparities between

groups have grown, decreased, or remained stable on three indicators of school readiness: teacher-rated math proficiency, verbal proficiency, and approaches to learning. Then, for those groups who have shown convergence in school readiness disparities over time, I assess whether the convergence was great enough to eliminate between group disparities for the cohort of students enrolled in kindergarten in 2010. Though increasing investments in early childhood education aim to improve school readiness of vulnerable populations, it is unclear whether recent cohorts of at-risk children are more prepared than their counterparts in the past and whether disparities between groups have decreased.

Background

Education policy and school readiness

The primary goal of education policy has been to fund primary and secondary education, working to improve the quality of instruction and to provide opportunities to learn for all students. The first notable law to address these issues was the Elementary and Secondary Education Act (ESEA) of 1965 (Public Law 89-10). Passed as part of President Lyndon B. Johnson's "War on Poverty", this policy aimed to decrease gaps in educational achievement by providing focused educational resources for students from traditionally disadvantaged and low-performing backgrounds. Though this act reached many school-aged children in the U.S., a number of members of Congress signed a minority report on ESEA, criticizing the bill for ignoring early childhood education, as they felt intervention in early childhood is essential in any anti-poverty program (Anderson, 2007).

More recent research has confirmed that early childhood education is important in reducing educational disparities. Heckman (2006, 2011) suggests that investments in early

childhood education for at-risk children, in particular, would lead to the greatest returns for children and society. Estimates range from $7 to $14 returns on each dollar spent on early education (Heckman et al., 2010; Reynolds, Temple and Ou, 2011). These returns for children could begin as early as the time they enter kindergarten (Heckman, 2011).

In a reauthorization of ESEA, the No Child Left Behind Act of 2001 (NCLB) included reform measures that both directly and indirectly influenced early childhood education. This policy served as the starting point of the current era of accountability in education. A significant reform measure included in NCLB was setting standards for grade-level achievement and assessments of students' progress as early as third grade to use as indicators of whether schools were adequately performing (U.S. Department of Education, 2002). Under this policy, the young elementary school students (grades K-2) had not been subject to the standards-based assessments of their older peers. But, with increasing strain on schools and teachers to ensure that children had the appropriate academic skills at third grade, there has been increasing pressure on children to rapidly develop cognitive and non-cognitive skills in the earliest years of elementary school (Stipek, 2006). Thus, teachers increasingly expect kindergarten students to arrive at kindergarten academically and behaviorally prepared to learn.

School readiness indicators provide a measure of how prepared a child is to succeed when they enter elementary school, which is kindergarten for over 77 percent of students in the U.S. (Davis and Bauman, 2011). Although only 15 states require kindergarten attendance, it has become the norm rather than the exception for students to begin schooling at kindergarten rather than first grade (Education Commission of the States, 2015). Children who are cognitively and behaviorally ready at kindergarten entry are more likely to have successful academic performance later in school, complete more years of education, and have fewer behavioral

problems throughout their educational careers than their peers who are unready (Duncan et al., 2007; Entwisle et al, 2005; Malaspina & Rimm-Kaufman, 2008; see review Tramontana, Hooper, & Selzer,1988).

Cognitive school readiness includes intellectual skills that serve as foundations for learning and translate into math, language, and reading skills (Bierman et al, 2008; National School Readiness Indicators Initiative, 2005). Behavioral school readiness includes skills that make it easier for a child to learn (such as listening and following directions), and social skills that help the student relate to the teacher and other students (Campbell & von Stauffenberg, 2008; Raver, 2002). Though cognitive skills are often stronger predictors of later academic outcomes than non-cognitive skills (Duncan et al, 2007), all of these skills set children on a pathway for school success (Bierman et al, 2008; Raver & Knitzer, 2002).

Sociodemographic differences in school readiness

Many of the educational disparities observed between demographic and socioeconomic groups begin early in children's educational careers. Previous literature has established that significant variation exists in the cognitive and non-cognitive readiness of children at kindergarten entry or earlier (see discussion in Disparities in School Readiness, 2005; Rouse, Brooks-Gunn, and McLanahan, 2005). In particular, there are significant differences in school readiness by race/ethnicity, gender, socioeconomic status and family structure.

Racial and ethnic disparities in academic achievement and attainment are one of the most commonly studied topics in education research. Scholars examining questions of school readiness are no strangers to this line of inquiry. It has been well established that a significant portion of academic disparities that exist between children of different racial/ethnic backgrounds

begin as early as school entry (Duncan and Magnuson, 2005; Fryer and Levitt, 2004). In fact, it is estimated that approximately 50 percent of the variation that exists between racial and ethnic groups at the end of high school can be attributed to differences in children's skills before they reach kindergarten (Phillips, Crouse, and Ralph, 1998). On indicators of cognitive readiness, White and Asian students have higher readiness scores than Black and Hispanic students on measures of both math and verbal skills (Galindo and Reardon, 2006; Isaacs, 2012). When examining non-cognitive skills, Hispanic students are less likely to exhibit negative behaviors, such as externalizing behaviors or low self-control, than their White or Black peers (Ramirez and Shapiro, 1998). But on indicators of learning behaviors, Hispanic students receive lower ratings than White or Asian students on indicators of task persistence and eagerness to learn, but higher ratings than Black students (Llagas and Snyder, 2003).

Similarly, gender differences observed later in students' educational careers can also be observed as early as school entry. On measures of early math and verbal/reading skills that serve as indicators of a child's cognitive readiness to begin school, female students have higher scores across outcomes (Dauber, Alexander, & Entwisle, 1993; Issacs, 2012; McCoy & Reynolds, 1999). These trends also hold for indicators of non-cognitive readiness. Male students tend to exhibit fewer positive behaviors associated with school readiness than female students, including lower levels of learning-related behaviors and higher levels of externalizing behaviors (Issacs, 2012). These gender gaps in non-cognitive school readiness skills can explain a significant amount of the variation that occurs in academic outcomes for children in elementary school (DiPrete and Jennings, 2012; Entwisle et al, 2007).

Children's family and household characteristics also play a significant role in their readiness at school entry. In particular, socioeconomic characteristics, such as maternal

education and household income, are associated with how cognitively and non-cognitively prepared children are for school. Often, low levels of these family resources are considered risk factors for young children. They can be associated with stress, inadequate nutrition, and few early learning opportunities which in turn may result in delayed development in early childhood (Hart and Risley, 1995; National School Readiness Indicators Initiative, 2005; Mistry et al 2010; Willingham, 2012).

Children born to mothers who have a college degree generally exhibit greater readiness than children born to mothers with a high school diploma or who have not completed high school (Duncan and Brooks-Gunn, 1997). Estimates suggest that increasing maternal education for mothers with the lowest levels of education would significantly increase the cognitive and behavioral readiness of their children at school entry (Magnuson and McGroder, 2002). In an evaluation of a program to increase the level of education of mothers on welfare, researchers find a causal relationship between maternal education and children's academic school readiness (Isaacs and Magnuson, 2011; Magnuson and McGroder, 2002).

Household income is also positively associated with children's cognitive and non-cognitive skills, as children in low income households are at greater risk of poorer academic outcomes and behavioral problems (Corak, 2013;Engle and Black, 2008; McLanahan and Percheski, 2008; Smith, Brooks-Gunn, and Klebanov, 1997). Increases in income for households at the low end of the income distribution matter more for improving children's early language, math, and behavioral outcomes than increases for children in higher income households (Brooks-Gunn and Duncan, 1997; Duncan and Magnuson, 2005; Duncan et al, 2011; Milligan and Stabile, 2008; Smith, Brooks-Gunn, and Klebanov, 1997). Generally, the

relationship between household income and cognitive skills and achievement is stronger than the relationship between income and behavioral skills (Brooks-Gunn and Duncan, 1997).

Across outcomes and ages, children living in households with two biological parents enjoy greater academic success and have better behavioral ratings than children in single or step-parent households (Brown, 2004; Janus & Duku, 2007; Isaacs, 2012; Carlson and Corcoran, 2001; Glick and Bates, 2008; Hair et al, 2006). Children living in single parent homes are more likely to be rated as having negative socioemotional behaviors (Hair et al, 2006; Ramey and Ramey, 1998) and displaying negative behavior in early childhood than their peers who live with both parents (Isaacs, 2012; Waldfogel, Craigie, and Brooks-Gunn, 2010). Some argue that single parenthood is not detrimental to children during early childhood, instead it is the risk factors that accompany single parenthood that account for these negative outcomes (Ricciuti, 1999).

Though many of these sociodemographic characteristics are highly correlated, across a majority of the research discussed here, many of the within group differences remain after accounting for a host of related factors.

Are recent cohorts of children more ready for school?

There are a number of reasons to expect that more recent cohorts of kindergarteners, like those assessed in the ECLS-K: 2010, will be more ready for school than the cohort assessed in the ECLS-K: 1998. First, in more recent cohorts, greater numbers of pre-school aged children were enrolled in center-based care, preschool, or pre-kindergarten programs (Laughlin, 2013). Estimates suggest that over 70 percent of five-year-old children (who were not enrolled in kindergarten) were enrolled in full-day early childhood programs in 2009 (the year prior to ECLS-K: 2010), an increase of approximately 23 percent since the late 1990s (prior to ECLS-K:

1998) (Aud, et al., 2012). When including three- and four-year-old children, and those who do not attend full-day programs, the trends are slightly more modest, with the change over this time period being closer to five percent (Child Trends Databank, 2014). Though the percent increase may seem small, these numbers could reflect well over a million more young children participating in these programs over the decade (author's calculations).

Thus, more recent cohorts of students entering kindergarten have greater experience in formal social institutions aimed a structuring their day and nurturing early educational development. As noted, participation in these types of early childhood education programs is associated with greater cognitive and non-cognitive skills at kindergarten entry (Gormley, Gayer, Phillips, & Dawson, 2005; Loeb, Bridges, Bassok, Fuller, & Rumberger, 2007; Morrissey, 2010; Votruba-Drzal et al., 2013).

Historically, children who are most likely to attend early educational programs, such as preschool or other center-based care, are Black children, children from highly educated families, in households with higher income, or with employed mothers. Conversely, children who have been least likely to attend these programs have lower levels of parental education, lower household income, have mothers who do not work outside of the home, or are Hispanic (Laughlin, 2013).

In the past decade, enrollment in center-based programs for preschools have increased across sociodemographic groups, notably for Latino children whose rates of enrollment are typically significantly lower than those of Black and White children (Annie E. Casey Foundation, 2013; Child Trends, 2012, 2014). Between 2001 and 2012, the rates of Hispanic enrollment in center-based care grew from 39.8 to 51.9 percent (Child Trends, 2012).

Additionally, gaps in rates of early childhood education enrollment for children in high and low educated families has declined (NIEER, 2007)

The growth of programs such as Head Start which is directed toward low-income families, state-funded pre-kindergarten programs which are free to all students or targeted populations of at-risk students, and child care vouchers available to low-income families, have all contributed to increasing preschool/pre-kindergarten enrollment rates for children who have been least likely to attend and often have the lowest cognitive and non-cognitive skills at kindergarten entry.

In addition to increased access to childcare vouchers, significant federal, state, and private funds over the last decade have been earmarked for improving the quality of early childhood education for all students (U.S. Department of Health and Human Services, 2012). And, for state-funded programs, a significantly greater proportion of programs require specialized teacher training in early childhood education or a bachelor's degree (Barnett et al, 2004; Barnett et al, 2011). As a result, today's kindergarteners may be more prepared for school because they may be receiving higher quality care in the years leading up to kindergarten.

There are also reasons to anticipate that the changes in school readiness between cohorts will be modest, if they exist at all. Between the time when the ECLS-K:1998 and ECLS-K: 2010 children entered kindergarten, the Great Recession led many families and individuals to experience unemployment, decreased income, and economic hardship. In turn, young children were at increased risk of facing decreased nutrition and were afforded fewer early learning opportunities, both investments associated with cognitive development (Irons, 2009). Further, even with vouchers to subsidize some of the cost of childcare, the high cost may have been

prohibitive for some families, particularly if a formerly employed caregiver now faces unemployment (NACCRRA, 2010).

These hardships may disproportionately reach some children, which in turn, may lead to fewer opportunities to improve readiness skills with respect to their peers. In particular, children from families of low socioeconomic status may have faced barriers to becoming more ready for school between 1998 and 2010. In 2010, low income families were at greater risk of food insecurity and had fewer resources to invest in early educational opportunities than prior to the recession. Conversely, families at the higher end of the income distribution were investing in their children to a greater extent during this time, in terms of both resources and education for their children (Kornrich and Lunn, 2013). As a result, children in low income families were at risk for poorer health outcomes and increased behavior problems during an important period of development. The stress endured by low income families during this time may also have negative consequences for children (Keating and Hertzman 1999). Parents who experience stress may be less likely to engage in enriching learning activities with their children, and children themselves may begin feeling the physiological effects of stress, which can impede cognitive and social development during important years for child development (Shonkoff, Boyce, and McEwen 2009).

Children of mothers who had low levels of education may be similarly disadvantaged. Children of mothers who have some education beyond high school were in households that were better able to deal with job loss that may have occurred during the recession (Ananat, Gassman-Pines and Gibson-Davis, 2011). Households where maternal education did not reach beyond high school had rates of poverty that grew more quickly during this time than households with more highly educated parents (Danzinger, Chavez, and Cumberworth, 2012). These more highly

educated households also experienced greater family stability during the recession (Qian, 2013). Together, these factors contributed to growing disparities between families where mothers had high (some college or greater) versus low (high school diploma or less) education. As a result, children in families with low education have suffered from the same difficulties as low income families, including fewer resources and increased stress.

Similarly, children living with a single parent were disproportionately affected by the recession. Children in two parent households have greater access to resources than children in single parent homes. Therefore, the shock of unemployment of a parent may not be as great to the family as the loss of employment of a sole breadwinner. As a result, children of single parents were at greater risk of experiencing the hardships described above, including food insecurity, stress, and fewer opportunities for learning, making it more difficult for students to make gains in both cognitive and non-cognitive readiness.

Similarly, the recession disproportionately affected Black and Hispanic families versus Whites (Danziger, Kochhar and Fry, 2014). The poverty rates increased at a greater rate for Black and Hispanic families, than for White families (Danziger, Kochhar and Fry, 2014). Though wealth decreased for all families at this time, the variation between Black and White families became even more pronounced (Shapiro, Meschede, and Osoro, 2013). Similarly, Hispanic families were hit particularly hard by the recession, with their wealth decreasing at a greater level than all other groups, also leading to an increased gap between Hispanic and White families (Kochhar, Fry and Taylor, 2011). As discussed above, families with greater wealth were continuing to invest in their children's education during the recession, therefore, the Black-White and Hispanic-White wealth differential may have also resulted in differential in investments in children's education. As a result, it may have been difficult for Black and

Hispanic students to make gains in school readiness, both within and between racial/ethnic groups.

But, there is little reason to expect differential change for male and female students between these cohorts of kindergarteners. As female students generally exhibit higher levels of cognitive and non-cognitive readiness than their male peers, unless education policies between 1998 and 2010 disproportionately targeted male students, there is little reason to expect the gap between groups to have decreased by 2010. If all children benefited from early childhood education policies that occurred during these years, it is more likely that the readiness disparities between male and female students would have remained constant over time.

Thus, there is reason to believe that the within group change for some sociodemographic groups between 1998 and 2010 would be low or non-existent, namely those in low SES families, who were in single parent households, male or female students, and children of a racial/ethnic minority group (with the exception of Asian children). In turn, it would have been difficult for these groups to reduce between group disparities, which means that disparities in school readiness that existed for the cohort of students who entered kindergarten in 1998-1999 were likely the same or greater for the cohort of students who entered kindergarten in 2010-2011.

The current study

In an era of increased emphasis on student achievement, school readiness at school entry has become an important part of students' educational trajectories. Thus, the primary aim of this study is to identify whether sociodemographic disparities in cognitive and non-cognitive school readiness have decreased, increased, or remained stable over time.

Comparing cohorts of students enrolled in kindergarten in 1998-1999 to those enrolled in 2010-2011, I examine within group rates of change over time in teacher-rated math proficiency, verbal proficiency, and approaches to learning, as indicators of school readiness. I compare these rates between groups to assess whether disparities observed between groups in 1998-1999 remain in 2010-2011.

It is important to remember that that this study is a descriptive enterprise. In order to make comparisons between broad sociodemographic groups, including race/ethnicity, gender, maternal education, household income, and family structure, the analyses included in this study do not test between group differences in rates of change in the presence of confounders.

Methods

Data and sample

The ECLS-K datasets are nationally representative samples of children enrolled in kindergarten in the U.S. in 1998-1999 and 2010-2011 school years, respectively (hereafter, ECLS-K: 1998 and ECLS-K: 2010). Children were given cognitive assessments, and parents, teachers, school administrators, and caregivers provided information about the children's home environments, school contexts, and academic and classroom performance at kindergarten, first grade, third grade, fifth grade, and eighth grade for the 1998-1999 cohort of students, and for the 2010-2011 cohort of students, child cognitive assessments and parent, teacher, and school administrator interviews were conducted in kindergarten and first grade (at the time of this study), with plans to assess second, third, fourth, and fifth grades in the future. The kindergarten wave of data collection for ECLS-K: 1998 included approximately 21,260 children enrolled in kindergarten during the fall of 1998. The kindergarten wave of data collection for ECLS-K:

2010 included approximately 18,200 children enrolled in kindergarten in the fall of 2010. I created an identifier for each data set and then appended the ECLS-K: 2010 to the ECLS-K: 1998 to create a single data set for analysis. A major strength of the ECLS-K studies is that they were designed so that comparisons across cohorts were possible.

Missing data were multiply imputed using the callable program IVEware (Raghunathan et al. 2002) in SAS 9.3. Post-imputation, those students who were identified as being of a race other than White, Black, Hispanic, or Asian (including non-Hispanic native Hawaiian and Pacific Islanders) were omitted from the analysis. The small sample size of the American Indian/Alaska native population in the study (approximately 120 before imputation) would make it difficult to generalize about this population and perform robust between group comparisons.

To correct for complex sampling design, I applied survey weights to this analysis, and limited the sample to those students who had valid survey weights. This reduced the final analytic sample of the ECLS-K: 1998 to approximately 16,390 and the analytic sample of the ECLS-K: 2010 to approximately 13,970. In accordance with ECLS-K data reporting requirements, unweighted sample sizes are rounded to the nearest 10.

Measures of School Readiness

This study estimates students' school readiness using teacher-ratings of the student's mathematics and verbal proficiency, as indicators of cognitive readiness, and teacher-ratings of the student's frequency in engaging in behaviors associated with learning, as an indicator of non-cognitive readiness. There are no direct assessment scores in mathematics, verbal/reading skills, or behavioral skills appropriate for cross-cohort comparison.

Mathematics readiness is based on teachers' assessments of whether a student was not yet proficient, beginning proficiency, in progress, intermediate proficiency, or proficient on a number of mathematics tasks. These tasks included whether a child sorted and classified math materials, can order a group of objects, understands the relationship between quantities, uses objects to solve problems, has an understanding of graphing, can use instruments accurately for measuring, and uses multiple strategies for solving math problems. By summing these items and dividing by the number of items included, I calculated an average score across math items to serve as an indicator of student math readiness at school entry. Those students with higher values were rated as having more proficiency than those students with lower ratings.

Verbal readiness is based on teachers' evaluations of student proficiency on using complex sentence structures, understanding and interpreting a story, knowing the alphabet, rhyming, the ability to predict what happens next in stories, reading simple books, and demonstrating early writing behaviors. Again, students are assessed on a five-point scale, ranging from not yet proficient to proficient. Items were summed and divided by the number of items included in the measure to create an indicator of student verbal readiness at school entry. For both cognitive measures used in this study, values for individual items were imputed before the composite measures were created.

Approaches to learning measures how frequently a student engaged in behaviors associated with learning. Teachers were asked to evaluate how often ("never"=1 to "very often"=4) students exhibited the following behaviors: keeping belongings organized, eagerness to learn new things, an ability to work independently, an ability to adapt to change in routine, persistence in completing tasks, and an ability to pay attention. This composite variable was created by NCES, and as with the previous measures, students received an average score for this

measure by summing and averaging across items. Only students who have teacher responses for at least 4 of the 6 indicators are included in this composite variable by NCES. Values were imputed for those students with missing data on this measure, either because of non-response or because they had too few responses to be calculated.

Sociodemographic Characteristics

Gender is a dichotomous variable. The reference category is *male* (=1).

Race/ethnicity is an ECLS-K classification of children's race/ethnicity based on parent-reported data and school-reported data. It includes 7 racial/ethnic categorizations: non-Hispanic, White; non-Hispanic, Black; Hispanic, race identified; Hispanic, no race identified; Asian; Native Hawaiian/Pacific Islander; American Indian/Alaska native; and two non-Hispanic races. For the purposes of this analysis, I collapse these categories into: *non-Hispanic White*, *non-Hispanic Black*, *Hispanic* (combining both Hispanic groups into a single category), and *Asian* (combining those identified as Asian and Native Hawaiian/Pacific Islander into a single category). I omit American Indian/Alaska natives from this analysis.

Maternal education is measured using parent reported education. In ECLS-K: 1998, I use a composite variable that specifies maternal education (wkmomed). I collapse the categories into less than high school education, high school diploma or equivalent, and at least some college education. In the ECLS-K: 2010, there are no variables that explicitly identify maternal education. Instead, respondents are asked about the education levels of "parent #1" and "parent #2" in the household. In order to create an indicator of maternal education in ECLS-K: 2010, I determined whether parent # 1 or parent # 2 was the mother (using the person household roster number: P1PEQHH1 and P1PEQHH2; and the relation to the focal child: P1_REL1 and P1_REL3) and then assigned the appropriate parent education (if mother was parent #1,maternal

education=P1HIG_1; if mother was parent #2, maternal education= P1HIG_2). Again, this variable was collapsed into three categories: less than high school education; high school diploma or equivalent, and at least some college education. For both measures, when no mother was present, I estimated an imputed value for maternal education.

Household income quartile uses a categorical measure of household income to create a relative measure of household income, from first quartile (which reflects the lowest 25% of income) to the fourth quartile (which reflects the top 25% of income). Because there was no continuous measure of income in the ECLS-K: 2010 data, I created a categorical income measure in the ECLS-K: 1998 data, using a continuous measure of household income which matched the income categories provided in the ECLS-K: 2010. Then, I divided these income categories into quartiles. As the 25th, 50th, and 75th percentile income categories varied between cohorts, the income quartile was determined separately for each cohort of students (approximate ranges for each data set, ECLS-K:1998: 1st quartile= <=$20,000; 2nd quartile=$20,001-$45,000, 3rd quartile=$45,001-$65,000, 4th quartile= >$65,001; ECLS-K: 2010:1st quartile= <=$25,000; 2nd quartile=$25,001-$50,000; 3rd quartile=$50,001-$100,000; 4th quartile=>$100,001; author's calculations).

Family structure is based on data from parents indicating whether children: living with two biological/adoptive parents, two other parents (one biological/adoptive and one other type of parent), a single parent, or living with another guardian. To acknowledge the increase in cohabiting relationships over time, this analysis does not focus on parents' marital status, but instead the presence of parents within the home.

Analytic strategy

All analyses were weighted to adjust for complex survey design and were conducted using SAS 9.3. First, I conduct descriptive analysis of the sociodemographic characteristics of students enrolled in kindergarten in 1998-1999 and 2010-2011 to understand whether the populations of students are demographically similar over time. These analyses include cohort comparisons by student demographic characteristics including gender and race, and by family socioeconomic and demographic characteristics, including maternal education, household income, and family structure.

Then, using linear regression (PROC GLM and PROC MI ANALYZE), I estimate whether the disparities between sociodemographic groups observed in the 1998 cohort have converged, diverged, or remained stable over time. I do so by examining the initial between group differences (intercepts) and the differences in the rates of change over time, or trends, between groups (slopes) (Firebaugh, 1997).

Finally, I assess whether the trend differences observed between groups in the previous analysis are enough to eliminate between group disparities in both cognitive readiness, as measured by math and verbal skills at school entry, and non-cognitive readiness, as measured by approaches to learning at school entry. To do this, I conduct a bivariate analysis of between group differences in school readiness for the cohort of students who were enrolled in kindergarten in 2010-2011.

As the models used in this study do not test the inclusion of control variables to account for any between group differences I observe in initial readiness (in 1998-1999), rates of change of readiness over time (trends), or endpoint readiness (in 2010-2011), it is important to recognize that this analysis is intended as a descriptive endeavor.

Results

Demographic characteristics of kindergarten students enrolled in 1998-1999 and 2010-2011

In Table 2.1, I present the demographic composition of students enrolled in kindergarten in 1998-1999 and 2010-2011 to show both similarities and differences between cohorts.

Table 2.1. Sociodemographic characteristics of students enrolled in kindergarten in 1998 and 2010.

	Weighted proportion or average	
	ECLS-K:1998 N=16,390	ECLS-K:2011 N=13,970
Household income quartiles		
Approximate average income	$40,000	$50,000
1st quartile	< $20,000	< $25,000
2nd quartile	$20,001-45,000	$25,001-50,000
3rd quartile	$45,001-65,000	$50,001-100,000
4th quartile	> $65,001	> $100,001
Maternal education		
Less than high school	.183	.132
High school diploma/equivalent	.330	.271
Some college or greater	.487	.597
Family structure		
Two biological parents	.654	.673
One biological parent, one other	.092	.075
Single parent	.228	.227
Other guardian	.026	.025
Racial/ethnic group		
White	.585	.532
Black	.156	.135
Hispanic	.182	.235
Asian	.034	.040
Gender		
Female	.492	.482
Male	.508	.518

Source: ECLS-K 1998 (kindergarten wave); ECLS-K: 2010 (kindergarten wave)
Weights: C1CPTW0, W1T0

First, beginning with family level characteristics, data in Table 2.1 show significant differences in family socioeconomic characteristics between cohorts. Given the increasing emphasis on and access to post-secondary education between cohorts (Cook, 2014), it is also not surprising that more than half (59.7%) of children in ECLS-K: 2010 have mothers who enrolled in some education beyond high school graduation. Compared to children who were enrolled in kindergarten in 1998, this is an approximately 11 percentage point increase in children whose mothers have some education beyond high school, reflecting a change of just over 20 percent between cohorts.

In order to make comparisons household income across cohorts, the analyses in this study rely on household income quartile as an indicator of relative income. Utilizing a quartile measure allows for the comparison of groups over time, without estimating the effect of inflation (Capuano, 2011). Estimates in Table 2.1 show that household income quartiles have also changed over time. Where the lowest quartile household income in 1998 was equivalent to less than $20,000, the lowest household income in 2010 was equivalent to less than $25,000. Larger differences can be observed for students in the highest income quartiles. Though the highest quartile in 1998 reflected a household income of over $65,001, in 2010, the highest quartile reflected household income of over $100,001.

A family-level characteristic that has shown little change over time is the distribution of students living in households with different family structures, shown at the bottom of Table 2.1. For both the 1998 and 2010 cohorts of students, approximately two-thirds (65.4% and 67.3%) of students lived in homes with both biological parents, versus with two other parents, a single parent, or with another guardian.

When moving to child-level demographic characteristics at the bottom of Table 2.1, there are both similarities and differences between cohorts. Not surprisingly, when comparing changes to gender composition over time, the proportion of female and male students enrolled in kindergarten is nearly the same in 2010 (48.2% female) as it was in 1998 (49.2% female).

But, notable differences between cohorts are evident when examining the racial and ethnic composition of the student population in Table 2.1. In 2010, 23.4 percent of children enrolled in kindergarten were of Hispanic ethnicity. In the 1998 cohort, 18.2 percent of kindergarten children were Hispanic. This change reflects the growing number of Hispanic children as an overall proportion of young, school-aged children in the U.S. (Census, 2012), rather than an increasing proportion of students within the Hispanic population enrolling in kindergarten (author's calculations based on American Community Survey 1999 and 2011).

Sociodemographic trends in school readiness between 1998 and 2010

Now, I turn to regression analyses which examine sociodemographic differences in school readiness for cohorts of students who began kindergarten 1998-1999 and those who began kindergarten in 2010-2011. The first column of results for each outcome presents initial differences in readiness between groups, as measured in 1998-1999. Significant between group differences are demarcated by a superscript "a", where values between groups were different at a p-value $\leq .05$. The second column of results for each outcome presents comparisons of rates of change between groups. When initial and trend differences have the same sign, trends are *diverging*. When initial and trend differences have opposite signs, trends are *converging* (or have crossed). If both are positive, then the second group is greater initially and the difference between groups is growing. If both are negative, then the first group is greater initially and the

difference between groups is growing. Finally, the third column of results for each outcome provides endpoint differences between groups, as measured in 2010-2011. Superscript letter "a" indicates significant differences exist between groups (p-value $\leq$.05), which indicates that disparities in readiness exist between these groups for the cohort of kindergarten students enrolled in 2010-2011. Each sociodemographic group analysis was conducted separately and is included in Panels 1 through 5 in Table 2.2. Within each panel, data for each readiness outcome: math readiness, verbal readiness, and approaches to learning, are presented in Columns 1, 2, and 3.

I begin by presenting analyses of the sociodemographic groups where I observe stability between 1998-1999 and 2010-2011 in the school readiness differences between groups. In some ways, stability may be considered positive, as it suggests that between group variations are not growing over time. In other ways, stability may be deemed negative, as it indicates that differences that existed between groups in 1998-1999 still remain in 2010-2011, despite the significant educational reform efforts and investments in early childhood education that have occurred between these times.

Table 2.2. Estimated coefficients for weighted OLS regression models predicting differences between sociodemographic groups in math and verbal school readiness and approaches to learning in 1998-1999 and 2010-2011 and differences between groups in rates of change in readiness over time.

	Math readiness			Verbal readiness			Approaches to learning		
	Initial difference	Trend difference	Endpoint difference	Initial difference	Trend difference	Endpoint difference	Initial difference	Trend difference	Endpoint difference
Panel 1									
Household income quartile									
1st / 2nd	0.251 [a]	-0.054	0.193 [a]	0.289 [a]	-0.042	0.231 [a]	0.142 [a]	-0.031	0.106 [a]
1st / 3rd	0.422 [a]	-0.010	0.412 [a]	0.474 [a]	0.055	0.522 [a]	0.246 [a]	0.007	0.257 [a]
1st / 4th	0.460 [a]	-0.044	0.414 [a]	0.503 [a]	0.036	0.527 [a]	0.207	0.020	0.223
2nd / 3rd	0.171 [a]	0.045	0.219 [a]	0.185 [a]	0.097	0.291 [a]	0.104 [a]	0.037	0.151 [a]
2nd / 4th	0.209	0.010	0.221	0.214	0.079	0.296	0.065	0.051	0.117
4th / 3rd	-0.038	0.035	-0.002	-0.029	0.018	-0.005	0.038	-0.013	0.034
Panel 2									
Maternal education									
Less than high school / High school diploma	0.311 [a]	-0.111	0.193 [a]	0.355 [a]	-0.046	0.302 [a]	0.161	-0.110***	0.038
Less than high school / Some college or more	0.621 [a]	-0.117	0.500 [a]	0.711 [a]	0.000	0.707 [a]	0.276 [a]	-0.071	0.199 [a]
High school diploma / Some college or more	0.310 [a]	-0.006	0.307 [a]	0.356 [a]	0.047	0.405 [a]	0.115 [a]	0.048	0.161 [a]
Panel 3									
Family structure[1]									
Two biological parents/ Two other parents	-0.242 [a]	0.133**	-0.101 [a]	-0.247 [a]	0.089*	-0.154 [a]	-0.220 [a]	0.045	-0.169 [a]
Two biological parents / Single parent	-0.291 [a]	0.089***	-0.206 [a]	-0.293 [a]	0.048	-0.248 [a]	-0.246 [a]	0.040*	-0.204 [a]
Two biological parents / Other guardian	-0.401 [a]	0.143*	-0.272 [a]	-0.343 [a]	0.074	-0.274 [a]	-0.346 [a]	0.035	-0.298 [a]
Two other parents / Single parent	-0.049 [a]	-0.044	-0.105 [a]	-0.046 [a]	-0.041	-0.094 [a]	-0.026	-0.005	-0.035
Two other parents / Other guardian	-0.158 [a]	0.010	-0.171 [a]	-0.095	-0.015	-0.120	-0.126 [a]	-0.009	-0.129 [a]

Other guardian / Single	0.110	-0.054	0.066	0.049	-0.026	0.026	0.100	0.004	0.094
Panel 4									
Race and ethnicity									
White / Black	-0.399 [a]	0.146***	-0.254 [a]	-0.348 [a]	0.125***	-0.223 [a]	-0.243 [a]	0.076***	-0.167 [a]
White / Hispanic	-0.476 [a]	0.098***	-0.379 [a]	-0.529 [a]	0.053*	-0.476 [a]	-0.143 [a]	0.057**	-0.086 [a]
White / Asian	-0.130	0.109*	-0.022	-0.186	0.160**	-0.026	0.056	0.010	0.066
Black / Hispanic	-0.076 [a]	-0.048	-0.125 [a]	-0.181 [a]	-0.073*	-0.253 [a]	0.100 [a]	-0.019	0.081 [a]
Black / Asian	0.269 [a]	-0.037	0.232 [a]	0.162 [a]	0.035	0.197 [a]	0.300 [a]	-0.067	0.233 [a]
Hispanic / Asian	0.345 [a]	0.011	0.357 [a]	0.343 [a]	0.107	0.450 [a]	0.199 [a]	-0.047	0.152 [a]
Panel 5									
Gender									
Female/male	-0.095 [a]	0.020	-0.080 [a]	-0.177 [a]	0.025	-0.156 [a]	-0.263 [a]	-0.042**	-0.305 [a]

[a] Indicates significant differences between groups *** p<0.001, **p<0.01, *p<0.05

[1] Note: For brevity, I list "two biological or adoptive parent" households as "two biological parent" households

For both indicators of family socioeconomic status included in this study, maternal education and household income quartile, I observe little change in cognitive disparities over time. In Panel 1 of Table 2.2, analyses suggest that students in the lowest income quartile have initial readiness scores approximately one-half of a standard deviation lower than students in the third and fourth income quartiles (approximate difference in values $\beta>0.4$ for math and $\beta>0.47$ for verbal readiness), and approximately one-third of a standard deviation lower in approaches to learning ($\beta>0.20$). The non-significant trend differences in Panel 1, across outcomes, indicate that the rates of growth in each between group analysis are similar and not significantly different from one another, the initial difference that existed between the first quartile and each of the remaining quartiles still exists in 2010-2011. To display this visually, I calculate predicted values of readiness for each come quartile and present them in a graph (Figure 2.1). The upward sloping lines for math and verbal readiness for all income quartiles demonstrate that on average, students in each income quartile have higher cognitive readiness scores in 2010-2011, but as these trend lines are parallel to one another, the between group differences that were observed in the first cohort are also observed in the second cohort.

Unfortunately, the differences between the second and third quartile became more pronounced by 2010-2011 for each outcome. Though these groups were not significantly different from each other on measures of cognitive and non-cognitive readiness in 1998-1999, by 2010-2011, students in the second quartile had significantly lower readiness scores than students in the third quartile. These differences may reflect the change in the third income quartile between cohorts. In 1998-1999, ECLS-K students in the third income quartile had family household income levels ranging from $45,001 to $65,000. By 2010-2011, the third income quartile looked much different, with a range of household income values from $50,001 to

$100,000. Therefore, the difference in dollars between the second and third quartile may have been much smaller for the first cohort than the second. Additionally, as mentioned previously, families in the highest income quartiles were still investing in their children's education during the recession. Thus, the differences between groups may reflect these differential investments.

On the other indicator of family socioeconomic status utilized in this study, maternal education, there generally appears to be stability in disparities between groups over time. When comparing initial student ratings on math readiness in Panel 2, those students who have mothers with the lowest levels of education (less than high school) have readiness scores approximately one-third of a standard deviation lower than children of mothers who have a high school diploma or equivalent (β=-0.311) and approximately two-thirds of a standard deviation lower than children of mothers who have some education beyond high school (β=-0.621). Children of mothers with a high school diploma have initial math readiness scores approximately one-third of a standard deviation below children of mothers with some education beyond high school (β=-0.31). Similar magnitude initial differences can be observed in Panel 2 when comparing verbal readiness scores across groups at 1998-1999.

There is no evidence of differential improvement in the math or verbal readiness ratings for children whose mothers have different levels of education. In Figure 2.2, I graph predicted values for readiness by maternal education (based on models used to create Panel 2). The slopes for each of the groups is similar, which means that any between group difference that existed for the first cohort in 1998-1999 also exists for the cohort of students enrolled in kindergarten in 2010-2011 (p-values range from 0.07 to 0.92). Though this suggests that between group differences in measures of non-cognitive readiness remain in 2010-2011, there is also no evidence that the differences between groups have grown during this time.

As with cognitive readiness outcomes, there are also differences in initial ratings of approaches to learning between students with mothers of different levels of education, though the between group differences are smaller than those observed for indicators of cognitive readiness (with between group differences approximately one-fifth of a standard deviation for children with mothers who have less than a high school versus a high school education, and for children of mothers with a high school education versus some education beyond high school; and approximately one-third of a SD difference between children with mothers who have less than a high school education versus some education beyond high school).

When comparing trends in growth in non-cognitive readiness, differences in readiness scores between children at certain levels of maternal education are decreasing. Data in Panel 2 (Table 2.2) show that ratings on approaches to learning for children of mothers with a high school education are converging with ratings of children whose mothers have less than high school education (trend difference: -0.11, p-value<0.001). Figure 2.2 demonstrates this convergence by plotting predicted values based on Panel 2. As shown in the bottom graph in Figure 2.2, when comparing the light gray line (representing children of mothers with a high school education) to the dashed line (representing children of mothers with less than high school education), the convergence in approaches to learning ratings over time is driven by decreasing rates of approaches to learning by children of mothers with high school education, rather than by large increases in approaches to learning by children of mothers with less than high school education. In fact, for the cohort of kindergarteners enrolled in 2010-2011, there is no significant difference between these groups on teacher-rated approaches to learning (p-value >.05), which means that the between group difference observed in 1998-1999 has been eliminated. While it is promising that the group with the lowest level of maternal education is making positive growth

in approaches to learning, it is of some concern that children of mothers with a high school education have lower ratings of non-cognitive readiness in the second cohort.

Fortunately, a number of other demographic groups have also experienced convergence in school readiness trends over time. Convergence indicates that the difference that existed between groups in the first cohort is smaller between groups in the second cohort.

Beginning with math readiness, estimates in Panel 3 show that the advantage associated with living in a two biological/adoptive parent household is declining in comparison to all other groups. Children in two biological/adoptive parent homes begin with an advantage equivalent to approximately one-fourth of a standard deviation or greater in math readiness compared to students in all other family structure types. Similar between group initial differences can be observed on measures of verbal readiness, with estimated differences ranging from 0.247 to 0.343 points on the indicator of verbal readiness (equivalent to approximately one-fourth to one-third of a standard deviation).

Despite these initial disparities, over time, the differences between groups in math readiness and verbal readiness have decreased for some groups as the rates of growth between groups have converged. In particular, children in homes with two other parents have smaller math and verbal readiness differences from children in homes with two biological/adoptive parents in 2010-2011 than in 1998-1999. Because the estimated coefficients for trend differences and initial differences have different signs in Panel 3 when comparing these groups, this indicates the slopes for these two groups are converging with each other. This can also be observed on Figure 2.3 for both math and verbal readiness, as the dashed line (representing two biological/adoptive parent households) and the solid gray line (representing two other parent households) have a wider gap at 1998-1999 than in 2010-2011. These lines are moving together

because of the higher rates of growth for children in two other parent households (trend difference=0.133 and 0.09 for math and verbal readiness, respectively), but unfortunately, this growth is not enough to eliminate the disparity between groups by 2010-2011 for either cognitive readiness outcome.

Similarly, children in single parent households have rates of growth for both math and approaches to learning readiness that are higher than their peers in two biological/adoptive parent households (trend differences=0.09 in math and 0.40 in verbal). But, again, despite these gains, children in homes with two biological/adoptive parents still have significantly higher math, verbal, and approaches to learning readiness ratings than their peers in all other household types in 2010-2011 (Panel 3, endpoint differences).

Finally, children in homes with other guardians are experiencing greater growth in math readiness over time compared to students in two biological/adoptive parent homes (trend difference=0.143). Because the trends for these groups are converging, the differences between students in two biological/adoptive parent homes and students living with other guardians are smaller in 2010-2011 than in 1998-1999, but the significant differences between these groups remain.

There are also some positive findings when comparing racial/ethnic disparities in school readiness over time. In Panel 4, I present estimated differences in school readiness between racial and ethnic groups. Though the groups that were significantly different from one another in the 1998-1999 cohort of kindergarteners (initial differences) remain significantly different in the 2010-2011 cohort (endpoint differences). Notably, students in some racial/ethnic groups made faster improvements in readiness than their peers, leading to smaller disparities in 2010-2011.

First, when comparing the slopes for White and Black students, Black students ratings on math readiness (trend difference=0.146) and verbal readiness (trend difference=0.125) are increasing at a faster rate between 1998-1999 and 2010-2011 than the rates of change for White students. Similarly, the difference between White and Hispanic students has grown smaller over this time, as the rate of change for Hispanic students is greater than that of White students across cognitive outcomes. These trends can be observed in Figure 2.4 for math and verbal readiness, with the dashed lines (representing Black students) and dotted lines (representing Hispanic students) showing a steeper slope than the slope for White students (solid gray line).

For approaches to learning, the convergence in readiness between White and Black students, and also between White and Hispanic students, is less reflective of faster positive change over time for Black and Hispanic students, but instead reflects a decreasing trend in non-cognitive readiness for White students, as shown in Figure 2.4 (and confirmed with supplemental analyses finding flat slopes for Black and Hispanic students, but negative slopes for White students).

Comparing trends in math and verbal readiness of White to Asian students, findings suggest that the readiness ratings of Asian students are converging with those of White students (trend differences=0.109 and 0.160 for math and verbal readiness, respectively). When comparing initial differences and endpoint differences, these groups were not significantly different from one another on either cognitive outcome in 1998-1999 or 2010-2011. Thus, the significantly different rates of change over time have not changed the difference between White and Asian students in math or verbal readiness.

These findings suggest that when I compare disparities in cognitive and non-cognitive readiness between students of different racial/ethnic backgrounds in 1998-1999 to the disparities

that exist between students in these groups in 2010-2011, the gap in readiness may be narrowing. Unfortunately, for some students the initial disparities in readiness that existed in 1998-1999 have grown over time. Specifically, when comparing change in verbal readiness between Black and Hispanic students over time in Panel 4 of Table 2.2, there is evidence of a growing gap between groups, with Black students beginning at higher levels of verbal readiness (β=0.181) and their rates of growth increasing more quickly (trend difference: 0.073, p-value=0.04) than Hispanic students. These differences can also be observed in the center graph of Figure 2.4, which uses estimated values to plot between group differences in verbal readiness. The dashed line, which represents Black students is slightly steeper than the dotted line, which represents Hispanic students.

Another group experiencing greater disparity in 2010-2011 than in 1998-1999 are male students. As shown in Panel 5 estimates of approaches to learning, the negative signs on both the initial differences (β=-0.263) and trend differences (β=-0.042) suggest that females students begin with higher approaches to learning scores in the first cohort and the scores of male and female students are diverging between cohorts.

However, on measures of cognitive readiness, the between gender group difference in math and verbal readiness has remained stable over time. In the first column of Panel 5, data show that the differences that differences existed between male and female students' cognitive readiness scores for the cohort of students enrolled in kindergarten in 1998-1999, with female students scoring approximately one-tenth of a standard deviation greater in math readiness (β=0.095), and nearly one-fifth of a standard deviation higher in verbal readiness (β=0.177). This is consistent with previous studies that demonstrate that female students often begin school at an advantage compared to their male peers, an advantage that is often maintained into elementary

school and beyond (DiPrete, 2009; Entwisle et al, 2007; Isaacs, 2012). Because the trends in math and verbal readiness for male and female students are not significantly different from one another, significant between group differences in cognitive readiness are still observed between male and female students enrolled in kindergarten in 2010-2011.

Discussion

In an era of educational accountability and significant reform efforts to eliminate educational disparities between children, the early years of a child's education have increasingly become the focus of policy and rhetoric for ensuring that all children are arriving at school "ready to learn". In part, this is due to prior research which established that students who arrive at school ready to learn, with cognitive skills, such as math and verbal skills, and non-cognitive skills, such as exhibiting positive learning behaviors, have greater academic success than their peers who arrive unprepared for formal schooling (Bierman, et al, 2008; Duncan et al, 2007; High, 2008;).

Yet, to date, no one has investigated whether recent cohorts of kindergarten students are reaching the start of school more prepared than students in past cohorts. This study provides a descriptive analysis of trends in cognitive and non-cognitive school readiness in the United States, as measured by two nationally-representative cohorts of children, those who entered kindergarten in 1998 and 2010. Building on what we know about sociodemographic disparities in readiness, I assess whether disparities in math readiness, verbal readiness, and approaches to learning decrease for all groups, or whether specific sociodemographic groups are making greater or lesser progress in decreasing these gaps. Additionally, I examine cognitive and non-cognitive sociodemographic differences in school readiness in 2010 to identify whether those

groups who were at a disadvantage in 1998-1999 were able to eliminate those disparities by 2010-2011.

On a positive note, one of the important findings in this study is that students in a number of sociodemographic groups are exhibiting positive growth in school readiness over time. Because the rate of change has been faster for some groups who had lower math, verbal, and approaches to learning ratings in 1998-1999, the disparities between students from different racial/ethnic groups, different family structures, and different levels of maternal education have decreased.

Notably, the gaps between Black and White students, and between Hispanic and White students has narrowed significantly between 1998-1999 and 2010-2011. This narrowing was due to faster rates of improvement in math and verbal readiness and approaches to learning for non-White students. Similarly, the gap between students in two biological/adoptive parent households and other household types has become smaller, as students in two other parent households have experienced sharper gains in math and verbal readiness than students in two biological/adoptive parent households. Students in single parent households have also narrowed gaps in math readiness and approaches to learning, with rates of growth over time faster than those of students in two biological/adoptive parent households.

Finally, the gap in non-cognitive readiness between children whose mothers had the lowest level of education (less than a high school diploma) and children of mothers with a high school diploma decreased between cohorts. While the rate of change for children of mothers with less than a high school education was slightly positive during this time, this decreasing gap is more reflective of the negative rate of change in non-cognitive readiness for children of mothers with a high school education. This finding is worrisome, as the population of students

of mothers with a high school education is already disadvantaged with respect to their peers who have mothers with higher levels of education. The downward trend in approaches to learning may result in growing disparities between groups at varying levels of maternal education as time goes on.

Unfortunately, students in the groups mentioned above were not able to eliminate gaps in readiness by 2010-2011, with the exception of children of mothers who have less than a high school diploma eliminating their disadvantage in approaches to learning with respect to children of mothers who have a high school diploma. For most groups, the initial disparities are so large that it may take another decade, or more, at the current rate of change to eliminate disparities between groups. (Assuming continued linear growth, the amount of time it would take for between group disparities to be eliminated can be roughly estimated by comparing the trend difference to the initial difference, keeping in mind that the trend difference reflects just over a decade.).

The remaining findings paint a less positive picture of our progress in eliminating disparities in school readiness during this time period. In fact, students in a number of groups experienced stability in readiness gaps over time. Many of the disparities that existed between socioeconomic groups remained the same in 2010-2011 as they were in 1998-1999. In particular, for cohorts of students enrolled in kindergarten in 1998-1999 and enrolled in 2010-2011, students in the top two income quartiles had significantly higher math and verbal readiness scores than their peers in the lower income quartiles, and students whose mothers had some education beyond high school were at an advantage compared to their peers whose mothers had a high school diploma or less education.

More disheartening than stability in readiness gaps between groups over time, two groups in this study experienced growing readiness gaps. On the measure of non-cognitive readiness for male students, the trend in approaches to learning diverged with female students, which suggests that the gap between male and female students on this measure has grown over time. Similarly, differences in verbal readiness scores between Black and Hispanic students have grown over time. Positively, this indicates that the rate of growth for Black students' verbal readiness is positive. Negatively, this means the verbal readiness scores of Hispanic students are increasing at a lower rate than their Black peers and the disparity may continue to grow over time.

Though this study does not examine the influence of education policy on increasing school readiness outcomes for children, it recognizes that the current era of education reform (much of which was enacted after the 1998 cohort of ECLS-K students began school) reflects increased focus on accountability, early childhood education, and the provision of targeted resources to low-income or at-risk students. Because of the established relationship between high-quality early childhood education and children's cognitive outcomes at school entry (Early et al., 2007; Fontaine, Torre, and Grafwallner, 2007), it is not surprising to see improvements in readiness for students in the lowest income quartile or those whose mothers had the lowest levels of education, as they were some of the populations earmarked to receive greater early childhood education support.

Although low SES students may have not been able to decrease gaps in readiness with their high SES peers, for these at-risk students, improving readiness across cohorts and maintaining pace with high SES students may be an important step in not falling further behind at school entry. Additionally, it is not surprising to see improvements for racial/ethnic minority children and those in households without two biological (or adoptive) parents, as these

populations of students may disproportionately benefit from increased early childhood education efforts at the state and federal level, particularly those targeted to disadvantaged populations. A direction for future research is to identify the populations of students reached by targeted early childhood education programs and evaluate whether these programs are positively associated with school readiness.

Because the purpose of this study is to provide a broad portrait of school readiness across sociodemographic groups, the comparisons displayed here do not include controls for variables which may explain some of the relationship between the sociodemographic variable of interest and the outcome. For example, enrollment in early childhood education programs may vary across racial or socioeconomic groups and may explain some of the between group differences observed here. Therefore, next steps for this study include conducting multivariate analyses that assess whether the trends I observed here remain in the presence of confounding variables. Future research can use these findings as a starting point to examine questions regarding the mechanisms behind growing or shrinking gaps in readiness, including early childhood educational policies and programs.

A strength of this study is the comparison of changes in readiness gaps between sociodemographic groups over time. Though prior research helped to establish the disparities observed in the ECLS-K: 1998 kindergarten cohort, this study importantly estimated whether those disparities remained stable, grew, or decreased over time. As the current educational climate is focused on high-stakes accountability testing, it becomes increasingly important that students enter school prepared to learn so that they are on track to succeed by the time they reach the critical points where evaluation occurs. Though a number of early childhood programs have focused efforts on serving the most at-risk children in order to help prepare them for

kindergarten, it is clear that significant disparities between children remain. Recognizing the areas where we are making progress (ex. general increases in both cognitive readiness across most groups) or where significant work remains to be done (ex. decreasing disparities between racial and ethnic groups) provides policy makers and educators important information for guiding future reform efforts.

While recognizing these important strengths, it is also important for any study to note its limitations. First, the measures of school readiness used in this study were based on teacher reported behaviors rather than direct student assessment (such as a standardized test). At the time of the release of the ECLS-K: 2010 data, there was no directly comparable student assessment score that was appropriate for comparison across cohorts. Therefore, the measures of readiness used here may be more akin to grades than test scores. Some argue that teacher grading or rating may be biased (Allen, 2005), may not be equitable measures of performance (Brennan, Kim, Wenz-Gross, and Siperstein, 2001), or not accurate predictors of students' future ability (Kang and Bishop, 1984). However, others argue that standardized assessments are not the most useful assessment tool as they may not adequately measure deep and creative thinking (Darling-Hammond, 1991; Harris, Smith, and Harris, 2011; Koretz, 2005).

As a sensitivity analysis of the teacher-ratings of children's math and reading scores, I compare the teacher ratings to children's assessment data for each of the data sets. To do this, I examined students in schools with multiple respondents. Then, for each student, I determined whether their math and reading assessment scores were at, above, or below the class average. Then, I compared the teacher ratings to the assessment score ratings. The correlations between teacher-ratings and student achievement scores suggest that teachers' ratings are adequate evaluations of student readiness ability ($r>.4$).

Additionally, the indicator of household income used in this analysis (income quartile) may not have been sensitive enough to fully understand the relationship between children's cognitive and non-cognitive readiness skills and their family income. Because of data limitations, I was not able to utilize comparable estimates of household income in dollars between cohorts.

Despite these caveats, this work is an important first step in understanding how school readiness is changing over time. In an educational climate of increasing focus on early childhood education and standardized assessments in early elementary school, the importance of school readiness is not likely to wane. In fact, as we look to the area where the greatest strides can be made in improving children's academic outcomes on their educational trajectory, it is often argued that children's skills at school entry are an important building block for future educational success.

A number of groups are making significant progress in reducing disparities in school readiness. But, it is clear that the historic differences, especially between racial and ethnic groups and between children of mothers with different levels of education are difficult to overcome. There have been a number of targeted interventions directed at decreasing disparities for at-risk populations, such as Head Start or the state-sponsored pre-k programs. But, it is unclear whether these targeted interventions are doing enough to eliminate school readiness gaps at kindergarten entry.

Additionally, as non-cognitive readiness skills appear to be slightly declining over time, it may be important to continue to emphasize to families and early childhood caregivers the importance of teaching children early academic behavioral skills that are important for their future success. Though cognitive readiness skills are more highly correlated with later academic

achievement than early non-cognitive skills (Duncan et al, 2007), higher non-cognitive behaviors at school entry are also associated with later positive behavioral outcomes, such as lower likelihood of grade repetition, school dropout, or school behavior problems (Alexander, Entwisle, and Horsey, 1997; Duncan et al., 2007; Entwisle, Alexander, and Olson, 2005; Kurdek and Sinclair, 2001).

Figure 2.1 Predicted values of teacher-rated school readiness by cohort for each household income quartile.

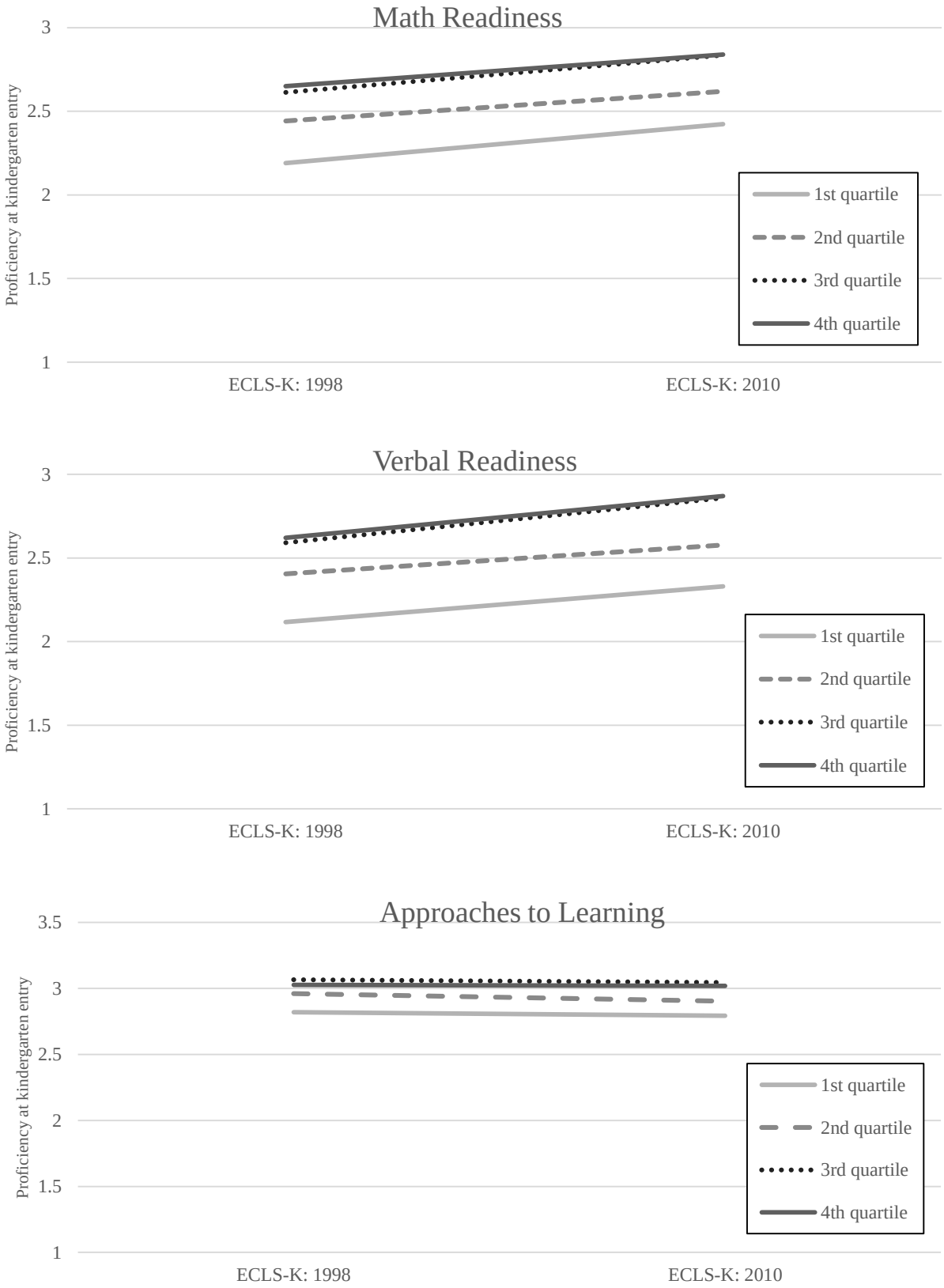


Figure 2.2 Predicted values of teacher-rated school readiness by cohort for each level of maternal education.

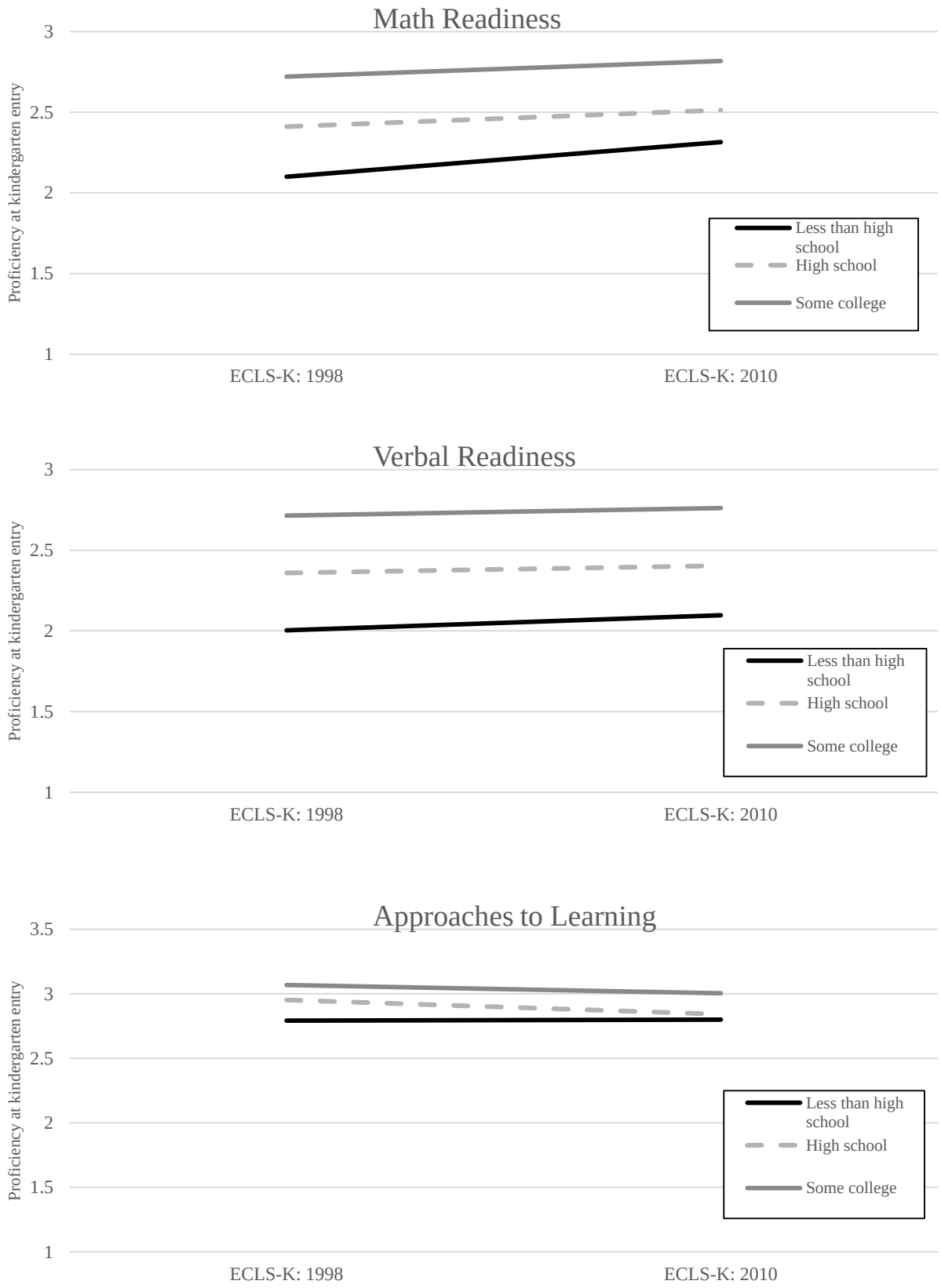


Figure 2.3 Predicted values of teacher-rated school readiness by cohort for each family structure.

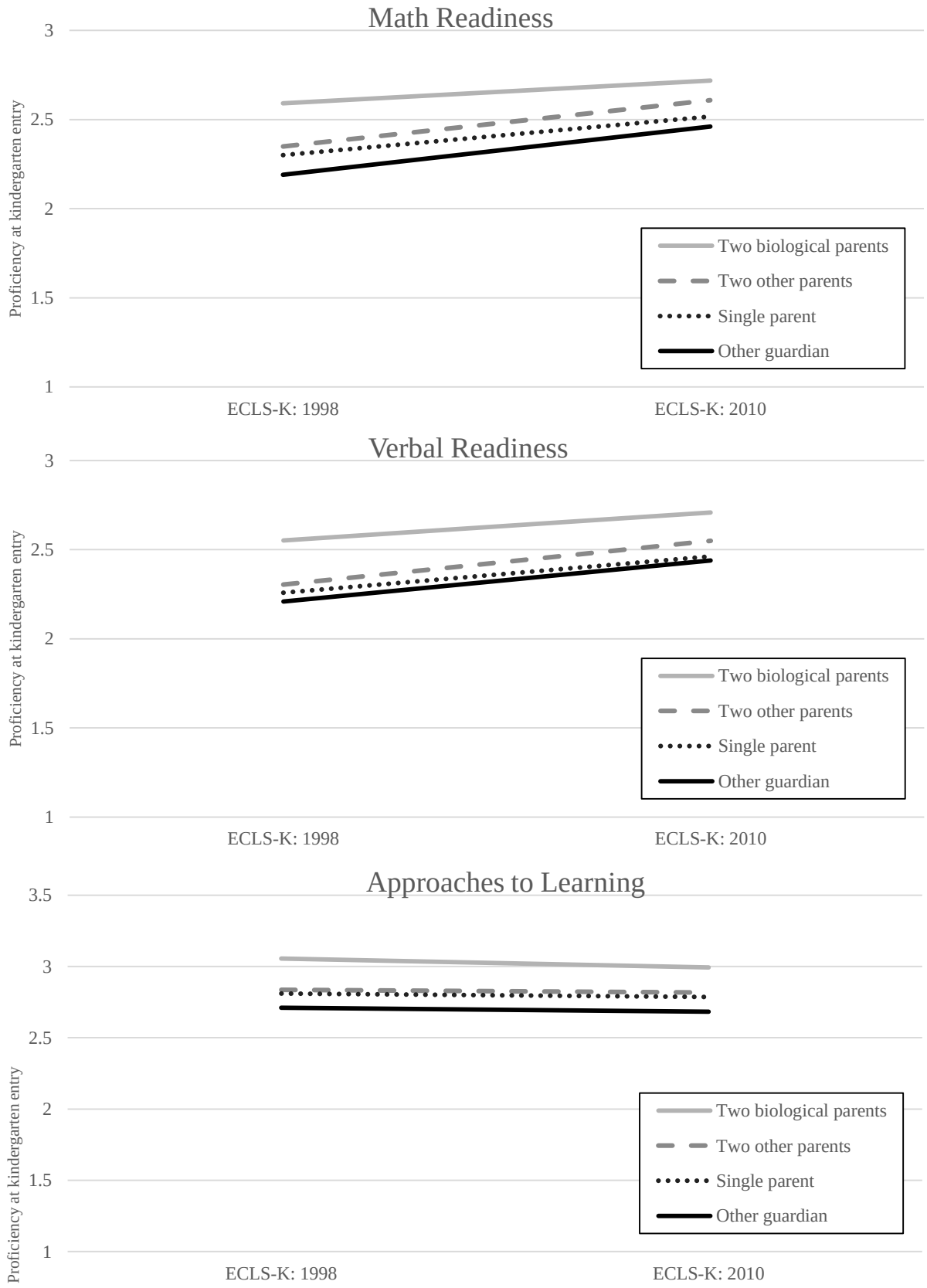


Figure 2.4 Predicted values of teacher-rated school readiness by cohort for each racial/ethnic group.

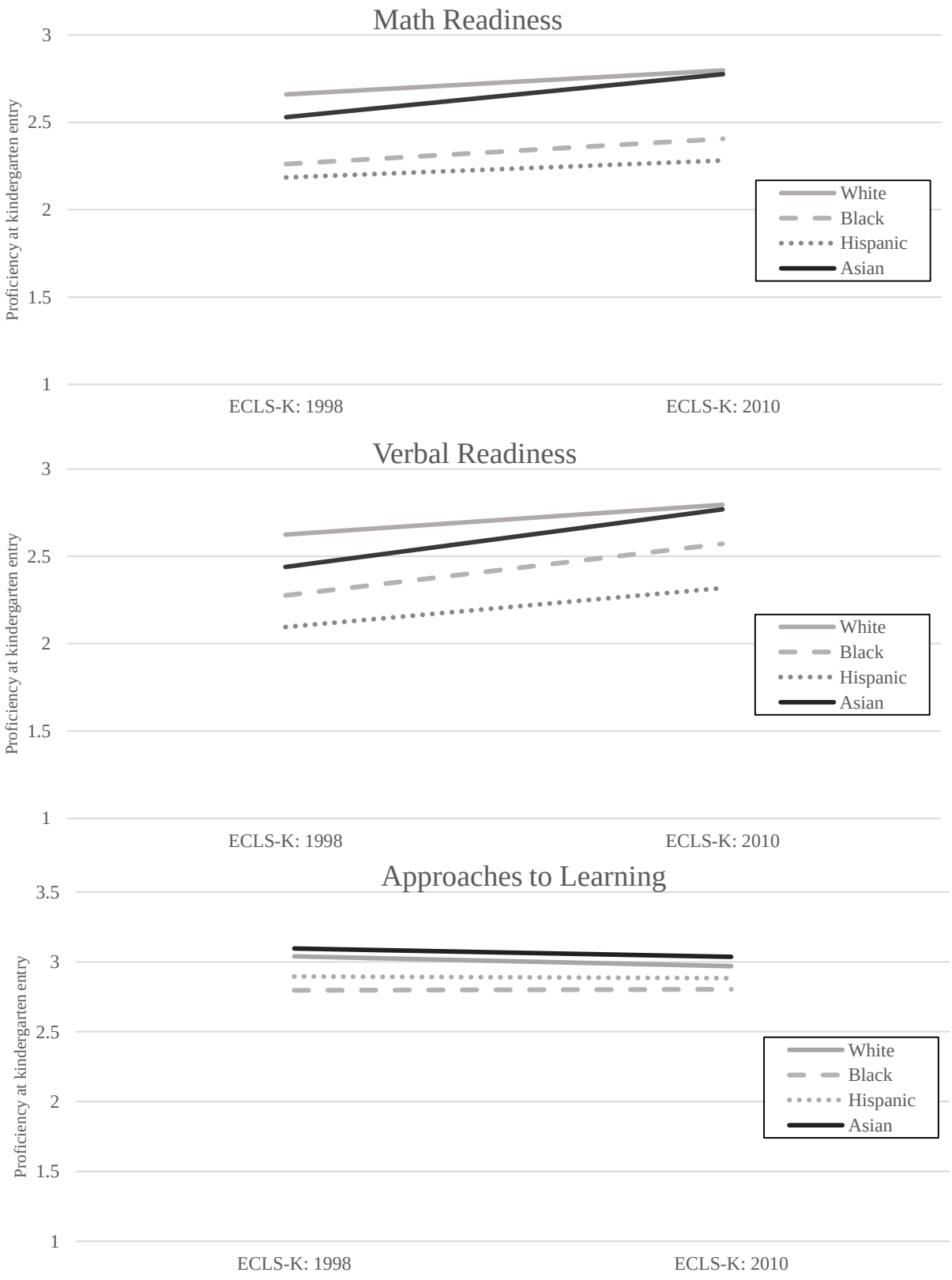
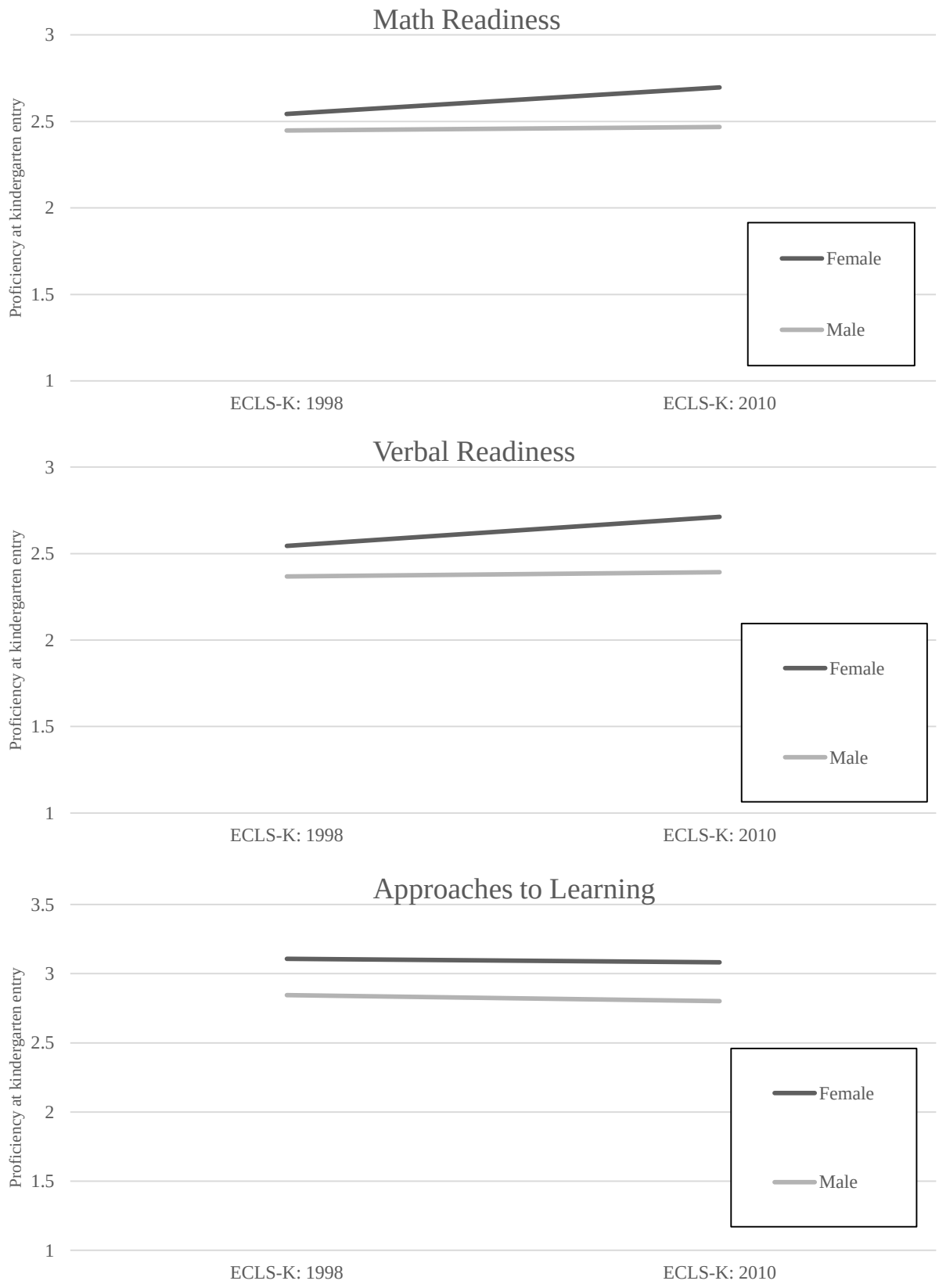


Figure 2.5 Predicted values of teacher-rated school readiness by cohort for each gender.



CHAPTER 3. IF YOU BUILD IT, WILL THEY COME? STATE EARLY CHILDHOOD EDUCATION POLICIES AND VARIATIONS IN STUDENT ENROLLMENT

Children enrolled in organized child care programs during early childhood, such as preschool, pre-kindergarten (pre-k), or other center-based care or nursery school programs, are more likely to be prepared for school upon reaching kindergarten (Magnuson and Waldfogel, 2005; Pianata, Cox and Snow, 2007; Ramey and Ramey, 2004). In these organized care programs, children develop cognitive skills, including early math and reading skills, and non-cognitive skills, including approaches to learning and socioemotional behaviors, to a greater extent than their peers who do not participate in these types of early childhood programs (Currie, 2001; Heckman, 2006). These skills are important in ensuring that children are ready for school upon kindergarten entry. As kindergarten curricula have increasingly included academic content to better prepare students for federal- and state-mandated assessments they will begin taking by third grade (Bassok and Rorem, 2014), students are expected to arrive at the first day of school ready to learn. As learning begets learning, children who are prepared for school have greater academic achievement and fewer behavioral problems throughout their educational careers when compared to students who are less prepared at school entry (Alexander, Entwisle, and Horsey, 1997; Duncan et al., 2007; Entwisle, Alexander, and Olson, 2005; Kurdek and Sinclair, 2001).

In order to help more children and families access care, federal and state governments have stepped in to provide opportunities for children to engage in early childhood education in a number of ways. Two of the principal ways this occurs are through the provision of state-funded pre-k or early childhood education programs (hereafter referred to as "state-funded pre-k") and through the allocation of funds to subsidize the cost of childcare.

States fall into one of three categories when it comes to funding pre-k programs: 1) offer *unrestricted* access to pre-k for all students (universal pre-k falls into this category), 2) offer *restricted* access to pre-k based on student risk profiles (including, but not limited to, coming from a low income household or having limited English proficiency), or 3) offer no state-funded pre-k programs.

States also provide support for early childhood education via the allocation of funds to child care programs. There are a number of ways to estimate the spending that occurs by state including total federal and state expenditures earmarked for early childhood services or measuring the state-determined level of allocated funds for state-funded early childhood programs. Through the Child Care Development Fund (CCDF), states serve as administrators of federal and state funds earmarked for the provision of subsidized childcare for families in need of support. These funds are not specific to center-based care programs, but, on average, over 60% of funds are allocated to center-based programs, with rates in some states as high as 80-95% (U.S. Department of Health and Human Services, 2012). Using these indicators of state-level spending may artificially appear to advantage students living in states with larger populations. Instead, utilizing a measure of per pupil spending provides a way to compare spending levels across states without unnecessarily penalizing children who do not live large states, such as California or Texas, for example.

Despite these offerings, it is unclear whether students who live in states with resources earmarked for early childhood education programs, including both higher levels of per pupil spending on early childhood education or access to state-funded pre-kindergarten programs, are more likely to be enrolled in organized care in the year or years before kindergarten entry. As one of the goals of providing early childhood education programs and services is to ensure equal

access to care, it is yet to be determined whether all children who live in states offering state-funded pre-k programs are more likely to enroll in organized care, or whether certain students are more or less likely to benefit from higher levels of funding or access to the state-funded pre-k programs.

Though more than half of four-year-old children are enrolled in some sort of organized care program, historically, there are significant differences in participation in these programs across racial and ethnic groups. Black children are the most likely to be enrolled in organized care programs, followed by Asian, White, and Hispanic children (Child Trends, 2012). These variations in enrollment are important to understand because, as discussed above, participation in organized care programs is associated with increased cognitive and, in some cases, behavioral readiness for school. And though organized care participation may only slightly reduce disparities in school readiness between children of different racial and ethnic backgrounds, enrollment in these programs plays a significant role in reducing within race disparities for children at school entry (Magnuson, Meyers, Ruhm, and Waldfogel, 2004; Magnuson and Waldfogel, 2005). Therefore, given the emphasis on education policies directed toward early childhood education, it is important to understand whether efforts being made to increase student enrollment in early childhood educational settings are associated with higher rates of enrollment, and whether these efforts benefit children of all racial and ethnic backgrounds.

Using the Early Childhood Longitudinal Study – Kindergarten Cohort 2010-2011 (ECLS-K: 2011) and indicators of state-level early childhood policy, this study examines the relationship between state-level early childhood education policies and children's utilization of organized care services. Specifically, I assess the relationship between living in a state which invests more heavily in early childhood education and programming, both in terms of financial

investment and the decision to offer free access to pre-k, and how likely a child is to enroll in organized care in the year before kindergarten. Then, I evaluate whether students of all racial and ethnic groups are benefiting from these policy decisions by comparing racial and ethnic differences in the utilization of organized care services in each of the state-level policy contexts. Finally, I examine within race variation in organized care enrollment to estimate whether living in a state offering greater resources is associated with higher odds of enrollment within each racial and ethnic group.

Background

Early childhood education in the United States

Organized care programs, including center-based care, preschool, and pre-k, often provide early learning opportunities to children before they reach school entry. In these early educational care settings, children learn both cognitive and non-cognitive skills that help to prepare them to arrive at kindergarten ready to learn. Children who are ready are more likely to have cognitive skills that provide the building blocks of later skills, including letter recognition and early vocabulary tools (Duncan et al., 2007; Hair et al, 2006), as well as basic math skills including understanding more and less, sequences, and sorting and classifying objects (Indiana Department of Education). Ready children also possess important non-cognitive skills that are important for learning, including the ability to follow directions, sit still, work independently, relate to other students, and not act out in the classroom (Dixon and Beard, 2011; Britto, 2012). Many of these skills are fostered in early childhood educational settings and together, these cognitive and non-cognitive skills set children on a path for success as they enter formal schooling.

In an effort to increase access to these types of organized care programs for all children, federal and state governments in many states have begun investing more heavily in early childhood. Although traditionally the U.S. education system has focused on K-12 education, increasingly, states are increasingly investing in pre-k programs as well. In fact, in their 2015 State of the State addresses, 30 of 46 governors (4 addresses not given) mentioned the importance of early childhood education programs and goals for the support or expansion of these programs within their state (National Governors Association, 2015).

Though these programs receive federal support, states are responsible for administering early childhood education and care programs. There are two predominant ways in which states may encourage enrollment in early childhood education programs. First, states may choose to provide state-funded pre-k programs to children before they reach kindergarten age. Some state-funded pre-k programs are available to all children in the state (generally around four-years-old). In some states, this comes in the form of universal pre-k, which are programs available to all students in the state. More often, states have programs that do not include any enrollment restrictions, but may only be offered in certain school districts. Generally, these types of programs allow students from outside the district to enroll in pre-k. Though these programs may not reach all students in a given state, they are the least restrictive among state early childhood education programs. On the other hand, some states offer programs only to at-risk students, which may include those who are near the poverty line, who have single parents, or have limited English proficiency. Ten states offer no state-funded pre-k programs.

In addition to providing programs, states offer funds to families to support childcare utilization. The largest program from which these funds are drawn is the Child Care Development Fund (CCDF), a joint effort between federal and state governments. The CCDF

provides access to vouchers for low-income families so that parents are able to work or attend school, while proving their children a safe care environment. As the level of funding states receive from the federal government for CCDF relies on matching funds (U.S. Department of Health and Human Services, 2012), the availability and level of funds varies between and serves as an indicator of how invested a state is in providing these early care services to children. While CCDF funds are not limited to center-based care programs, a substantial amount of funds (over 80% in many states) are directed to center-based programs versus other care types (U.S. Department of Health and Human Services, 2012). In most states, the vouchers provided through CCDF are meant to subsidize the cost of care, with parents or guardians also expected to contribute financially. Separate from CCDF funds, states also allocate funds to early childhood services through the state-funded pre-kindergarten programs mentioned above. Per pupil spending through these programs may serve also as an indicator of the state's commitment to early childhood education programming. States which invest more heavily per pupil are better able to provide the resources needed for successful pre-k programs, such as highly trained teachers, safe environments, and a developmentally sound learning environment (Barnett et al, 2010).

Through this network of resources, the goal of most states is to ensure that all children are receiving an opportunity to access care and education services to prepare them for kindergarten. But it is unclear whether living in a state with greater early childhood investments results in a greater likelihood of children enrolling in early childhood programs.

There are a number of reasons to believe that the enrollment of children in organized care would vary depending on whether the child lived in a state with unrestricted access to state-funded pre-k, restricted access to state-funded pre-k, or in a state that offers no state-funded pre-

k programs. First, in states offering state-funded pre-k to all children (herein referred to as *unrestricted pre-k*), parents and families may feel that it is the norm that children participate in organized care and therefore are more likely to enroll their child in early childhood programs, whether it is a state-funded program or not. Social norms are an important driver of behavior, with a number of subfields within the social sciences recognizing the ways that norms can drive consumer purchasing (Peattie, 2010), healthy decision making (Sieverding, Matterne, and Ciccarello, 2010), and even early education enrollment (Simon and Makar, 2009). For example, families following social norms regarding early childhood education can be observed in New York City and nearby areas of New Jersey (Fox, 2014; Laskey, 2015). Here, families compete to get their children enrolled in early childhood education programs through lottery system for a very limited number of spots in public preschools or through family and child interviews for placement in particular high profile private programs (Moody, 2013). Though families of high socioeconomic status may have initially driven these trends, families across the socioeconomic spectrum now feel pressure to enroll their children in care before entry to formal schooling and behave accordingly (Brody, 2015; Samuels, 2014).

Additionally, the provision of unrestricted pre-k programs may simply lead to more opportunities to engage in early education programs for families and in turn, students have a greater likelihood of enrollment. Organized care programs are often expensive (Schulman, 2000) and cost may serve as a barrier to enrollment for many families (NACCRRA, 2010). Therefore, simply removing this barrier may result in more families being able to enroll their children in early care. A similar pattern connecting supply of goods or services to the utilization of goods or services can be observed in the urban public housing market. In an evaluation of the utilization of housing vouchers through the Housing and Urban Development (HUD) program,

researchers found that in markets where more rental units are available, there are higher rates of utilization (Finkel et al., 2003). Though other factors were associated with utilization of the HUD program, the driving force influencing usage was the availability of units in an area. In a similar way, in states that offer pre-k programs to more students, such as in states with unrestricted versus restricted program offerings, or in states with restricted programs versus none, it would not be surprising to discover more students enrolling in organized care services. Generally, the widespread provision of programs such as state-funded pre-k may reduce a number of barriers to utilization including financial, logistical, and stigma associated with utilizing government funded programs (see discussion of stigma in Stauber and Schlesinger, 2006).

Conversely, parents in states which offer no-cost services to only at-risk populations or offer no state-funded services may assume that only certain groups participate in organized care and thus may be less likely to enroll their children. Or, if the familial norm is that a parent or other relative stays home with their children, it may not matter whether any state-funded pre-k programs are offered where a child lives, these families will be less likely to utilize care (Brandon, 2004; Holloway and Fuller, 1999).

The connection between per pupil financial investment in early childhood education by the state and student enrollment is less clear. One way economic resources may be connected to utilization of care is through perceptions of organized care program quality. In economic and marketing literature, it is well-established that the perception of quality of a good or service is directly connected to the price of the good or service (see review in Rao and Monroe, 1989). As parents rate quality as one of their leading concerns in making decisions about child care, they may choose not to enroll their children in organized care programs if they do not perceive the quality is high enough (NACCRRA, 2010). It is no surprise that states that spend more money

on early childhood education have greater opportunities to achieve the ten quality benchmarks set forth by the National Institute for Early Education Research, including the hiring of well-qualified teachers, low staff-child ratios, and supplemental health screenings and referrals (Barnett et al., 2010). According to NIEER estimates, in order to reach all quality indicators, state-specific estimates of funding per pupil on early childhood education range from approximately $3,500 to over $8,000 (Gault, Mitchell, and Williams, 2008; Barnett et al., 2010). Parents who live in states investing more per pupil on early childhood education may perceive the quality of education as high and may be more likely to enroll their children in organized care programs.

Generally, access to state-funded programs is likely to matter more for children's enrollment in organized care than spending. The provision of programs may be more directly connected to families having access to programs than the connection of government spending to the individual child's utilization of organized care.

Racial and ethnic variations in enrollment in organized care

Though over half of three- and four-year-old students are enrolled in organized care programs on a regular basis in the year or years before they reach kindergarten (Child Trends, 2012), there are significant differences in the rates of enrollment by race and ethnicity. Black and Asian children are more likely to be enrolled in organized programs than White or Latino children, with rates of enrollment over 60 percent. Latino children have the lowest rates of enrollment in preschool or other early childhood center-based programs, with rates of enrollment over the past two decades near 30 percent and only recently reaching 50 percent (Capizzano, Adams and Ost, 2006; Child Trends, 2012; Magnuson and Waldfogel, 2005).

As enrollment in organized care is associated with higher rates of readiness for school (see discussion in Chapter 2), it becomes increasingly important to understand how to help increase participation in early learning programs as a means of ensuring all children begin school ready to learn.. It is also clear that enrollment in these programs may play a significant role in reducing within race disparities for children at school entry (Magnuson, Meyers, Ruhm, and Waldfogel, 2004; Magnuson and Waldfogel, 2005). In other words, when comparing children of the same racial or ethnic background, those who were enrolled in organized care programs are significantly more prepared for school than their peers who did not participate in organized care before kindergarten. Therefore, understanding how to increase enrollment for all children may be important in helping to eliminate disparities in readiness both within and between groups.

State-level early childhood policies and disparities in enrollment

Although the goals of state-level early childhood education initiatives include increasing participation in early childhood education programs, it is unclear whether they equally reach all children. As noted, there is significant variation in enrollment between racial and ethnic groups and no groups have 100 percent participation in organized care. State policy decisions regarding financial investments in early childhood and the provision of no-cost pre-k programs to some or all children in the state may help to both reduce disparities in enrollment between groups and to increase the likelihood of enrollment for all groups.

Just as there are a number of reasons to believe all children would benefit from living in a state which offers unrestricted access to state-funded pre-k, there are a number of reasons to believe children of different racial and ethnic groups may or may not benefit from living in places with these programs. When comparing across racial and ethnic groups, Black, Asian, and White children may benefit little from being in a state offering any level of state-funded pre-k

because their rates of enrollment are already high. The norms within these groups may be for children to attend organized care during early childhood and therefore, no matter the level of access to state-funded programs where they live, these children may continue to enroll in organized care in high rates.

Hispanic students, on the other hand, may benefit from these same norms if they live in a state offering unrestricted access to pre-k. As their enrollment rates are generally low, if the new norm for this population is to enroll in care, Hispanic students in unrestricted access states should have higher rates than Hispanic students living in state with no pre-k offered. Hispanic students are also likely to benefit from living in a state offering restricted access to state-funded pre-k, if differences in resources are what explain differential participation in organized care as Hispanic students have a greater likelihood of being identified as an at-risk group, whether because of low socioeconomic status of the family or because of limited English proficiency (Kominski, Jamieson, and Martinez, 2001).

Similarly, other families who may have had barriers to access may no longer face these constraints if they live in states offering unrestricted access to state-funded pre-k. Black families in particular report paying a larger portion of their income to child care than families of other racial and ethnic groups, with many listing the expense of childcare only behind that of housing (NACCRRA, 2010). Therefore, rather than their being no relationship between enrollment and access to unrestricted pre-k for Black students, Black families in states offering unrestricted access to care may enroll their children in even higher numbers, if no longer facing financial constraints.

Additionally, Black students may receive an extra boost by living in a state offering restricted access to state-funded pre-k because they are more likely to be in a population

identified as at-risk for a number of reasons, including low socioeconomic status of their family or being from a single parent home (Kominski, Jamieson, and Martinez, 2001). Therefore, Black children in unrestricted or restricted access states may receive a double boost contributing to their odds of enrolling in care: the already high norms of this group of enrolling in organized care and the elimination of barriers to access.

Conversely, living in a state that offers unrestricted access to care may result in already advantaged students becoming more advantaged. In particular, families who were able to afford organized care without having access to no-cost care were already more likely to enroll their children. Therefore, these children may find additional benefits as the significant funds which would have been allocated to the cost of organized care may be directed to other developmentally stimulating activities or resources for the child.

In addition to differential returns to living in states with different levels of access to state-funded pre-k programs, students of different racial and ethnic groups may benefit differently from living in places where there are higher financial investments by the state earmarked for early childhood programs. In particular, as the cost of organized care is extremely high, higher than a year of education at a state college in thirty-one states (Child Care Aware, 2013), families who live in states who spend more per pupil on early childhood programs may feel less of a financial burden to pay for this care. As many Black and Hispanic families note the significant cost investment of early childhood programs as prohibitive (NACCRRA, 2010), Black and Hispanic students may have more opportunities to enroll in organized care if a greater proportion of the cost is subsidized.

As with the provision of state-funded pre-k programs, if the level of state funding is positively associated with odds of enrolling in organized care, rather than a differential return for

Black or Hispanic families who struggle to afford care, it may be that families who are already advantaged become even more advantaged. In turn, there may be little observable difference between students who live in states investing more heavily financially in early childhood care.

The current study

To evaluate whether state policies are associated with children's enrollment in organized care during early childhood, this study examines the relationship between odds of enrollment and two state-level policy decisions regarding the provision of early childhood education and care: per pupil financial investments in early childhood programs and the provision of unrestricted, restricted, or no state-funded pre-kindergarten programs to children within the state.

As these policies are often meant to provide opportunities to all children, I also examine whether children of all racial and ethnic backgrounds benefit from these early childhood education initiatives or whether some groups differentially benefit with regards to enrollment in organized care. Though I use state-level funding and program measures, this analysis is not intended to be a state-level analysis of early childcare services. Instead, I use state-level early childhood policy initiatives as a way to contextualize the early childhood education offerings available to children.

Methods

Data and sample

The data used in this study are from the Early Childhood Longitudinal Study – Kindergarten Cohort 2010-2011. The ECLS-K: 2011 is a nationally representative sample of approximately 18,200 children enrolled in kindergarten in the U.S. in the 2010-2011 school year. Children are given cognitive assessments and parents, teachers, school administrators, and caregivers provide information about the children's home environments, school contexts, and

academic and classroom performance at kindergarten entry through fifth grade. This study uses parent-reported data from the kindergarten wave of data collection to understand children's experiences prior to their entry to formal schooling.

Additionally, I have merged state-level early childhood education funding and services data from two sources to the ECLS-K. The first source of data comes from the Child Care Development Fund (CCDF) of the U.S. Department of Health and Human Services. The Child Care Development Fund provides publicly-accessible data sets which include detailed information about total federal and state contributions to the CCDF program as well as the proportion of these funds targeted for infant and toddler care, investments in improving the quality of care, and care for school-aged children. I use state-level data for the 2009 calendar year, which reflects the year prior to kindergarten entry for ECLS-K: 2010 students.

I also utilize state-level early childhood program information provided by the National Institute for Early Education Research (NIEER). Since 2004, the NIEER has conducted annual analyses of the "State of Preschool" in the United States, providing state-by-state assessments of state-funded early childhood pre-k programs. These assessments include measures such as the number of children served by state-funded programs, the quality of these programs, and the amount spent by states on these programs. For this study, I use findings from the report "The State of Preschool 2010" (Barnett et al, 2010) to create a dataset of state-level variables (described in the Measures section below). This report captures the 2009-2010 school year, which reflects the year prior to kindergarten entry for the ECLS-K: 2010 students.

The sample is restricted to students identified as White, Black, Hispanic, and Asian (including Pacific Islander) by parent or school report, decreasing the analytic sample to 17,090. To correct for the complex sampling design of the ECLS-K, I apply survey weights and limit the

analytic sample to only those students who have valid weights which resulted in approximately 13,970 students. In accordance with ECLS-K data reporting requirements, sample sizes have been rounded to the nearest 10. Missing data were multiply imputed using IVEware, a callable program in SAS 9.3 (Raghunathan et al. 2002). In instances where ECLS-K provided imputed measures, including maternal education and household income, using the imputation flags provided in the data set, I omitted imputed values provided by ECLS-K and re-imputed values for these variables.

Measures

Enrollment in organized care is a dichotomous variable taken from the fall kindergarten wave of data collection asking parents whether the child had ever been enrolled in a day care center, preschool, prekindergarten, or nursery school program on a regular basis before kindergarten.

State-level early childhood education funding is measured using two variables. First, using data from the CCDF, I determine the total *per pupil investment through the CCDF*, by combining both state and federally allocated funds for the CCDF program and dividing by the number of children served in that state. I also use an indicator of *per pupil spending on state-funded pre-kindergarten programs* using data from the NIEER State of Preschool 2010 annual report. Utilizing these two measures allows me to capture the primary sources of early childhood spending in a state. By including the CCDF as a source of funding, I am able to estimate per pupil investments for students who live in states that do not offer state-funded pre-kindergarten programs. In supplemental analyses, I tested state allocated spending and total (state and federal)

spending (in millions) (not per pupil) and found results similar to those when including per pupil spending measures described above.

Access to state-funded pre-k is a three-category variable which determines whether a child lives in a state that offers *unrestricted* state-funded pre-k programs, *restricted* state-funded pre-k programs, or *no* state-funded pre-k programs as of the 2009-2010 school year. A state was classified as "unrestricted" if they offered universal pre-k to all students or had no restrictions (such as income requirements or other risk identifiers) in place that would limit student access to state-funded pre-k programing. "Restricted" states are those that only offer access to targeted populations of students, including students from low-income families or those considered at risk for poor academic achievement. Some states offer no state-funded pre-kindergarten programs of any type, with respect to state-funded pre-k availability, children in these states would be classified as "none". For those states with multiple programs in place, a classification was made based on the types of programs that served the most students in the state.

Race/ethnicity is an ECLS-K classification of children's race/ethnicity based on parent-reported data and school-reported data. It includes 7 racial/ethnic categorizations: non-Hispanic, White; non-Hispanic, Black; Hispanic, race identified; Hispanic, no race identified; Asian; Native Hawaiian/Pacific Islander; American Indian/Alaska native; and two non-Hispanic races. For the purposes of this analysis, I collapse these categories into: *non-Hispanic White, non-Hispanic Black, Hispanic* (combining both Hispanic groups into a single category), and *Asian* (combining those identified as Asian and Native Hawaiian/Pacific Islander into a single category). Due to small sample size, I omit American Indian/Alaska natives from this analysis.

This analysis also includes a number of control variables including *gender* (ref=male), *maternal education* (less than high school, high school diploma/equivalent, some college or

greater), *maternal employment* (full-time, part-time, unemployed, not in the labor force), *household income quartile, family structure* (two biological/adoptive parents, two other parents (one biological/adoptive and one other), single parent, and other guardian), and *non-English language use at home* (0=English, 1=non-English).

Analytic strategy

I begin by conducting descriptive analyses of the sample of students in this study who were enrolled in kindergarten in the 2010-2011 school year. I also provide a descriptive assessment of the variation in early childhood education policies between states. Then, I present the bivariate association between state-level early childhood program policies and student participation in organized care to show whether there is an association between living in a state which provides a greater amount of support for early childhood programming and a child's likelihood of enrollment in organized early childhood care. For policies that are significantly related with enrollment, I present multivariate models that show whether confounders explain this association. I also present multivariate models that show whether students from different racial/ethnic backgrounds similarly benefit from state-level policies associated with enrollment, examining with and between group differences in odds of enrollment.

All analyses were weighted to adjust for complex survey design and were conducted using SAS 9.3. As the outcome variable is dichotomous, all analyses are conducted using multivariate logistic regression.

Results

Demographic characteristics of children enrolled in kindergarten in 2010-2011

The demographic composition of the population of students enrolled in kindergarten in 2010-2011 is presented in Table 1. This table presents weighed means or proportions for each child- or family-level characteristic.

Table 3.1. Demographic characteristics of students enrolled in kindergarten in 2010-2011

	Weighted proportion (standard deviation)
	N=13,970
	ECLS-K:2010
Enrollment in organized care	.68 (.46) [1]
Gender	
Female	0.482
Male	0.518
Racial/ethnic group	
White	0.532
Black	0.135
Hispanic	0.235
Asian	0.04
Maternal education	
Less than high school	0.132
High school diploma/equivalent	0.271
Some college or greater	0.597
Maternal employment	
Full-time	0.418
Part-time	0.205
Unemployed	0.076
Not in the labor force	0.301
Household income quartiles	
1st quartile	< $25,000
2nd quartile	$25,001-50,000
3rd quartile	$50,001-100,000
4th quartile	> $100,001
Family structure	
Two biological/adoptive parents	0.673
Two other parents	0.075

Single parent	0.227
Other guardian	0.025
Non-English language spoken at home	0.17

Source: ECLS-K: 2010 (kindergarten wave)
Weights: W1T0
[1]The standard deviation reported here is approximate as all analyses in this study utilize imputed data.

Presented in the first row of Table 1, it is no surprise that the proportion of male to female students is split nearly equally, with female students comprising 48.2 percent of students in the sample. When examining the racial and ethnic composition of the sample, White students represent the largest racial/ethnic group enrolled in kindergarten in 2010-2011, with over half of students being identified as White (53.2 percent). But, it is noteworthy to observe that 23.5 percent of children enrolled in kindergarten in 2010-2011 were of Hispanic ethnicity. This number is in line with estimates that approximately 25 percent of the school-aged population of students will be of Hispanic ethnicity this decade, up from one-fifth of students just five years prior (Hispanic students comprised approximately 19.9 percent of the public school aged population in 2005) (Fry and Lopez, 2014). This change reflects the growing number of Hispanic children as an overall proportion of young children in the U.S. (Murphey, Guzman, and Torres, 2014). The next largest proportion of students enrolled in kindergarten in 2010-2011 are Black (13.5 percent), followed by Asians (4 percent).

When examining family-level socioeconomic characteristics in the center of Table 1, more than half of the students in this sample (59.7 percent) have mothers who enrolled in some education beyond high school graduation. This means that approximately 40 percent of children in the sample have mothers who completed a high school education or less, 27.1 percent and 13.2 percent respectively. Given the increasing emphasis on and access to post-secondary

education in recent years, it is not surprising that I observe a large proportion of mothers participating in education after high school completion. Maternal employment is also an important indicator of family socioeconomic status. For children in the study sample, there are a greater proportion with mothers actively participating in the paid labor force than not, with over 60 percent of mothers working either full- (41.8 percent) or part-time (20.5 percent). And finally, the average annual household income of families of children in this analysis is approximately $50,000; with one-half of students in homes below this amount, and one-half of students in homes above this amount.

The household composition of students in the sample is weighted heavily toward two parent homes, with approximately almost three quarters of students in either in homes with two biological/adoptive parents (67.3 percent) or two other parents (7.5 percent). The remaining students live with a single parent (22.8 percent) or with another guardian (2.5 percent).

Finally, approximately 17 percent of the sample primarily speaks a language other than English at home. Though this number may seem high, it may reflect the growing proportion of Hispanic students as a proportion of the overall school-aged student population.

State comparisons of support of early childhood education

Before turning to estimates from models showing how state-level support of early childhood education is related to enrollment in early childhood education programs, it is useful to show the types of resources that states allocate to support early childhood education and how dramatically these resources vary by state. In Table 3.2, I first show how states vary with respect to the allocation of financial resources to early childhood education programs by presenting the range of per pupil spending allocated through the Child Care Development Fund (CCDF) and

state-funded pre-k programs. I use two these indicators of funding because together they capture the two primary sources of funding allocated by states to support early childhood care and education (Panels 1 and 2). Further, as CCDF supports early childhood care, even in states without fully funded state pre-k, I am able to measure financial investments that occur for children who live in states that do not offer state-funded pre-k.

Table 3.2. Descriptive means of state-level early childhood education policies for per pupil funding through the CCDF, per pupil funding through state-funded pre-k, and the type of state-funded pre-k offered in 2009-2010 (N=50)

	Mean (unweighted)	Range (min-max)
Panel 1.		
Per pupil funding through CCDF	$5,676	$2,844-12,570
Panel 2.		
Per pupil funding to state-funded pre-K programs	$4,493	$115-11,578
	Proportion (unweighted)	N
Panel 3.		
Type of state-funded pre-K offered		
Unrestricted	0.28	14
Restricted	0.52	26
None	0.20	10

States also support early childhood programs by offering no-cost access to state-funded pre-k programs. Therefore, in Panel 3 of Table 3.2, I also show the proportion of states that offer *unrestricted* state-funded pre-k programs, *restricted* state-funded pre-k programs, or *no* state-funded pre-k programs in 2009-2010, to show that variation occurs between states with respect to the level of access to state-funded pre-k that they provide. Together, these state-level descriptive analyses show that there is wide variation in the provision of resources to support early childhood programs between states. As a result of this variation, some students may find

themselves in states with few resources allocated toward early childhood programs, while others live in educational climates offering high levels of support.

As presented in Panel 1 of Table 3.2, on average, states spend approximately $5,676 per student through the Child Care Development Fund. This reflects wide variation, as the states allocating the greatest amount of funds through this program spend over $10,000 per student (examples of these states include: California, Nevada, and Maine), and the states allocating the least funds spend under $3,000 per student (examples of these states include: South Dakota, New Mexico, and Louisiana).

Average values of per pupil investments in state-funded pre-k are shown in Panel 2 of Table 3.2. As with CCDF funds, there are significant variations between states with respect to the level of per pupil funding allocated to early childhood programs. In states offering state-funded pre-k, the average level of spending is approximately $4,493 per student, with the highest states spending over $8,000 per student (examples of these states include: New Jersey, Connecticut, Alaska, and Oregon) and the lowest states spending under $2,000 per student (examples of these states include: Maine, South Carolina, Nebraska, and Arizona).

Finally, Panel 3 of Table 3.2 presents the distribution of states across levels of access to state-funded pre-k programs offered to students in a state. In total, 80 percent of states in the U.S. offer some level of access to state-funded pre-k, either unrestricted or restricted access. Fourteen states offer unrestricted access to state-funded pre-k. This number reflects nearly one-third of U.S. states. The largest proportion of states offer restricted access to state-funded pre-k, with just over half of states (26 states) offering pre-k programs to targeted populations. Families may be targeted because of income guidelines (i.e. 185 percent of the poverty line) or membership in an at-risk group (i.e. single parent, limited English proficiency, etc.). The

remaining ten states offer no state-funded pre-k programs, reflecting 20 percent of states in the U.S. A list of states with state-level pre-k access classifications created for this study can be found in Appendix A.

While these estimates provide a portrait of state-level variation in child care investments, it is important to recognize that ECLS-K: 2010 students are not equally distributed between states; the ECLS-K is not representative of states, but a nationally representative study. Of the sample of students in this analysis, approximately one-third of students are in states offering unrestricted pre-k programs (32 percent), over 60 percent of students are in states offering restricted pre-k access, and the remaining 10 percent of students are in states offering no state-funded pre-k. Therefore, the analyses that I am about to present do not allow for a direct comparison between states, but uses state-level policy variables to examine the varying contexts of early childhood education and how these contexts may be associated with enrollment in organized care.

State-level support of early childhood education and enrollment in organized care

Now, I present results from logistic regression models that estimate whether indicators of state-level support for early childhood education are related to children's enrollment in organized care. For interpretation, I transform the logits resulting from the logistic regression model in to odds ratios by exponentiating the logit. In Table 3.3, estimates in Model 1 show that there appears to be little to no observable relationship between per pupil spending through CCDF and enrollment in organized care (OR:.9998; p-value: 007). Though this value is significant at the p=.05 level, the odds ratio is very close to 1, which suggests a one unit change (representing one thousand dollars) in in per pupil spending through the CCDF would do little to change the odds

of enrollment in organized care for students when compared to students who live in states that do not increase CCDF spending. Similarly, in Model 2, there is no relationship between per pupil spending on state-funded pre-k programs and children's odds of enrollment in organized care (OR: 1.000; p-value: .076). This suggests that there is no observable benefit of living in a state that invests more heavily, per pupil, in state-funded pre-k programs.

Table 3.3. Logits from weighted logistic regression models estimating enrollment in organized child care by state early childhood education policies and child- and family-level background.

Variables	Model 1	Model 2	Model 3	Model 4
Intercept	0.915***	0.736***	0.718***	0.730**
Per pupil funding through CCDF	-0.022***	---	---	---
Per pupil funding to state-funded pre-K programs	---	0.011	---	---
Type of state-funded pre-K offered (ref: none)				
Unrestricted	---	---	0.116*	0.213***
Restricted	---	---	0.048	0.152
Gender (ref: female)				
Male				0.049*
Race/ethnicity (ref: White)				
Black				-0.045
Hispanic				-0.180*
Asian				0.013
Maternal education (ref: high school diploma or equivalent)				
Less than high school diploma/equivalent				-0.250**
Some college or greater				0.467***
Maternal employment (ref: not in the labor force)				
Full-time				0.140***
Part-time				0.178***
Unemployed				0.157**
Household income quartile (ref: 4th quartile)				
1st				-0.444
2nd				-0.427
3rd				-0.228
Household structure (ref: other guardian)				
Two biological/adoptive parents				0.001
Two other parents				0.048
Single parent				-0.027
Language spoken at home (ref: English)				
Non-English				-0.262***

Weight: W1T0
*** p<0.001, **p<0.01, *p<0.05

Notably, across both indicators of state-level financial investments in early childhood programming measured here, there is no clear advantage to a student's likelihood of enrollment from living in a state that invests more heavily in these programs. Supplemental analyses testing two other measures of financial investment: total funds (rather than per pupil funds) and an indicator of high spending finds similar results to those presented here (results available upon request). Further, I tested supplemental models which included controls for child and family demographic and socioeconomic characteristics. Any small, but significant relationship observed in Model 1 of Table 3.3, between the context of early childhood spending and enrollment became non-significant and the odds ratio closer to 1 in the presence of confounders (results available upon request).

In Model 3 (Table 3.3), when I examine the relationship between access to state-funded pre-kindergarten programs and organized care enrollment, a different picture emerges. The reference group in Model 3 is children who live in states that do not offer access to state-funded pre-k. The estimates in this table suggest that children who live in states offering unrestricted access to state-funded pre-k have significantly higher odds (OR: 1.12; p-value: .018) of enrolling in organized care than their peers who live in states with no access to state funded pre-k. This equates to 12 percent greater odds of enrolling in organized care for children who live in states offering unrestricted access to pre-k than children in states with no access to state funded care. But, students in states which offer restricted access to state-funded pre-k have do not have higher odds of enrollment in organized care than their peers in states with no access to care (p-value >0.10). When comparing students in states offering unrestricted access to pre-k versus those in

states offering access to restricted pre-k programs, there are no observable differences in odds of enrollment between these groups, though the difference approaches significance (p-value=.07).

When adding control variables to Model 3, the magnitude of the estimated effect of living in a state that offers unrestricted access to pre-k increases slightly (OR: 1.24), so that once controlling for confounders, students who live in states that offer unrestricted access to pre-k are 24 percent more likely to enroll in organized care than students who live in states offering no access to state-funded pre-k. The estimated effect of living in a state that offers restricted access to state-funded pre-k versus living in a state offering no access to state-funded pre-k is significant in Model 4 (OR:1.16, p-value<0.001), showing that students who live in states offering restricted access to state-funded pre-k have 16 percent higher odds of enrollment in organized care than students who live in states that offer no access to state-funded pre-k. Supplementary analyses show that once the controls are added, there remains no difference in the odds of enrollment between students who live in states that offer unrestricted versus restricted access to pre-k (p-value=0.12).

In summary, when considering the relationship between state-level investments in early childhood care and education, as measured by per pupil spending and the provision of access to state-funded pre-k, and a student's odds of enrolling in organized care, Models 1 and 2 in Table 3.3 presents findings which suggest that financial investments have very little or no association with odds of enrollment in organized care. But, the availability of state-funded pre-k programs in a state, either unrestricted or restricted, is associated with greater odds of enrollment than living in a state with no access to state-funded pre-k, net of controls. Thus, moving forward I focus the analysis on understanding which students are benefiting most from living in states offering

different types of access to state-funded programming or whether all students benefit from living in states offering access to unrestricted pre-k.

As I previously argued, students of all racial/ethnic groups may not benefit equally from living in a state that offers access to state-funded pre-k programs. I also argue that all races/ethnicities may not observe the same within group patterns of association between levels of access to state-funded pre-k and organized care enrollment. Therefore, the remaining models show whether there is between group variation in the odds of enrollment in organized care by race/ethnicity for students who live in states that offer unrestricted, restricted, or no access to state-funded pre-k and whether within racial/ethnic groups, students benefit similarly from all levels of access to state-funded pre-k.

Racial and ethnic variations in enrollment in organized care

I begin by presenting between racial/ethnic group analyses of the relationship between access to state-funded pre-k and the odds of student enrollment in organized care in Table 3.4. Data in Model 1 present logistic regression coefficients from models predicting enrollment in organized care by race/ethnicity and the level of state-funded pre-k offered in the state in which the child resides. Interaction terms in this model allow for the examination of how these odds of enrollment vary between racial/ethnic groups for children who live in states offering unrestricted, restricted, or no access to state-funded pre-k. In Model 2, control variables are added to Model 1 to test whether the inclusion of a series of child- and family-level background measures explain any of the observed difference between racial/ethnic groups, state-funded pre-k offerings, and enrollment.

Table 3.4. Logits and odds ratios from weighted multivariate logistic regression models predicting enrollment in organized care by race/ethnicity and type of access to state-funded pre-k offered by their state.

	Model 1		Model 2[1]	
	Estimate	**Odds ratio**	**Estimate**	**Odds ratio**
Intercept	0.846***		0.745*	
Access to state-funded pre-k (ref: none offered)				
Unrestricted	0.176**	1.193	0.140*	1.150
Restricted	0.176**	1.192	0.151**	1.163
Race/ethnicity (ref: White)				
Black	-0.383**	0.681	-0.220*	0.803
Hispanic	-0.328	0.721	0.045	1.046
Asian	-0.318	0.728	-0.273	0.761
*Black*Access to state-funded pre-k*				
Black*Unrestricted	0.306**	1.358	0.403**	1.496
Black*Restricted	0.060	1.062	0.075	1.078
*Hispanic*Access to state-funded pre-k*				
Hispanic*Unrestricted	-0.245	0.783	-0.178	0.837
Hispanic*Restricted	-0.337	0.714	-0.253	0.776
*Asian*Access to state-funded pre-k*				
Asian*Unrestricted	-0.068	0.934	0.138	1.148
Asian*Restricted	0.215	1.240	0.360*	1.433

Weight: W1T0 *** p<0.001, **p<0.01, *p<0.05
[1]Model 2 includes the following child- and family-level control variables: maternal education, maternal employment, household income, family structure, language spoken at home, and gender.

Model 1 shows that when comparing students who live in states with no access to state funded pre-k (the reference group) by race/ethnicity, White students have significantly higher odds of enrollment than Black students (OR for Black students: 0.681). Though Hispanic and Asian students who live in states offering no access to pre-k appear to have odds of enrolling in

organized care nearly 30 percent lower than White students (OR for Hispanic students: 0.721; for Asian students: 0.728), they are not significant, though approach significance (p-value: 0.06 and 0.08, respectively). In fact, across levels of state-offered access to pre-k, White students typically have the highest odds of enrollment and Hispanic students typically have the lowest odds of enrollment.

In order to examine the between group difference in states offering restricted access to state-funded pre-k, I use the results presented in Model 1 to calculate predicted values of odds of enrollment and graph these estimates in Figure 3.1. Supplemental analyses in which I changed reference groups allowed me to indicate where significant differences are observed. For children who live in states offering restricted access to pre-k, White and Asian students exhibit the highest odds of enrollment in organized care, as shown in the dark gray and black bars in Figure 3.1. For White students, their odds of enrollment are approximately 28 percent higher than Black students, and almost 50 percent higher than Hispanic students. Hispanic students represented by the striped bar in Figure 3.1 exhibit the lowest odds of enrolling in organized care, with odds of enrollment also lower than those of Black students (difference in predicted values: 0.34 logits) and Asian students (difference in predicted values: 0.56 logits).

Similarly in Figure 3.1, I observe between group differences in odds of enrollment for children who live in states that offer unrestricted access to state-funded pre-k. Though there are some similarities to the patterns observed for students who live in states offering restricted access to pre-k, there are some significant between group differences for students who live in states that offer unrestricted access to pre-k. First, the difference between White and Black students is no longer significant (p-value=0.287), this suggests that these students have similar odds of enrollment when living in states that offer unrestricted access to pre-k. White and Black students

both exhibit higher odds of enrollment than Asian students in states offering unrestricted access to state-funded pre-k, with White students exhibiting 32 percent greater odds of enrollment and Black students exhibiting 27 percent greater odds of enrollment. And once again, Hispanic students exhibit the lowest odds of enrollment across groups in these states, with odds almost 45 percent lower than their White peers in similar states, approximately 40 percent lower than their Black peers, and 20 percent lower than their Asian peers.

In Model 2, after adding controls to the model, though many of the patterns within racial/ethnic groups remained the same, some patterns between groups have changed. Though White students generally had the highest odds of enrollment in each state offered pre-k access type, when confounders are added to the model, this is no longer the case. Similarly, Hispanic students no longer have the lowest odds of enrollment in each setting. Now, in each level of state offering of state-funded pre-k, a different racial/ethnic group exhibits an advantage compared to their peers of other racial and ethnic groups. Figure 3.2 presents a visual representation of the predicted values calculated from this model. Supplemental analyses in which I changed reference groups allowed me to indicate where significant differences are observed.

First, when comparing students in states that offer no state-funded pre-k, Black students represented by the light gray bar, are the only group that have lower odds of enrollment than White students, represented by the dark gray bar, with estimated odds approximately 20 percent lower. Though in Figure 3.2 it appears that Asian students have lower odds of enrollment than White students and Hispanic students, these differences are not statistically significant (p-values>0.10).

For students who live in states with restricted access to pre-k, when including a set of potential confounding variables in Model 2, as shown in Figure 3.2, the differences between

White and Black, and White and Hispanic, and Black and Hispanic students remain, but the estimated logits are approximately two-thirds smaller for each of these pairs than in the previous model. Further, Asian students in states offering restricted access to state-funded pre-k now have the highest odds of enrollment compared to their peers. The difference between Hispanic and Asian students is approximately half the size it was in the previous model, but still significant, with Asian students now only having approximately 33 percent greater odds of enrolling in care than Hispanic students (OR: 1.33). Notably, in comparing the light gray and striped bars for students who live in states offering restricted access to pre-k in Figure 3.2, I no longer observe a difference between Black and Hispanic students. The inclusion of control variables fully mediate the difference between Black and Hispanic students observed in Model 1. Specifically, the joint inclusion of variables controlling for maternal education, household income, and language spoken at home account for the previously observed relationship.

Finally, when comparing the odds of enrollment for students who live in states that offer unrestricted access to pre-k a significant difference has emerged in the odds of enrollment between White and Black students. Though these students had similar rates of enrollment in the model with no controls (Model 1), with the addition of household income quartile and maternal education to the model, Black students now have higher odds of enrollment than their White peers in these states. This finding suggests that when comparing White and Black students with similar levels of maternal education and household income, the odds of enrollment for Black students are approximately 1.2 times greater than the odds of enrollment for White students (OR: 1.20). Additionally, the difference between Hispanic and Asian students in states offering unrestricted access to pre-k is no longer significant (p-value>0.10) in a model including control

variables. In particular, including a measure of maternal education mediates the observed difference between Hispanic and Asian students in Model 1.

The difference between White and Hispanic students' odds of enrollment is no longer statistically different once controls are added to the model. As shown in comparing the dark gray and striped lines in Figure 3.2 for students who live in states offering unrestricted access to pre-k versus the same groups in Figure 3.1, it is clear that the increased predicted odds of enrollment for Hispanic students has led to the elimination of the difference between groups.

Specifically, the addition of maternal education and language use at home mediate the relationship between race and enrollment for Hispanic and White students in states that offer unrestricted access to pre-k. Similarly, there is no longer a difference between White and Asian students after controls are added to the model. In this case, the addition of language use in the home as a control variable is what mediates the difference between White and Asian students who live in states offering unrestricted access to pre-k. The association between language and enrollment may not be surprising for Hispanic students, as it is well established in the literature that Hispanic households are less likely to be predominantly English speaking, but this relationship may be less expected for Asian households.

Supplemental analyses show that over 60 percent of the Asian students in the study sample live in households where English is not the primary language spoken at home. Thus, the variation that exists within the Asian student population with regards to language may reflect a risk area that is often overlooked for populations other than Hispanic students.

One additional observation across the models presented in Table 3, and supplemental models testing differences between all combinations of racial and ethnic groups, is that Hispanic students in particular have higher odds of enrollment once confounders are added to the model;

the odds are two times higher (or greater) for those who live in states that offer unrestricted access to pre-k or no access to pre-k and approximately 50 percent higher when living in a state that offers restricted access to pre-k. The difference between baseline odds in models with and without controls are not as substantial or do not emerge for other racial and ethnic groups. This indicates that once including controls in the analysis, Hispanic students' odds of enrollment are higher and the disparities between Hispanic students and students of other racial and ethnic backgrounds are smaller than originally observed.

Across levels of state-level access to state-funded pre-k programs, it appears that the race/ethnicity moderates the relationship between state policies regarding access to pre-k and enrollment in organized care. While it may be uncommon to consider race a moderating variable, a moderator is simply a variable that "affects the direction and/or strength of the relation between an independent…and dependent…variable" (Baron and Kenny, 1986: 114). White students generally have an advantage in simple models without at controls (see Figure 3.1), but in many cases, once controls are added to the models, the differences decrease substantially or become non-significant (see Figure 3.2). In fact, in states offering unrestricted access to care, Black students have the highest odds of enrollment, and in states offering restricted access to care, Asian students have the highest odds of enrollment.

Within racial/ethnic group comparisons of enrollment in organized care

After examining between racial and ethnic group differences in enrollment by the level of access to state-funded pre-k offered in each state, I now briefly discuss within racial/ethnic group differences in the odds of enrollment in organized care. This analysis allows me to examine whether students within a given racial/ethnic group differentially benefit from the level of access

to state-funded pre-k in the state where they reside, net of confounders. These comparisons can be viewed in Figure 3.2 by comparing across similarly colored bars.

For example, in order to compare predicted estimates of the log odds of enrollment for White students who live in states offering unrestricted access to pre-k, restricted access to pre-k, or no access to pre-k, I compare the dark gray bars across levels of state-funded pre-k in Figure 3.2. It appears that there is no difference in odds of enrollment whether students live in states offering unrestricted or restricted state-funded pre-k (OR: 1.00, p-value=.993). But, for White students who live in states offering any state-funded pre-k (either unrestricted or restricted), they are more likely to be enrolled in organized care than White students in states offering no state-funded care. The difference between living in a state which offers any access to state-funded pre-k versus living in a state which offers no access to state-funded pre-k equates to approximately 16 percent greater odds of enrolling in organized care (OR=1.16).

To compare within group variation in predicted log odds of enrollment in organized care for Black students, I compare across the light gray bars in Figure 3.2. Black students who live in states that offer unrestricted state-funded pre-k have significantly higher odds of enrollment in organized care than Black students who live in states offering restricted access to pre-k or no access to state-funded pre-k, with differences in predicted logits approximately 0.316 and 0.542 higher, respectively. Black students who live in states that offer restricted access to pre-k versus no access to state-funded pre-k have approximately 20 percent higher odds of enrolling in organized care.

Conversely, Hispanic students find no benefit from living in a state that offers any type of access to state-funded pre-k, as shown when comparing the striped bars across state-level access types in Figure 3.2. Whether a Hispanic student lives in a state offering unrestricted access to

pre-k, restricted access, or no access, the odds of for these students are enrollment are not significantly different from one another.

Interestingly, when comparing within Asian students across levels of access to state-funded pre-k, they benefit most from living in a state that offers restricted access to pre-k, as shown in the high black bar in the center of Figure 3.2. The odds of enrollment of Asian students in these states are over 30 percent higher than the odds of enrollment of Asian students who live in states that offer unrestricted access to pre-k or no access to pre-k.

Discussion

The goals of this study were to examine the relationship between state policies regarding early childhood education and care and the odds of a student enrolling in organized care in the year before kindergarten, and to evaluate whether these policies were associated with enrollment for all racial and ethnic groups or whether some groups differentially benefitted from state-level early childhood policies. I focused the analysis on three measures of state investment in early childhood: per pupil spending through the Child Care Development Fund, per pupil spending on state-funded pre-kindergarten programs, and the level of access offered to state-funded pre-kindergarten. As the educational climate within the U.S. is currently focused heavily on providing opportunities for early childhood development by supporting early learning opportunities, the findings from this study have important implications for evaluating the success of state policy. Given the strong relationship between organized child care participation and school readiness (Cannon, Jacknowitz, and Karoly, 2012; Gormley, Phillips, and Gayer, 2008), understanding whether policies are trickling down to reach students by increasing their probability of enrolling in organized care is an important endeavor.

The first important finding in this study suggests that there is little to no association between the level of spending per pupil on early childhood services and a child's odds of enrolling in organized care, whether considering resources allocated by the CCDF or the amount spent on state-funded pre-kindergarten programs. There is significant variation in per pupil spending through these programs across states, with some states spending less than $2,000 per student and others spending well over $8,000. However, greater spending does not translate to increased enrollment for students living in states which invest more financial resources in early childhood programs.

In supplemental analyses, I compare students in the highest spending states to those in the lowest spending states and find no relationship between per pupil spending and odds of enrollment. Given the mixed findings between per pupil spending and later student outcomes (K-12) in the prior literature, the result in this study is not completely unexpected. Further, per pupil funding may be too far removed from the evaluation process of families when trying to decide whether or not to enroll their child in care. Or, for parents who are aware of student expenditures on early childhood programs, they may observe that programs receiving these resources are not in their local communities and therefore would have no bearing on their decisions to enroll their child in organized care.

Second, I found that, on average, children who live in states offering unrestricted or restricted access to state-funded pre-k are more likely to have been enrolled in organized care than students who live in states that do not offer state-funded pre-k. When adding controls to this model, I find that this pattern remains, though the estimated coefficients predicting the odds of enrollment decrease in magnitude.

Therefore, I focused my remaining analyses on examining this means of providing more direct early childhood support to children and families in a state: access to state-funded pre-k. States vary with the extent to which they provide these programs to children in their state, with some states providing unrestricted access to pre-k, other states restricting access to those students who they identify as most at-risk, most commonly, children from low income families, and a number of states providing no state-funded pre-k programs to any students.

Unfortunately, study findings vary widely between racial/ethnic groups. When examining between group differences, I find that of children who live in states that offer access to unrestricted pre-k, Black students have the highest odds of enrollment in organized care (Figure 3.2), after the inclusion of child- and family-level confounding variables. This may reflect the generally high rates of enrollment for Black students in organized care. Because this group already has high rates of enrollment, when students live in a state that provides no-cost pre-k to students, those Black students who were not previously enrolled in care may be more likely to be enrolled when families observe that this is the norm in their state.

In states offering restricted access to state-funded pre-k, between group comparisons find that Asian students have the highest odds of enrollment among all racial/ethnic groups net of confounders. I had anticipated that Black and Hispanic students would have the highest odds of enrollment in restricted states, because low-income parents in these groups acknowledge cost to be a barrier to enrolling children in organized care and low-income families are those most likely to receive the targeted support offered through programs in states offering restricted access to care.

A partial explanation for these findings may be that significant variation that exists within Asian subgroups in the U.S. (American Psychological Assocation, 2012; Kao, 1995; Xie and

Goyette, 2004). In particular, a number of southeast Asian groups are often identified as low-income and a significant number of Asian families may have children who are not proficient in English (a risk identifier in some states). As the cultural norms of many Asian subgroups emphasize the importance of education (see discussion in Stanley and Okazaki, 1990; Schneider and Lee, 1990), the high odds of enrollment for Asian students who live in states that offer restricted access to pre-k may reflect a combination of cultural norms emphasizing education and risk populations who are unable to otherwise unable to afford organized care for their children being granted the opportunity. In future analyses, disaggregating students may help to tease apart these differences.

Finally, in comparisons of children who live in states that offer no state-funded pre-k programs by race/ethnicity, the only notable difference is between White and Black students. In these states, White students have significantly higher odds of enrollment than Black students, and controls for child and family characteristics do not explain this relationship.

When making comparisons within racial/ethnic groups, another important finding emerges. For Hispanic students, there is no return on odds of enrollment in organized care from living in a state that offers unrestricted or restricted pre-k programs. Historically low rates of organized care enrollment, coupled with no observed relationship between state-level access policies and odds of enrollment, may suggest that state policies regarding early childhood education are not reaching Hispanic students and their families. As these students are likely to be in the risk categories identified by targeted programs in some restricted access states, including low income, low parental education, and limited English proficiency, I anticipated that these students might benefit most from living in a state with restricted access to pre-k. The norms of enrollment in organized care that might come with living in a state that provides

unrestricted access to pre-k may not reach Hispanic families, particularly if they value family care for children during early childhood.

Conversely, within the Black student population, those children who live in states that offer unrestricted access to state-funded pre-k have the highest odds of enrollment, followed by children in states that offer restricted access to pre-k, and finally, by students who live in states that offer no access to state-funded pre-k. Similarly, White students who live in states that offer any level of state-funded pre-k have higher odds of enrollment than White students who live in states that offer no state-funded pre-k programs.

In some ways, this analysis supports the argument that state policies regarding early childhood education, particularly the provision of state-funded pre-k programs, may result in the advantaged gaining even greater advantage. In particular, Black and White students, who typically have the highest rates of organized care enrollment, both have higher odds of enrollment if they live in a state that offers any access to pre-k, whether it is unrestricted or restricted.

Though Black students are not typically identified as an advantaged group, they typically have the greatest propensity to participate in organized care compared to students in other racial/ethnic groups. Therefore, living in a state that offers access to state-funded care may result in their rates of enrollment growing even higher. Participation in organized care for Black and White students may reflect the norms of enrollment in organized care in states offering unrestricted access to pre-k and the decreased barriers to care in states offering restricted access to at-risk populations, so that in addition to the students who were already able to participate in care (either because of parental expectations of early childhood education or financial resources) more students in these groups are enrolling in care.

Though it is clear that White, Black, and Asian students are enrolling in organized care in higher rates when they live in states that offer access to some type of state-funded pre-k, one limitation of this study is the inability to determine whether students are enrolling in high quality programs. Observations and assessments of early childhood care programs find great variation across programs with respect to the quality of care offered, including having teachers who are highly trained, having developmentally appropriate guidelines for instruction, and creating an environment where children feel safe. Despite the high likelihood of enrollment in organized care for Black children who live in states offering unrestricted access to pre-k, or for Asian students in states offering restricted access to pre-k, it is not evident whether the programs these children are participating in are adequately preparing them to be successful in kindergarten.

Another limitation of this study is the inability to know whether a child in the ECLS-K: 2010 participated in a *state-funded* program in the year before kindergarten. Though student participation in organized care can be measured, including preschools, pre-k, nursery school, or other center-based care programs, I do not know whether these programs are privately funded by families, subsidized by resources provided through the CCDF, or are entirely subsidized by the state. Therefore, the conclusions I make here are not how state policies directly influence student and family behavior, but instead, they are about how state policies create an environment of early childhood education within the state and how families may respond to this environment by enrolling their children in early educational programs.

An important future direction for this line of research is to examine early childhood education the level that occurs in the step between policy and children and families, namely, how policy is translated to organized care programs. And, in turn, how organized care programs reach students and families to encourage enrollment. In research examining the outcomes of state

policy, there is often a disconnect in examining how (and whether) these policies ultimately reach children. Unfortunately, given current limitations of ECLS-K: 2010, this question cannot be addressed using this data set.

Overall, this study provides a mixed portrait of the relationship between state policies regarding early childhood education and student enrollment in organized care. Though some populations appear to benefit from living in states that offer any level of access to state-funded pre-k, the current policies may be resulting in already advantaged students gaining further advantage. Additionally, one of populations of students who have the lowest rates of enrollment in organized care, Hispanic students are not benefiting from living in states which offer state-funded pre-k. Therefore, going forward, it may be important to identify ways to provide targeted information to these families and emphasize the importance of early childhood as the starting point of children's educational careers or risk greater educational disparity in the future as these students risk falling further behind their peers.

Figure 3.1, Predicted log odds of enrollment in organized care by race and level of access to state-funded pre-k.

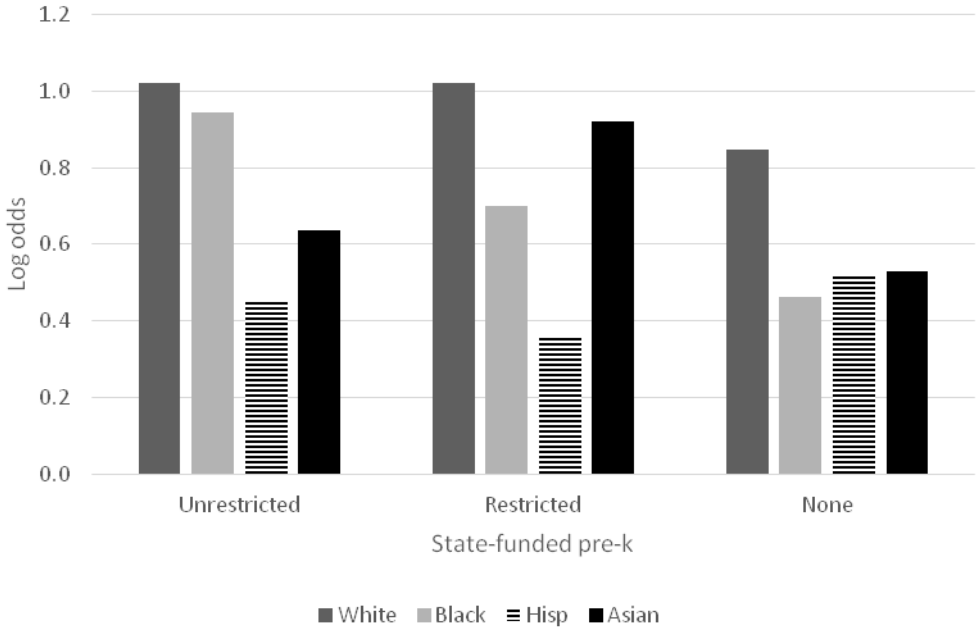
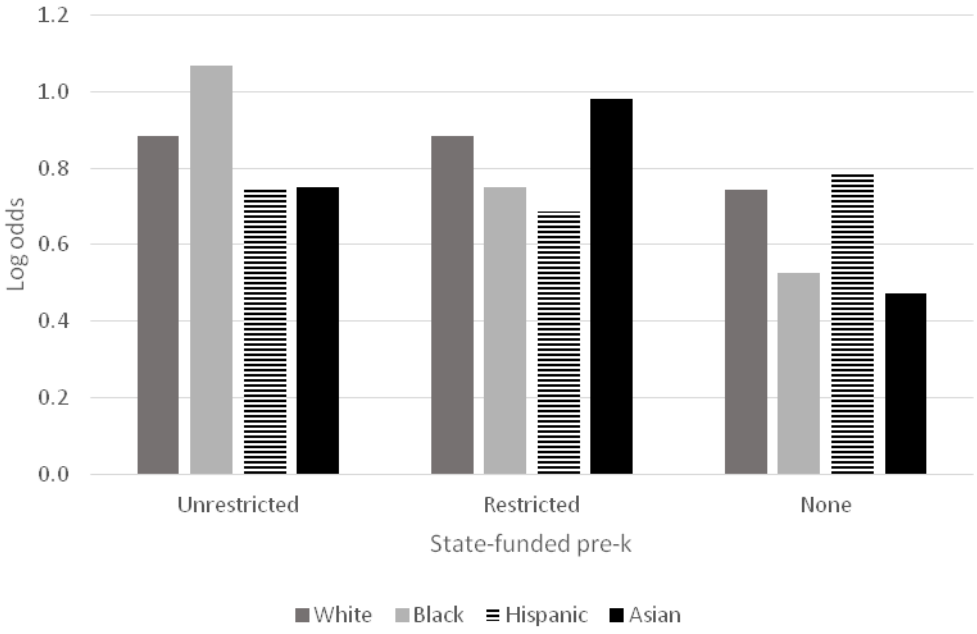


Figure 3.2, Predicted log odds of enrollment in organized care by race and level of access to state-funded pre-k, net of confounders.



CHAPTER 4. STATE-LEVEL EARLY CHILDHOOD EDUCATIONAL CLIMATE AND STUDENT SCHOOL READINESS: EXAMINING STATE POLICY CONTEXTS FOR EARLY LEARNING

Early childhood education has increasingly become an area of interest in examining ways to eliminate educational disparities between children. Though states once focused primarily on policies regarding kindergarten through high school education, they now recognize the importance of providing support to children and families even earlier in their educational careers.

Ranging from the provision of no-cost access to pre-kindergarten (pre-k) for all students (Barnett, Brown and Shore, 2004), to offering financial subsidies to families to help cover the cost of early child care for at-risk populations (U.S. Department of Health and Human Services, 2012) states vary widely in their investments supporting early childhood programs. States also develop policies guiding the administration of early childhood programs, including requirements for teacher training and education, appropriate student-to-teacher ratios in a class, the provision of health screenings, or the utilization of a set of early learning standards to guide instruction (Barnett et al, 2010). Policies also guide the level of per pupil spending by a state, the provision of full- or half-day programs, and whether the state offers services to all children or only those in targeted populations identified as at-risk.

Together, these policies shape the early childhood educational climate of each state. Broadly, an educational climate reflects the shared perception of an education system's norms, goals, policies, and practices by students, families, and educators (Anderson, 1982; Roff & McAleer, 2001). States that aim to create a climate conveying the importance of early childhood learning and development may act accordingly by investing heavily in state-funded pre-k programs, demanding high quality standards for these programs, and offering these services to all children or those at greatest risk of poor educational performance.

Most studies of educational climate either focus on the ways that broad policy issues contribute to an individual's perceptions of the educational context in a state or across the country (David, 2007; Duderstadt, 2009), or focus more narrowly on school climates, observing characteristics of schools, how they differ, and how these characteristics may be associated with student outcomes (see reviews in Andersen, 1982 and Thapa et al, 2013; Pong and Zeiser, 2012; Wang and Dishion, 2012).

In the school climate literature, both overall school climate (as a composite series of factors) and individual factors (including teacher professionalism, teacher-student relations, or academic press, for example) have been shown to be related to positive student achievement and behavioral outcomes (Cohen, McCabe, Michelli, and Pickeral, 2009; Schaps, 2005).

Fewer studies have focused on connections between the broader educational climate, such as that created by state policy, and student outcomes. This may be due, in part, to the perception that state policies are too far removed from students to influence their outcomes. In an Education Week essay, Baeder (2012) argues that states have a "very, very" indirect impact on student performance. Yet, studies have found that state-level high school education policies, such as changes to course requirements for high school graduation, the implementation of an exit exam, or requiring all students in a district to take the SAT are associated with higher academic achievement scores (Bishop and Mane, 2004; Lee et al., 2006; Lukemeyer, Crippen, and Archambeault, 2007; Musoba, 2004). These studies examine the association between state policy and student academic outcomes without directly measuring the intervening mechanism that the policies are intended to modify (such as the actual courses taken or increased emphasis in schools on test preparation).

Even less is known about the relationship between early childhood education policy and early student achievement outcomes, such as school readiness. Though significant work has assessed the variation in early childhood educational policies across states (see extensive annual reports prepared by the National Institute for Early Education Research, 2004-2014; Stebbins and Knitzer, 2007), few studies have examined the relationship between state-level policy contexts and student academic outcomes during early childhood. Often these studies only measure the presence of a program rather than specific elements of these programs which are also guided by policy (Andrews , Jargowsky, and Kuhne, 2012; Barnett, et al, 2013; Gormley, 2008).

I argue that the presence of state-level policies regarding early childhood education creates an educational climate for students and families in a state that emphasize the importance of early childhood development and learning. For families in states where the early childhood educational climate reinforces this message, I anticipate that the relationship between the policies that create this environment and student outcomes in early childhood will emerge. Specifically, I anticipate that students who live in these states will benefit from this climate and be better prepared for school than their peers who live in states that do not create a climate that emphasizes the importance of early childhood development.

I also anticipate that these policies may not reach all students equally. Given the significant racial and ethnic disparities in access to educational opportunities that have been observed for decades (Coleman et al., 1966; Gamoran and Long, 2007), students of all racial/ethnic groups may not benefit from state-level investments in early childhood education. Differentials in returns to policy may result in students who are already advantaged with regards to school readiness gaining even further advantage, including White and Asian students.

Conversely, early childhood education policies may disproportionately improve readiness of disadvantaged populations, including Black and Hispanic students.

Using the Early Childhood Longitudinal Study – Kindergarten cohort of 2010-2011 (ECLS-K: 2010) and data on state pre-k programs collected by the National Institute for Early Education Research (NIEER), I examine the relationship between the early childhood educational climate of a state and children's school readiness. To reflect state-level educational climate, I use three measures of state policies concerning early childhood education and care: quality requirements of state-funded pre-k programs, the estimated amount of additional per pupil funding needed to achieve all NIEER quality benchmarks, and the proportion of four-year-old children served by state-funded pre-k programs. Specifically, I assess whether children who live in states with greater levels of these resources have higher math and verbal readiness for school than their peers in states with fewer resources. Further, I examine racial and ethnic differences in the relationship between these early childhood educational climate variables and children's school readiness to evaluate whether all students benefit from these policies or whether some policies have differential returns.

Background

Early childhood education policies

Early childhood education policies in the United States are a relatively new phenomena (Shonkoff and Meisels, 1990). Traditionally, the department of education within each state made decisions about kindergarten through high school education (U.S. Department of Education, 2012). But, as researchers look to address disparities in formal education at their inception,

increasingly, early childhood educational opportunities are seen as a tool for addressing those disparities that exist at kindergarten entry (Heckman, 2006).

A number of states have chosen to offer state-funded early childhood education programs in the form of pre-kindergarten to students and families within their state (Barnett et al, 2004, 2010). In some cases, these programs are offered universally to all students, in other cases, these programs are targeted to at-risk populations, often identified by family's low income status (Barnett, Brown, and Shore, 2004). As state-funded pre-k programs are administered by the state, generally through the educational agency that sponsors K-12 education, states also make policy decisions regarding the implementation of pre-k programs.

In particular, states often determine a set of standards for state-funded pre-k programs. The National Institute for Early Education Research (NIEER) has outlined a list of ten quality standards that are associated with providing a high quality educational environment for children during early childhood (2010). Though not a comprehensive list, NIEER argues that without these standards, it would be difficult to provide quality education services. The ten quality standards include educational requirements of teachers and assistant teachers, such as whether they have a bachelor's degree with a specialization in early childhood education, having an associate's degree in child development or some other type of certification, as well as on-going training (Barnett et al., 2010). States may also have guidelines regarding the student-to-teacher ratio or student-to-staff ratio, with a lower student-to-teacher ratio being associated with a higher quality environment for children. Early learning standards, an evaluation process, provision of health screenings and referrals, and the provision of at least one meal are also included in the quality benchmarks identified by NIEER.

States also decide how to fund early childhood programs through policy. Generally through a combination of state, federal, and local funds, states determine how much to invest in pre-k programs (ASHA, 2015). Financial investments allow states to provide resources associated with providing a high quality learning climate for students, including tools for learning, continuing education for teachers, offer competitive salaries to hire highly qualified teachers, and lower class sizes, all factors associated with higher student achievement (Barnett and Robin, 2006; Haskins and Rouse, 2005). These resources also align with the NIEER quality benchmarks. The NIEER has estimated the per pupil expenditures needed to provide the ten quality benchmarks within each state. This value varies by state and is based on both the estimated per pupil cost for providing a high quality program (Gault, Mitchell, and Williams, 2008) and a state-level cost adjustment (Taylor and Flower, 2004). Across the country, many students are in states where per pupil expenditures are lower than the estimated per pupil cost of meeting all ten NIEER quality benchmarks.

As mentioned, another significant aspect of state early childhood education policy revolves around the number of students reached through state-funded programs. Most state-funded pre-k programs are only targeted to four-year-old children in the state. (see Barnett et. al., 2010) Though some states offer unrestricted pre-k programs, which allow all children in the state to access state-funded pre-k, other states choose to target their early childhood program resources to at-risk students, including students from low income families, students with developmental delays, or students with limited English proficiency, for example (Dotterer, et al, 2013). Because of state-level policies targeting at-risk populations, some states may serve a smaller proportion of students than others.

These policies contribute to the early childhood educational climate of a state. An educational climate reflects the shared perception of an education system's norms, goals, policies, and practices by students, families, and educators (Anderson, 1982; Roff & McAleer, 2001). States making significant investments in early childhood education, as evidenced by requiring high quality standards of state-funded pre-k programs, funding programs adequately to meet quality benchmarks, and providing early childhood services to a greater proportion of students may be creating an educational climate in the state that emphasizes the importance of early childhood development and education.

Though state-level early childhood policies may work collectively to create a broad climate of the importance of early childhood education in a state, individually, policies may also influence family's perception of a state's early childhood educational climate. For example, if a family lives in a state where a greater number of quality standards are required of state-funded programs, the family's perception of the educational climate of a state may be that high quality early childhood education is important. Similarly, states that fund their early childhood education programs adequately to reach quality benchmarks may be fostering an educational climate that emphasizes their commitment to quality early childhood education. Finally, if a large proportion of students are enrolled in state-funded pre-k programs within a state, families may perceive the educational climate of their state as supportive of early childhood education and conducive to early childhood learning and development.

Studies of educational climate generally measure how a broad educational climate, such as that created by state-level or federal-level educational policies translate into perceptions of education by individuals (Anderson, 1982; Miles and Leinster, 2007; Varma, Tiyagi, and Gupta, 2005). An extension of education climate research focuses more narrowly on the educational

climates specifically created in schools, or school climates. A school climate may be measured by a single factor, such as teacher-student relationships, the academic pressure of the school, or the safety of the school. Conversely, a school climate is seen as a set of characteristics of a school and how these characteristics jointly create the student (or educator) perception of the educational climate within the school (Cohen, McCabe, Michelli, and Pickeral, 2009; Hoy and Hannum, 1997). School climate research is typically more connected to student outcomes than studies of broader educational climates. These outcomes include academic achievement, including grades and test scores (Hoy and Hannum, 1997; Uline and Tschannen-Moran, 2008), or student behavioral outcomes, including misbehavior at school or odds of being suspended (Hinojosa, 2008; Stewart, 2003).

There are few studies that connect broader educational climate, such as that created by state-level policies, to student outcomes. This research is generally limited, as some argue that state policies are too far removed from students to influence outcomes (Baeder, 2012). But, some studies have tested the hypothesis that state education policies are connected to student outcomes, finding that state-level high school education policies, such as changes to course requirements for high school graduation, the implementation of an exit exam, or requiring all students in a district to take the SAT are associated with higher academic achievement scores (Bishop and Mane, 2004; Lee, 2006; Lukemeyer et al, 2007; Musoba, 2005). Similarly, in an evaluation of a state level policy regarding the improvement of community college retention rates, students who were enrolled in community college after this policy was implemented had higher rates of certificate completion than their peers who were enrolled in community college before the policy (Hillman, Tandberg, and Fryar, 2015).

In most cases, these studies examine the association between state policy and student academic outcomes without directly measuring the intervening mechanism that the policies are intended to modify (such as the actual courses taken or increased emphasis in schools on test preparation). Studies that do examine these intervening mechanisms have found mixed results. In an evaluation of state-level policies regarding increased physical education in schools as a means of improving student health outcomes, Kim (2012) tested the school policies regarding physical education that resulted from state policy and the relationship between both levels of policy and student outcomes. This study found no association between state or school policies and student obesity. Conversely, Cohen and Hill (2001) evaluated the relationship between a teacher improvement policy and student outcomes in California, and identified a number of specific offerings for teachers, which resulted from this policy, that were associated with increased student achievement outcomes.

The challenge in investigating the mechanisms that influence student outcomes that result from policies may occur in identifying the correct program, or portion of a program, that is associated with student outcomes. If identifying an incorrect program or service that connects state-level policy to student outcomes, it may appear as though policies are not improving student outcomes when in fact the policies are associated with increased student achievement or academic attainment.

Education climate and school readiness

While the educational climate created through state-level high school education policies or through policies supporting college completion may be associated with student outcomes, fewer scholars have examined the relationship between the educational climate specifically created as result of early childhood education policies and student outcomes. Early childhood is

a unique phase of student education and, thus, the outcomes examined at this time are also unique. For young children, one of the most important educational outcomes to assess is how prepared a child is for entry into formal schooling.

School readiness is an indication of how prepared a child is to succeed when they enter elementary school, which is kindergarten for over 77 percent of students in the U.S. (Davis and Bauman, 2011). Readiness includes both cognitive and non-cognitive skills that are associated with later learning. Cognitive school readiness includes intellectual skills that serve as foundations for learning and translate into math, language, and reading skills (National School Readiness Indicators Initiative, 2005; Salkind, 2008). Non-cognitive school readiness includes skills that make it easier for a child to learn (such as listening and following directions), and social skills that help the student relate to the teacher and other students (Campbell & von Stauffenberg, 2008; Raver, 2002). Cognitive skills are often stronger predictors of later academic outcomes than non-cognitive skills (Duncan et al, 2007). Given the emphasis on standardized testing and assessment in the current era of educational accountability, examining factors associated with cognitive measures of school readiness may provide important areas for further policy consideration.

The early childhood educational climate that is likely to influence school readiness is one where families perceive that early learning opportunities and early childhood development are important. There are a number of state-level policies that may contribute to the creation of this sort of educational climate. I focus on three types of policies here: policies that are associated with creating a high quality learning environment, policies that are associated with the per pupil financial investment by states, and policies that determine how many students will be served by state-funded programs.

The educational climates created by these policies are likely to be positively associated with cognitive school readiness for a variety of reasons. First, when considering state policies regarding quality regulations, in states where expectations of quality are high (as measured by the number of quality regulations required by state-funded pre-k programs in the state), students may be more likely to be receiving high quality early education. Though not an exhaustive list, the National Institute for Early Education Research (NIEER) has identified a set of ten quality benchmarks that are associated with a strong pre-k program, including the hiring of well-qualified teachers, low staff-child ratios, and supplemental health screenings and referrals (NIEER, 20xx). High quality early childhood education programs, in turn, are associated with greater cognitive readiness for school (Burchinal, 1999; Loeb et al, 2007; Vandell, 2004). Further, high quality regulations of state-funded programs may create an educational climate that emphasizes the importance of high quality care. In turn, in order to be competitive with state-funded programs, private programs would need to offer the same quality of care, which means all students in a state may benefit from policies requiring more quality standards of state-funded programs (Samuels, 2014), whether they are enrolled in a state-funded pre-k program or not.

There are also reasons to believe that children who live in states where per pupil funding is adequate to meet the estimated cost of achieving all NIEER quality benchmarks may have greater readiness for school. In theory, states that are spending enough per pupil to reach all quality benchmarks are in fact providing higher quality learning environments for students than states which are not providing enough funding to reach these quality benchmarks. According to NIEER estimates, in order to reach all quality indicators, state-specific estimates of funding per pupil on early childhood education range from approximately $3,500 to over $8,000 (Gault, Mitchell, and Williams, 2008; NIEER, 2010). As students who are in high quality programs are

more prepared for school than their peers in lower quality programs (Burchinal, et al, 2010; Curby et al., 2009), students who live in states that spend enough to provide high quality programs may have greater readiness for school. Further, if families perceive that early childhood education quality is important because they live in states that adequately fund programs, they may be more likely to demand that the programs their children are participating in are providing the necessary quality of care.

Finally, students who live in states where many students receive access to early childhood education may be more ready for school because these states foster an education climate that supports early childhood development and education. The odds of enrollment in early education programs are greater for those students who live in states where a high proportion of students are enrolled in care. Even if a child does not participate in state-funded pre-k programs, if living in a state where many other children are enrolled in early childhood education, families may recognize the importance of creating an environment that fosters early learning for children. As a result, families may be more likely to help children develop the skills they need for greater success at school entry.

Unfortunately, these policies may not benefit all students equally. Most generally, state-level policies regarding early childhood education may simply be a reflection of state-level policies for K-12 education. As the United States has a long history of unequal access to K-12 educational resources among students of different races and ethnicities (Coleman, et al., 1966; Darling-Hammond, 1998), when evaluating early childhood education policies, it may be that the most advantaged students gain even greater advantage from living in a state with a strong early childhood education climate (Gormley, 2005). In turn, the racial/ethnic disparities between students may continue to grow. In particular, White and Asian students who live in states with

strong, positive early childhood educational climates may retain or multiply their cognitive advantages in school readiness with respect to their Black and Hispanic peers).

Conversely, students from typically disadvantaged groups may benefit from living in a state that create a climate emphasizing the importance of early childhood education. In particular, Black students may benefit from a climate fostering high quality early childhood education. Though Black students have the highest rates of enrollment in organized care, they are least likely to be enrolled in high quality programs (Magnuson and Waldfogel, 2005). Therefore, Black students may particularly benefit from living in a state where the quality requirements of state funded programs are high and states are investing enough funds per pupil to reach the NIEER quality benchmarks. Access to an early childhood educational climate which emphasizes high quality care may contribute to the reduction of racial/ethnic gaps in school readiness between Black students and other groups.

An early childhood educational climate which reinforces the importance of participation in early childhood education, fostered through the provision of state-funded pre-k programs to a greater proportion of students, may benefit Hispanic students to a greater extent than other groups. Though these students typically have the lowest rates of enrollment in early childhood education programs (with average enrollment rates over the past decade around 30 percent), living in states where a high proportion of students are enrolled in state-funded pre-k may influence the behavior patterns of Hispanic families. As social norms are an important driver of behavior, upon recognizing that enrollment in early care is the norm, rather than the exception, Hispanic families may be more likely to enroll their children in early care. Magnuson and Waldfogel (2005) argue that policies boosting the enrollment of Hispanic students in early

childhood education programs may be particularly important for reducing disparities in readiness.

Ultimately, it is also a possibility that these policies may not result in improvements in school readiness for any children. First, within the quality benchmarks outlined above, there may be significant variation between programs. For example, one benchmark lists having at least 15 hours of teacher in-service educational opportunities as an target for high quality education. But, some programs may choose to provide significantly more training than that to their teachers. As a result, there may appear to be no relationship between teacher training and school readiness because the variation in programs masks any benefit. Also, simply because a student may be in a state does not require the ten NIEER quality benchmarks does not mean they do not have access to high quality programs. Therefore, when comparing students in states with greater and fewer benchmarks, there may be no observed relationship between policies regarding program quality and student readiness for kindergarten.

Further, per pupil spending may not be connected to readiness as there is relatively little regulation as to how funds are spent by programs. In the extensive body of literature examining the relationship between per pupil spending and student outcomes, there is mixed evidence whether higher spending is connected to better academic achievement for older students (those in K-12) (see thorough discussion in Burtless, 1996). These findings may be no different for the educational experiences of children in early childhood. Though some argue that financial resources provide schools the ability to purchase instruments for learning (such as books or computers) and hire highly trained and qualified teachers that are associated with better outcomes for students (Crampton,2009; Roza, 2010), others feel that estimates of per pupil spending are often disconnected from how funds are actually spent which is why there may be no

observable relationship between state-level financial investments and student outcomes (Timar and Roza; 2010).

Though above I argue that living in a state with a higher proportion of students enrolled in state-funded pre-k programs may foster an educational climate of the expectation of early childhood education participation and emphasis on the importance of early learning before school entry, conversely, this aspect of the educational climate may not be associated with increased readiness. If having more children enrolled in pre-k results in a higher student-to-teacher ratio or more disadvantaged students in a classroom, pre-k teachers may struggle to instruct students in the cognitive and non-cognitive skills needed to be prepared for kindergarten.

The current study

In a period of significant investment in early childhood education by states, I argue that states that foster an educational climate that is suggestive of a highly supportive environment of early childhood learning and development will result in students who are more prepared for school. Thus, the goal of this analysis is to examine the relationship between the early childhood educational climate of a state and children's school readiness.

Using three indicators of state educational climate, quality requirements of state-funded pre-k programs, the estimated amount of additional per pupil funding needed to achieve all NIEER quality benchmarks, and the proportion of four-year-old children served by state-funded pre-k programs, I assess whether children who live in states with greater levels of these resources have higher math and verbal readiness for school than their peers in states with fewer resources. I also examine racial and ethnic differences in the relationship between these educational climate variables and children's school readiness to evaluate whether all students benefit from these

policies or whether some policies have differential returns for students of different racial/ethnic groups.

Methods

Data and sample

The data used in this study are from the Early Childhood Longitudinal Study – Kindergarten Cohort 2010-2011. The ECLS-K: 2011 is a nationally representative sample of approximately 18,200 children enrolled in kindergarten in the U.S. in the 2010-2011 school year. Children are given cognitive assessments, and parents, teachers, school administrators, and caregivers provide information about the children's home environments, school contexts, and academic and classroom performance at kindergarten entry through fifth grade. This study uses parent-reported data from the kindergarten wave of data collection to understand children's experiences prior to their entry to formal schooling and teacher-reported data from kindergarten in order to understand children's cognitive abilities at school entry.

Indicators of state-level early childhood policy measures come from the State of Preschool 2009 Yearbook, published by the National Institute for Early Education Research. This book provides a summary of state-level policies regarding quality benchmarks, the number of students served, the level of access students have to state-funded pre-k programs (unrestricted, restricted, or no access) as well as a number of funding indicators. Using the state FIPS codes in the restricted ECLS-K: 2010 dataset, I merge a dataset I created based on the state-level policy variables from the State of Preschool Yearbook to the ECLS-K: 2010 data. Specifically, this dataset includes state-level indicators of the percent of four-year-old students served by state-funded pre-k programs, the amount of funding spent per pupil, the estimated amount of funding

needed per pupil to achieve all ten NIEER quality benchmarks, and the number of NIEER benchmarks reached.

There are two sample restrictions made for the purposes of this study. First, I omit students identified from a racial or ethnic background other than non-Hispanic White, non-Hispanic Black, Hispanic, or Asian/Pacific Islander, decreasing the analytic sample from 18,170 to 17,090. Additionally, I restrict the sample to only those students who live in states which offer either unrestricted or restricted access to state-funded pre-k programs as the state-level policy measures are only applicable for students who live in states which offer programs (see description of these variables in Chapter 3). This reduces the analytic sample to 13,930. Finally, to correct for the complex sampling design of the ECLS-K, I apply survey weights and limit the analytic sample to only those students who have valid weights which resulted in a final sample of approximately 12,470. In accordance with ECLS-K data reporting requirements, sample sizes have been rounded to the nearest 10. Missing data were multiply imputed using IVEware, a callable program in SAS 9.3 (Raghunathan et al. 2002). In instances where ECLS-K provided imputed measures, including maternal education and household income, using the imputation flags provided in the data set, I omitted imputed values provided by ECLS-K and re-imputed values for these variables.

Measures

Mathematics readiness is based on teachers' assessments of whether a student was not yet proficient, at beginning proficiency, in progress, intermediate proficiency, or proficient on a number of mathematics tasks. These tasks included whether a child sorted and classified math materials, can order a group of objects, understands the relationship between quantities, uses objects to solve problems, has an understanding of graphing, can use instruments accurately for

measuring, and uses multiple strategies for solving math problems. By summing these items and dividing by the number of items included, I calculated an average score across math items to serve as an indicator of student math readiness at school entry. Those students with higher values were rated as having more proficiency than those students with lower ratings.

Verbal readiness is based on teachers' evaluations of student proficiency on using complex sentence structures, understanding and interpreting a story, knowing the alphabet, rhyming, the ability to predict what happens next in stories, reading simple books, and demonstrating early writing behaviors. Again, students are assessed on a five-point scale, ranging from not yet proficient to proficient. Items were summed and divided by the number of items included in the measure to create an indicator of student verbal readiness at school entry. For both cognitive measures used in this study, values for individual items were imputed before the composite measures were created.

There are three indicators of the context of early childhood education services within each state used in this study: high number of quality benchmarks (seven or greater NIEER benchmarks of ten), the amount of additional per pupil funding needed to achieve all ten NIEER quality benchmarks beyond the current level of per pupil funding (in thousands of dollars), and the proportion of four-year-old children in the state who are enrolled in state-funded pre-k. All state-context variables are drawn from the NIEER State of Preschool Yearbook.

Race/ethnicity is an ECLS-K classification of children's race/ethnicity based on parent-reported and school-reported data. It includes 7 racial/ethnic categorizations: non-Hispanic, White; non-Hispanic, Black; Hispanic, race identified; Hispanic, no race identified; Asian; Native Hawaiian/Pacific Islander; American Indian/Alaska native; and two non-Hispanic races. For the purposes of this analysis, I collapse these categories into: *non-Hispanic White, non-*

Hispanic Black, Hispanic (combining both Hispanic groups into a single category), and *Asian* (combining those identified as Asian and Native Hawaiian/Pacific Islander into a single category). Due to small sample size, I omit American Indian/Alaska natives from this analysis.

This analysis also includes a number of control variables including *enrollment in organized child care in the year before kindergarten*, *gender* (ref=male), *maternal education* (less than high school, high school diploma/equivalent, some college or greater), *maternal employment* (full-time, part-time, unemployed, not in the labor force), *household income quartile*, and *non-English language use at home* (0=English, 1=non-English).

Analytic strategy

All analyses were weighted to adjust for complex survey design and were conducted using SAS 9.3. I begin by conducting descriptive analyses of the sample of students in this study who were enrolled in kindergarten in the 2010-2011 school year. This sample is restricted to students who lived in states that offered some level of access to state-funded pre-kindergarten (unrestricted or restricted). I also provide a descriptive analysis of the early childhood educational climate of each state, as indicated by state-level early childhood policies regarding quality requirements, funding needed to reach NIEER benchmarks, and the proportion of students enrolled in state-funded pre-k, to observe the degree of variation between states.

I then present the results of OLS regression models examining the relationship between these indicators of state-level early childhood educational climate and student math and verbal school readiness, respectively. This analysis will demonstrate whether there is an association between living in a state that creates an educational climate of support for early childhood education and a child's readiness for school, net of confounders.

Finally, I present multivariate models that include interactions between race/ethnicity and indicators of state-level early childhood educational climate to assess whether there is racial/ethnic variation in the relationship between living in a state with high quality requirements, where less funding is needed to reach NIEER benchmarks, and a greater proportion of students enrolled in state-funded pre-k and student math and verbal school readiness.

Results

Characteristics of children in analytic sample

The demographic composition of the subsample of students enrolled in kindergarten in 2010-2011, who live in states that offer either unrestricted or restricted access to state-funded pre-k, is presented in Table 4.1. This table presents weighed means or proportions for each child- or family-level characteristic.

Table 4.1. Demographic characteristics of students enrolled in kindergarten in 2010-2011 who live in states offering state-funded pre-kindergarten.

	Weighted proportion or average (standard deviation)
	N=12,470
Math school readiness	2.640 (0.893)[1]
Verbal school readiness	2.618 (0.963)[1]
Enrollment in organized care	0.687
Gender	
Female	0.484
Male	0.516
Racial/ethnic group	
White	0.528
Black	0.141
Hispanic	0.286
Asian	0.046
Maternal education	

Less than high school	0.146
High school diploma/equivalent	0.295
Some college or greater	0.559
Maternal employment	
Full-time	0.412
Part-time	0.203
Unemployed	0.078
Not in the labor force	0.307
Household income quartiles	
1st quartile: < $25,000	0.203
2nd quartile: $25,001-50,000	0.249
3rd quartile: $50,001-100,000	0.228
4th quartile: > $100,001	0.320
Family structure	
Two biological parents	0.674
Two other parents	0.073
Single parent	0.230
Other guardian	0.024
Non-English language spoken at home	0.182

Source: ECLS-K: 2010 (kindergarten wave)
Weights: W1T0
[1]The standard deviation reported here is approximate as all analyses in this study utilize imputed data.

Beginning with the average readiness scores of children in the sample presented in Table 4.1, the average math readiness score of students is 2.640, with an approximate standard deviation of .89 (the standard deviation is approximate because this analysis is based on imputed data). The average verbal readiness score of students in the study sample is 2.618, with an approximate standard deviation of .96.

Next, I move on to present descriptive statistics of the sample based on child-level background characteristics. Approximately 68.7 percent of students in this sample were enrolled in some type of organized care program, such as preschool, pre-k, or other center-based care, in

the year before kindergarten entry. As it is estimated that over 60 percent of children participated in organized care at some point before they reach kindergarten (Child Trends, 2014), this finding demonstrates that the students in this study have participation rates in organized care enrollment in line with the national average.

It is also no surprise that the proportion of male to female students is split nearly equally, with female students comprising 48.4 percent of students in the sample. When examining the racial and ethnic composition of this population, it is not surprising that White students represent the largest racial/ethnic group enrolled in kindergarten in 2010-2011, with over half of students being identified as White (52.8 percent). But, it is noteworthy to observe that 28.6 percent of children enrolled in kindergarten in 2010-2011 were of Hispanic ethnicity. This number is in line with estimates that approximately 25 percent of the school-aged population of students will be of Hispanic ethnicity this decade, up from one-fifth of students just five years prior (Hispanic students comprised approximately 19.9 percent of the public school aged population in 2005) (Fry and Lopez, 2014). This change reflects the growing number of Hispanic children as an overall proportion of young children in the U.S. (Murphey, Guzman, and Torres, 2014). The next largest population of students enrolled in kindergarten in 2010-2011 are Black (14.1 percent), followed by Asian students (4.6 percent).

When examining children's family-level socioeconomic characteristics presented in the bottom half of Table 4.1, more than half (55.9 percent) of the students in this sample have mothers who enrolled in some education beyond a high school diploma or equivalent. Given the emphasis on enrollment in post-secondary education in recent years (Cook, 2004), a high proportion of children with mothers who participated in some education beyond high school is expected. Approximately 44 percent of students in the sample have mothers who completed their

high school education or less, with rates of 29.5 percent and 14.6 percent, respectively. Maternal employment is also an important indicator of family socioeconomic status. Nearly two-thirds of children in this sample have mothers who are actively participating in the paid labor force in either full (41.1 percent) or part-time (20.3 percent) employment. The children in this subsample come from slightly more financially advantaged households than the full sample of ECLS-K: 2010 students. As income is measured in quartiles, if the analytic sample in this study was the same as the full ECLS-K sample, 25 percent of students would be in each income quartile. However, a greater proportion of students are in the highest quartile (32.0 percent) and a smaller proportion of students are in the lowest quartile (20.3 percent).

The household composition of the sample presented in Table 4.1 shows that approximately two-thirds (67.4 percent) of students lived in homes with both biological/adoptive parents and 23 percent of students lived in homes with a single parent, accounting for approximately 90 percent of students in the sample. The remaining 10 percent of students lived in homes with two other parents (one biological/adoptive parent and one other parent, such as a step-parent) (7.3 percent) or with another guardian (2.4 percent).

State-level variation in early childhood educational climate

This study utilizes three measures of state-level policy to capture the early childhood educational climate within a state: program quality requirements, necessary funding to meet the ten quality benchmarks identified by NIEER as important components of good early education programs, and the proportion of four-year-old children in a state served by state-funded pre-k programs. There are 40 states offering some level of state-funded pre-k, either unrestricted or

restricted access to students, included in this analysis. Across measures, the values presented in Table 4.2 show the range of state-level investments in early childhood education across the U.S.

Table 4.2. Descriptive state-level statistics indicating mean level of indicators of state early childhood educational climate or the proportion of states fostering a particular educational climate, in states where some level of state-funded pre-k was offered in 2009-2010 (N=40)

	Mean or proportion (unweighted)	Range (min-max)
Panel 1. High quality requirements (7 or greater)	0.650	
Panel 2. Estimated per pupil funding needed to reach all 10 NIEER quality benchmarks	$1,096.23	$0-4,964
Panel 3. Proportion of four-year-old students enrolled in state-funded pre-k programs	0.253	.011-.70

Table 4.2 shows the variation between states' early childhood education policies. In Panel 1 of Table 4.2, I provide the range of values that corresponds to the number of quality guidelines that states require of the pre-k programs they administer. These values range from zero (of ten) quality guidelines in the states with the fewest requirements, to ten (of ten) guidelines in the states with the most requirements. The average number of quality guidelines per state is 7.2. To better capture those states requiring the highest quality of their programs, I use a dichotomous classification of this variable in subsequent analyses that classifies a state as having "high quality guidelines" if they employ seven or greater quality requirements. Over half of the states in the U.S., and 65 percent of states in this sample, are classified as states requiring a high level of quality guidelines for their state-funded pre-k programs. An example of a few

states that are classified as requiring high quality guidelines are Georgia, Oklahoma, and North Carolina.

In the second panel in this table (Panel 2, Table 4.2), I present the range of values of additional per pupil funding expenditures needed, by state, to meet the ten NIEER quality benchmarks. This value reflects the difference between the amount spent per pupil for state-funded pre-k in 2009 and the estimated per pupil amount of expenditure needed to reach all quality benchmarks. On average, states offering state-funded pre-k programs need to spend approximately $1,096.23 more per pupil to reach ten quality benchmarks. This deficit ranges from $0, which reflects states providing adequate funding to their programs to meet these benchmarks, to $4,964. For context, some states providing adequate funds to reach all NIEER quality benchmarks are North Carolina, Oklahoma, and Alaska; the states needing the most additional per pupil funds to reach these benchmarks include Massachusetts, Georgia, and Missouri.

The final state-level indicator of early childhood educational climate is the proportion of four-year-old children in the state served by state-funded programs is presented in Panel 3 of Table 4.2. On average, approximately 25.3 percent of four-year-olds within each state are served by state-funded pre-k programs. This value ranges widely, with the states serving the lowest proportion of students reaching 1.1 percent of four-year-olds and states serving the greatest proportion of students reaching over 70 percent of four-year-old children. A few of the lowest states are Rhode Island, Minnesota, and Alaska, and a few of the highest states are West Virginia, Florida, and Oklahoma.

As the sample of students included in this study is drawn from a nationally representative sample of kindergarten students in the U.S. in the 2010-2011 school year, the analytic sample of

students is not equally distributed among states. In comparison to the state-level averages presented in Table 4.2, 44 percent of children in this sample live in states which require a high level (7+) of quality guidelines of their state-funded programs. On average, these students live in states that need to spend approximately $1,300 in additional funds per pupil to reach the ten quality benchmarks identified by NIEER, with some students in states that need to spend no additional funding and students living in states that would need to spend almost $5,000 in additional per pupil funds to meet these benchmarks. Finally, approximately 28 percent of four-year-old students are served by state-funded pre-k programs in the states where ECLS-K students reside. Again, the percent of students served varies widely, ranging from 1.4 to 70.7 percent.

State educational climate and school readiness

Now, I present regression analyses examining the relationship between state-level educational climate, as measured by early childhood policies, and teacher ratings of children's math and verbal school readiness. The first column of Table 4.3 presents regression models estimating the association between teacher-rated math readiness for school and living in a state with a high number of quality requirements for state-funded pre-k programs, the amount of per pupil funding needed to reach quality benchmarks, and the proportion of four-year-old children in the state enrolled in state-funded pre-k.

Table 4.3. Weighted multivariate regression models of school readiness by state-level education climate indicators for ECLS-K:2010 children who live in a state offering state-funded pre-k.

	Math readiness		Verbal readiness	
	Model 1	Model 2	Model 3	Model 4
Variable	Estimate	Estimate	Estimate	Estimate
Intercept	2.584***	2.510***	2.513***	2.457***
High quality requirements of state-funded pre-k programs	0.102***	0.083***	0.119***	0.089***
Amount of additional per pupil funding needed to reach all NIEER quality benchmarks (in thousands)	-0.022**	0.002	-0.022**	0.004
Proportion of four-year-old children in state served by state-funded pre-k	0.001***	0.002***	0.003***	0.003***
Race/ethnicity (ref: White)				
Black		-0.150***		-0.090**
Hispanic		-0.143***		-0.158***
Asian		0.081		0.108*
Maternal education (ref: high school diploma or equivalent)				
Less than high school		-0.063		-0.129**
Some college or greater		0.182***		0.256***
Household structure (ref: other guardian)				
Two biological/ adoptive parents		0.134		0.117
Two other parents		0.112		0.069
Single parent		0.059		0.007
Maternal employment (ref: not in the labor force)				
Full-time		0.033		0.074
Part-time		0.031		0.062
Unemployed		-0.059		-0.059
Household income quartile (ref: 4th)				
1st		-0.201		-0.251
2nd		-0.126		-0.174
3rd		-0.054		-0.076
Language spoken at home (ref: English)				
Non-English		-0.129***		-0.174***

Male	-0.086***	-0.155***
Organized care before kindergarten	0.085***	0.125***

Weight: W1T0 *** p<0.001, **p<0.01, *p<0.05

Shown in Model 1 in Table 4.3, all indicators of state educational climate are associated with math readiness in the expected directions. Living in a state where a high number of quality benchmarks (7+) are required of state-funded pre-k programs is associated with greater ratings of math readiness, an increase of 0.10 for those who live in a state with high quality requirements which is approximately equivalent to just over one-tenth of a standard deviation. Similarly, students who live in states where a greater proportion of students are served by state-funded programs receive an increase of 0.001 for each unit (percentage point) increase in proportion of four-year-old students served. In other words, for students who live in states where 100 percent of four-year-olds are enrolled in state-funded pre-k programs, the math readiness scores of students in that state are approximately 0.10 points higher than students in states with zero percent of four-year-olds enrolled in state-funded pre-k. This is equivalent to just over one-tenth of a standard deviation difference.

Conversely, students who live in states where a greater amount of spending is needed to reach all ten NIEER quality benchmarks have lower math readiness scores (β=-0.022, p-value=0.004) than their peers who live in states that are estimated to provide adequate funding to reach all quality benchmarks. This coefficient suggests that for every thousand dollars needed to reach all NIEER quality benchmarks, by NIEER's estimation, student math readiness scores suffer by approximately 0.02 points. For students in states where little funding is needed to meet benchmarks, this difference is small (0.02 x dollars needed, in thousands). But, for students who are in states who need the most funding (nearly $5,000), the differential they experience in math

readiness with their peers in states that need no additional funding is approximately 0.10 points, or just over one-tenth of a standard deviation.

Model 2 includes controls for child and family level characteristics and the relationship between living in a state with high quality requirements and a greater proportion of four-year-old students enrolled in state-funded pre-k in the state both remain positive and significant (β=0.08, p-value <.001; and β=0.002, p-value <.001, respectively). In comparison to the models without controls, the estimated coefficient associated with living in a state with high quality requirements is slightly smaller, but the magnitude of the coefficient associated with living in a state with a higher proportion of four-year-old students enrolled in state-funded pre-k programs is twice the size as in the previous model (β=0.002 versus β=0.001). But, the inclusion of these control variables fully explains the negative relationship between per pupil funding needed to reach quality benchmarks and math readiness. Specifically, once I account for students' racial/ethnic background, the estimated effect of state-level per pupil funding deficits is no longer a significant predictor of students' math readiness scores.

Similar results can be observed when examining the relationship between these policy variables and children's verbal readiness for school in Table 4.3. In the model without controls (Model 3), both living in a state with high quality requirements for state-funded programs and with a greater proportion of four-year-old students enrolled in state-funded pre-k are associated with greater verbal readiness scores, with verbal readiness increases of .119 points (p-value<0.001) for those who live in a state with high quality requirements and an increase of .003 points (p-value<0.001) for each unit (percentage point) increase in proportion of four-year-old students served. The estimated difference in verbal readiness for students living in a state that has high quality requirements (7+) versus living in a state with low quality requirements (≤6) for

state-funded pre-k programs is approximately one-eighth of a standard deviation. Students who live in states where a greater proportion of students are served by state-funded programs receive an increase of 0.003 points in verbal school readiness for each unit (percentage point) increase in proportion of four-year-old students served. In other words, for students who live in states where 100 percent of four-year-olds are enrolled in state-funded pre-k programs, the verbal readiness scores of students in that state are approximately 0.30 points higher than students in states with zero percent of four-year-olds enrolled in state-funded pre-k. This is equivalent to just nearly one-third of a standard deviation difference.

Also, the negative relationship between per pupil funding needed to reach all quality benchmarks and verbal readiness for school is present in this model (β=-0.022, p-value=0.007) Again, when adding controls for race/ethnicity to the model (Model 4), this association becomes non-significant (p-value=0.777), but the positive association between living in a state with high quality requirements and a greater proportion of four-year-old students enrolled in state-funded pre-k remains.

Racial and ethnic variation in the relationship between policy and school readiness

As I argue above, students from different racial/ethnic backgrounds may not all similarly benefit from positive educational climates or may not all suffer from negative educational climates. The remaining analyses presented in Table 4.4 show whether differences in the relationship between early childhood educational climate, as measured by state-level policies, and student cognitive school readiness are moderated by race/ethnicity. In order to assess whether students of all racial/ethnic backgrounds benefit similarly from the educational climate created by state-level early childhood educational policies, I move to regression models that

allow the association between policy and readiness to vary across racial and ethnic groups. These models include a full set of controls for child- and family-level background characteristics.

Table 4.4 Weighted multivariate regression models of school readiness including interactions between state-level education climate indicators and race/ethnicity, for ECLS-K: 2010 students who lived in states offering some level of state-funded pre-k.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model6
	Math readiness	Verbal readiness	Math readiness	Verbal readiness	Math readiness	Verbal readiness
Variable	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Intercept	2.556***	2.545***	2.582***	2.568***	2.608***	2.544***
High quality requirements of state-funded pre-k programs	0.086***	0.094***				
Funding needed to reach all NIEER quality benchmarks (in thousands of dollars)			0.013	0.019		
Proportion of four-year-olds enrolled in state-funded pre-k					0.000	0.002**
Race/ethnicity (ref: White)						
Black	-0.139***	-0.053	-0.069	0.031	-0.154**	-0.058
Hispanic	-0.120***	-0.121***	-0.132***	-0.176***	-0.275***	-0.254***
Asian	0.050	0.059	-0.011	0.013	-0.104	-0.050
Interactions: race x high quality requirements						
Black x high quality	-0.010	-0.048				
Hispanic x high quality	-0.072	-0.114**				
Asian x high quality	0.078	0.123				
Interactions: race x funding needed						
Black x funding needed			-0.046*	-0.068***		
Hispanic x funding needed			-0.021	-0.002		
Asian x funding needed			0.080	0.079		
Interactions: race x proportion four- year-olds enrolled in state pre-k						
Black x % 4 year olds					0.000	-0.001
Hispanic x % 4 year olds					0.004***	0.003**
Asian x % 4 year olds					0.007*	0.006*
Maternal education (ref: high school diploma or equivalent)						
Less than high school	-0.061	-0.126**	-0.059	-0.125**	-0.059	-0.125**

Some college or greater	0.180***	0.253***	0.180**	0.252***	0.178**	0.253***
Household structure (ref: other guardian)						
Two biological/ adoptive parents	0.135	0.118	0.131	0.113	0.128	0.111
Two other parents	0.114	0.072	0.110	0.067	0.111	0.067
Single parent	0.060	0.008	0.057	0.005	0.055	0.003
Maternal employment (ref: not in the labor force)						
Full-time	0.034	0.075**	0.036	0.078**	0.036	0.078**
Part-time	0.030	0.059*	0.030	0.060*	0.032	0.063*
Unemployed	-0.057	-0.055	-0.055	-0.051	-0.056	-0.056
Household income quartile (ref: 4th quartile)						
1st	-0.200	-0.250	-0.193	-0.242	-0.193	-0.243
2nd	-0.126	-0.175	-0.120	-0.166	-0.122	-0.169
3rd	-0.055	-0.078	-0.049	-0.071	-0.050	-0.073
Language spoken at home (ref: English)						
Non-English	-0.130***	-0.176***	-0.133***	-0.179***	-0.131***	-0.176***
Male	-0.086***	-0.156***	-0.086***	-0.156***	-0.086***	-0.155***
Organized care before kindergarten	0.085***	0.126***	0.085***	0.126***	0.083***	0.123***

Weight: W1T0 *** p<0.001, **p<0.01, *p<0.05

In Models 1 and 2, I present the findings of regression models examining the relationship between living in a state with a high number of quality requirements and student's math and verbal readiness for school. In order to more easily interpret the full range of within and between group racial/ethnic differences captured by the interaction terms shown in these models (and supplementary models where I switch out the reference category that are noted by superscripts), I graphed predicted mean values of mathematics readiness for students from different racial/ethnic backgrounds who live in states that have high quality requirements of their state-funded pre-k

programs (7+) and those who live in states that do not meet this quality requirement (require six or fewer quality benchmarks), when all other controls are held constant.

In Figure 1a, when comparing math readiness scores for same race peers in states that have high versus low quality requirements, White students represented, by the dark gray bars, in high quality requirement states have math readiness that are approximately 0.09 points higher (p-value<0.001) than White students in low quality requirement states. A difference of over one-tenth of a standard deviation. Similarly, among Asians those students who live in states with high quality requirements for state-funded pre-k have significantly higher math readiness scores than Asian students who live in states with low quality requirements for state-funded pre-k. The difference between these groups is approximately 0.16 points, or the equivalent of roughly just under one-fifth of a standard deviation.

Conversely, in comparing the striped bars in Figure 1a. that represent Hispanic students, there is almost no difference in math readiness scores between Hispanic students who live in states that have high quality requirements for state-funded pre-k programs when compared to those who live in states with low quality requirements for these programs. Supplemental analyses show that the slight difference that may exist between groups is not significant. Similar patterns exist when comparing Black students who live in states that have high quality requirements for pre-k programs versus those that do not. The light gray bars in Figure 4.1a. show that Black students find no benefit to math readiness when living in a state that has high quality requirements (note: predicted values used for all figures in Chapter 4 can be found in Appendix B).

In summary, I find that White and Asian students benefit from a positive educational climate created by states that require a high number of quality guidelines for state-funded

programs. This climate does not appear to benefit those students who have the lowest math readiness scores, Black and Hispanic students, who likely need the most support.

Turning to between racial/ethnic group comparisons in states that have high quality requirements, when comparing across bars on the left side of Figure 1a, I find that White and Asian students (dark gray and black bars, respectively) who live in states that have high quality requirements have significantly higher math readiness scores than Black and Hispanic students (light gray and striped bars, respectively) in the same states. The difference in predicted values of math readiness between White and Black students (predicted value difference: 0.16) and White and Hispanic students (predicted value difference: 0.20) is near one-sixth and one-fifth of a standard deviation, respectively. The difference between White and Asian students in these states is not significant (p-value>0.10). This finding provides further support that students who are already academically advantaged gain even greater advantage with respect to their peers when living in a state with high quality requirements for pre-k programs.

In Models 2 and 3 in Table 4.4, I present similar analyses predicting verbal school readiness. Figure 4.1b presents a graph of predicted mean values of verbal readiness for students from different racial/ethnic backgrounds who live in states that have high quality requirements of their state-funded pre-k programs (7+) and those who live in states that do not meet this quality requirement (require six or fewer quality benchmarks), when all other controls are held constant.

The patterns observed in Figure 4.1b based on predicted values of verbal readiness are nearly identical to those observed in Figure 4.1a, based on predicted values of math readiness. In within group comparisons, White and Asian students who live in states with high quality requirements for state-funded pre-k programs have higher verbal readiness scores than their same race/ethnicity peers who live in states with low quality requirements. Again, Black and Hispanic

students who live in states with high quality requirements for state-funded pre-k programs find no added benefit when compared to their same race/ethnicity peers who live in states with low quality requirements.

When comparing verbal readiness scores between racial/ethnic groups for children who live in states with high quality requirements for state-funded pre-k programs, White and Asian students exhibit the highest verbal readiness, with readiness scores similar between groups. Hispanic students have the lowest verbal readiness scores of all groups in these states, with predicted readiness ratings approximately 0.23 points lower than White students, and 0.42 points below Asian students. These differences are equivalent to almost one-fourth and just over two-fifths of a standard deviation, respectively.

Similarly, when assessing how math and verbal readiness vary by race/ethnicity as per pupil funding needed to meet NIEER quality benchmarks increases, the educational climate has more pronounced estimated effects for some racial/ethnic groups than others. In Models 3 and 4 in Table 4.4, I present regression models predicting both math and verbal school readiness and include interactions between race/ethnicity and the level of per pupil funding needed to reach all NIEER quality benchmarks to estimate the extent of these differences.

Again, for ease of interpretation, I graphed predicted values of math and verbal readiness calculated from estimates in Models 3 and 4 in Figures 4.2a and 4.2b. I present line graphs here as the educational climate indicator used in these models is a continuous variable, with some students living in states that need no additional funding to reach all ten NIEER quality benchmarks, but other students living in states that need almost $5,000 extra per pupil to reach all ten benchmarks.

Figure 4.2a demonstrates how math readiness varies for children from different racial/ethnic backgrounds who live in states with different per pupil funding needs. In comparing the lines between racial/ethnic groups at the far left of Figure 4.2a, when students live in states where per pupil funding needs are met, there are no differences in math readiness, with the exception of a statistically significant, but small difference between White and Hispanic students, with predicted values of math readiness of 2.582 and 2.450, respectively. This can be observed in Figure 4.2a when comparing the dark gray line to the dashed line. However, the slopes for White and Hispanic students remain relatively flat and similar, in that the lines are parallel across levels of per pupil funding needed to reach quality benchmarks. This suggests that the difference between these groups does not change based on the level of funding needed by the state in which they reside and that neither White nor Hispanic students face lower math readiness scores when living in a state that needs a greater amount of funding to achieve quality standards.

Conversely, when examining the slope of the light gray line for Black students in Figure 4.2a, it has a slightly downward slope which suggests that as a greater amount of per pupil funding is needed to reach quality benchmarks, Black students have lower math scores. This finding reflects the expectation between adequate quality investments and student readiness: as there is greater deficit between what is needed and what is available, students would have lower readiness scores. But, the relationship between per pupil funding needed and math readiness for Asian students does not follow this pattern. In fact, the slope of the line for Asian students (black line) in Figure 4.2a is positive, which suggests that Asian students who live in states that need additional per pupil funding to reach quality benchmarks are not disadvantaged compared

to their peers of other racial and ethnic groups. This finding is counterintuitive and will be discussed in further detail in the Discussion section that follows.

For verbal readiness, when living in a state that needs no additional per pupil funding to reach all NIEER quality benchmarks as presented in Figure 4.2b (based on Model 4), Hispanic students have significantly lower scores than their White, Black, or Asian peers, with predicted values approximately one-fifth of a standard deviation below the other students (predicted value for Hispanic students: 2.39; White: 2.57; Black: 2.60; Asian: 2.58). Given the greater likelihood of limited English proficiency for Hispanic students with respect to their peers, this variation is not surprising. This difference can be observed in comparing the dashed line, which represents the Hispanic student population, to the three lines representing the other racial and ethnic groups.

Similar to Model 3 predicting math readiness (Figure 4.2a), in Figure 4.2b, Hispanic and White students have similar, flat slopes which means the advantage of White students does not grow when a greater amount of per pupil of funding is needed to reach all NIEER quality benchmarks. Also, Black students (light gray line, Figure 4.2b) again have a downward slope which demonstrates that at higher levels of per pupil funding needed to achieve all NIEER quality benchmarks, these students have lower verbal readiness scores.

Finally, I present graphs displaying predicted values of math and verbal readiness created from Models 5 and 6 in Table 4.4. Figures 4.3a and 4.3b show racial/ethnic differences in readiness by the proportions of four-year-olds enrolled in state-funded pre-k in the states where ECLS-K: 2010 children reside.

In states where the lowest proportion of four-year-olds are served by state-funded pre-k programs, an estimated value of zero percent, White students have the highest predicted math readiness scores (2.61), as shown by the dark gray line in Figure 4.3a. Their scores are similar to

those of Asians, but significantly different than those of Black students represented by the light gray line (predicted math readiness at zero percent served: 2.45) and of Hispanic students represented by the dashed line (predicted math readiness at zero percent served: 2.33).

As shown in Figure 4.3a, the slopes of the lines representing White and Black students are flat and parallel across the range of values for the proportion of four-year-olds enrolled in state-funded programs. This indicates that the difference that exists between students in these populations is the same regardless of their state's educational climate created by the proportion of four-year-old students enrolled in state-funded pre-k. Conversely, Hispanic and Asian students receive a boost in math readiness when living in a state where a greater proportion of four-year-old students are enrolled in care. The dashed line, representing Hispanic students, and the black line, representing Asian students both have an upward slope, which suggests a positive relationship between the educational climate created by having a larger proportion of four-year-old students enrolled in state-funded pre-k and math readiness, for Hispanic and Asian students. For Hispanic students, every 25 percent increase in the proportion of four-year-olds enrolled in state-funded pre-k in their state is associated with just over a one-tenth of a standard deviation increase in math readiness. For Asian students, every 25 percent increase in the proportion of four-year-olds enrolled in state-funded pre-k in their state is associated with an increase of almost one-fifth of a standard deviation in math readiness. These findings have been confirmed by supplemental analyses that involve changing out the reference groups in Model 5.

In Figure 4.3b, I present similar findings when graphing predicted values of verbal readiness by race/ethnicity and across a range of values representing the proportion of four-year-olds enrolled in state-funded pre-k in a child's state. The findings here replicate those observed in comparing between racial/ethnic group differences in math readiness in Figure 4.3a, with the

exception of White and Black students having similar verbal readiness scores when they live in states where no four-year-old students are served by state-funded pre-k. In these states, Hispanic students have the lowest verbal readiness scores compared to all other racial/ethnic gorups (predicted value of verbal readiness: 2.29; approximately one-third of a standard deviation lower than children of other races/ethnicities). This finding is not surprising given the greater likelihood of limited English proficiency or English as a second language for Hispanic students.

However, once again, Hispanic students benefit from living in a state with a higher proportion of four-year-olds enrolled in state funded pre-k, with the dashed line in Figure 4.3b sloped upward. As a result, when comparing predicted verbal readiness scores for Hispanic students to Black students in states where 50 percent of four-year-olds are enrolled in pre-k, the estimated difference in verbal readiness between groups is approximately 0.01 points and non-significant. Similarly, Asian students' verbal readiness scores are higher when living in a state with a higher proportion of four-year-old children enrolled in state-funded pre-k, which can be observed by the upward sloping black line in Figure 4.3b.

In summary, these findings suggest that there are racial/ethnic differences in the benefit received from living in a state that creates a climate of early childhood education participation, measured by the proportion of four-year-old students enrolled in care in the state. For Hispanic students, this indicates that an educational climate that demonstrates and encourages participation in state-funded pre-k may be important for improving both math and verbal readiness outcomes. For Asian students, this finding suggests that one of the more advantaged populations in terms of math and verbal readiness gains even greater advantage when living in an educational climate that fosters student enrollment in state-funded care.

Discussion

This study began by asking whether the early childhood educational climate that resulted from state-level early childhood education policies would be associated with school readiness outcomes for students at kindergarten entry. Despite the argument that state education policies are too far removed from students to be associated with student outcomes, this study looked to build on research which found a positive relationship between state-level policies directed toward high school students and student academic outcomes to examine state-level early childhood educational policies and student outcomes.

Using the Early Childhood Longitudinal Study – Kindergarten cohort of 2010-2011 (ECLS-K: 2010) and data on state pre-k programs collected by the National Institute for Early Education Research (NIEER), I compared children who live in states with stronger educational climates, as measured by greater levels of three of state policies: quality requirements of state-funded pre-k programs, the estimated amount of additional per pupil funding needed to achieve all NIEER quality benchmarks, and the proportion of four-year-old children served by state-funded pre-k programs.

I found that on average, the relationship between these policies and student outcomes are as expected. Notably, students who live in states where the educational climate emphasizes the importance of high quality care by requiring a high number of quality guidelines (7 or more) of their state funded pre-k programs have higher levels of math and verbal readiness than their peers in states with low quality requirements (6 or less) for state-funded pre-k programs, net of controls. Further, students who live in states where the early childhood educational climate reinforces the importance of early childhood development and learning, as indicated by a greater proportion of four-year-olds enrolled in state-funded pre-k programs, have higher readiness

scores on both indicators of math and verbal readiness. Again, these findings remain when a set of controls for child- and family-level background characteristics are included in the model.

Also as expected, the relationship between the amount of per pupil spending needed to reach all ten NIEER quality benchmarks increased and student readiness was negative. This finding indicates that students have lower readiness scores when they live in negative educational climates created by states that are not adequately supporting state-funded pre-k programs to reach the benchmarks identified as important for providing high quality education. Once controlling for race, this relationship was no longer significant for math or verbal readiness.

The second goal of this study was to assess whether the relationship between educational climate and school readiness was different between racial/ethnic groups. To test this, I estimated regression models predicting math and verbal readiness, with interactions between race/ethnicity and each of the state policies described above. I then calculated predicted values of readiness for each model, and graphed these values to facilitate the interpretation of the differences between groups.

This analysis importantly showed that there are significant between group differences in whether children benefit from the educational climate created by state-level policy. With some exceptions, many of the findings from this analysis suggests that stronger educational climates may result in advantaged students gaining even greater advantage. Specifically, White and Asian students exhibited greater math and verbal readiness scores when living in states with high quality requirements for state-funded pre-k programs. Unfortunately, Black and Hispanic students did not find the same advantage from living in a state with high quality requirements

when compared to their same race/ethnicity peers who lived in states with low quality requirements.

For a number of reasons, this finding is troubling. First, this suggests that policies which result in high quality requirements for states, generally intended to increase the quality of state-funded pre-k programs, may not be reaching disadvantaged students. In turn, the disparities between students with respect to school readiness may continue to grow.

It is also important to remember that the indicator of quality requirements used in this study reflects the number of quality requirements outlined in the state policy. This measure does not indicate that all state-funded programs are meeting those quality requirements. Perhaps White and Asian students are more likely to live in states where state-funded programs meet the quality requirements than Black and Hispanic students. In supplemental analyses, I used the continuous indicator of quality requirements (zero to ten) to assess whether there was variation by race/ethnicity in the number of quality requirements for state-funded programs. Surprisingly, I found that on average, Black students in the study sample live in states with the highest number of quality requirements (6.8 of 10) of all racial/ethnic groups (p-value<0.001). However, Black students also live in states where per pupil spending is the lowest, with spending levels significantly lower than all other racial/ethnic groups. Thus, the likelihood of state-funded pre-k programs in their state being able to achieve the high number of quality guidelines required through state policy may be very low.

Unfortunately, Black students are also particularly disadvantaged when living in a state where more per pupil funding is needed to reach all ten NIEER quality benchmarks. Black students who live in states where a greater amount of funding is needed to reach the benchmarks have lower readiness scores than Black students who live in states where no additional funding is

needed. When comparing between racial/ethnic groups, Black students are the only population who face a negative and significant relationship between funding needed and school readiness, which means they are the only group that has lower readiness scores at higher levels of funding needed. Though the estimated effect size may be small, predicted values are around -0.03 in math and -0.04 in verbal readiness for each thousand dollars in per pupil spending needed by their state, this also results in a growing disparity between Black students and their peers who do not face this negative relationship.

Unexpectedly, Asian students who live in states with additional funding needed have higher readiness scores than Asian students who live in states with no additional funding needed. In addition, when comparing between racial/ethnic groups, Asian students are the only group in which a positive, and significant, relationship exists between funding needed and both math and verbal school readiness. This finding is counterintuitive and requires additional research to understand why this may be the case for Asian students.

In future research, one testable explanation for this finding may be that Asian families are more likely to enroll their children in external learning opportunities (Cheadle, 2008), such as tutoring, in a practice referred to as "shadow education" that occurs in a number of Asian countries (Bray and Lykins, 2012). In particular, Asian families who perceive their state-funded early childhood educational program as lacking because the program is not receiving sufficient funding to meet quality benchmarks may invest most heavily in these external resources. It is unlikely that these questions can be answered using ECLS-K and may rely on a data set that provides more information about children's early developmental experiences, such as ECLS-B.

The last important finding of note is that Hispanic students and Asian students benefit from living in states that create an educational climate that reinforces the importance of early

childhood learning. I argue that states create this climate by serving a greater proportion of four-year-old students through state-funded pre-k programs. Because Hispanic students generally have low rates of enrollment in organized care during early childhood, living in a state where the educational climate emphasizes the importance of early learning may result in more Hispanic students engaging in early learning opportunities and in turn, these students may be more prepared for school. Additionally, as this trend is observed in the two racial/ethnic groups in which a large proportion of children are immigrants or children of immigrants, moving forward, I intend to extend research questions regarding differential benefits from early childhood education policies to comparisons of the association between policies and students outcomes for students of different generational statuses.

It is important to remember that this study is meant to understand the early childhood educational contexts of young children. Therefore, any observations about state-level policies are meant to more broadly reflect the educational climate created as a result of these policies rather than comparisons between states. This is not a deficiency of the study, but an important feature of this research. As researchers and policy makers continue to evaluate the effectiveness of early childhood education policies, the approach used in this study allows for the focus to be on individual students, who are ultimately the intended audience of most educational policies.

Figure 4.1. Predicted values of readiness by race/ethnicity and state-level quality requirements of state-funded pre-k programs.

Figure 4.1a: Math readiness

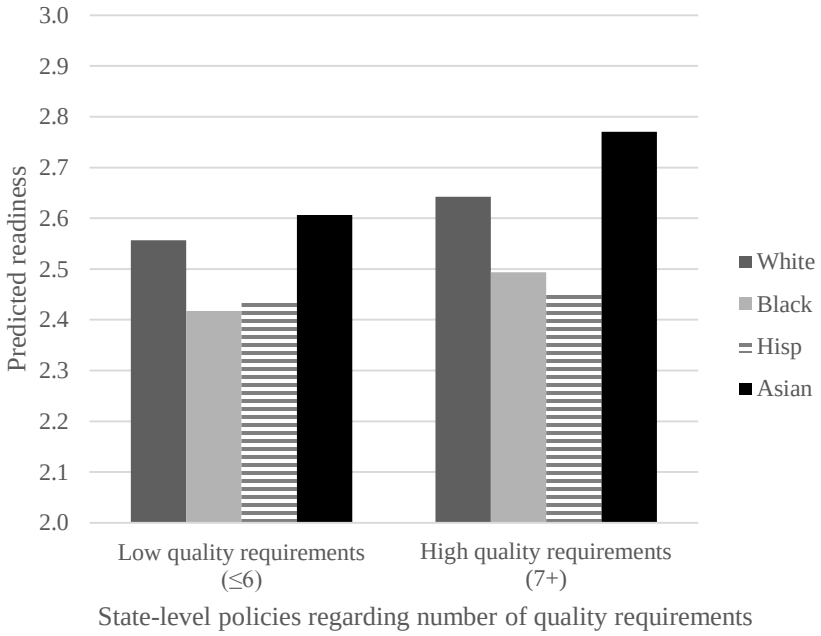


Figure 4.1b: Verbal readiness

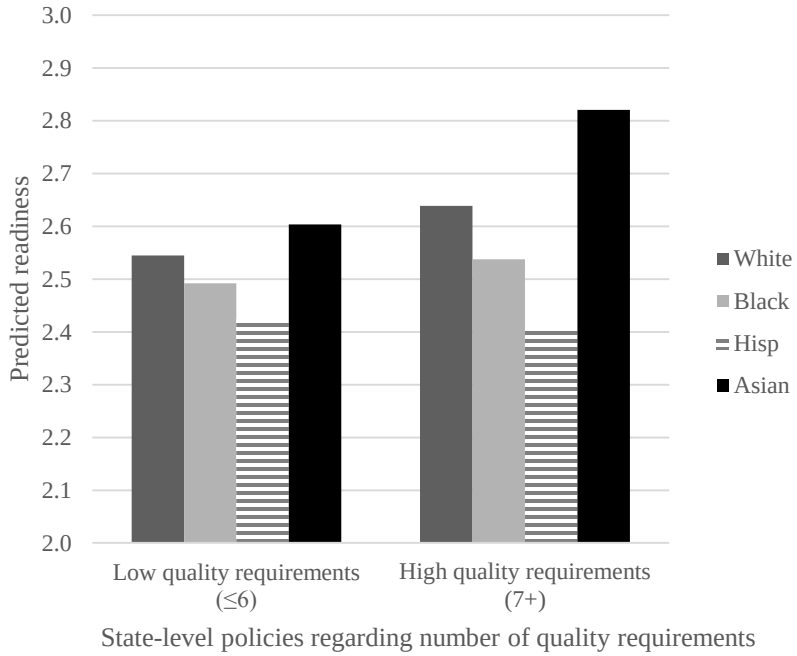
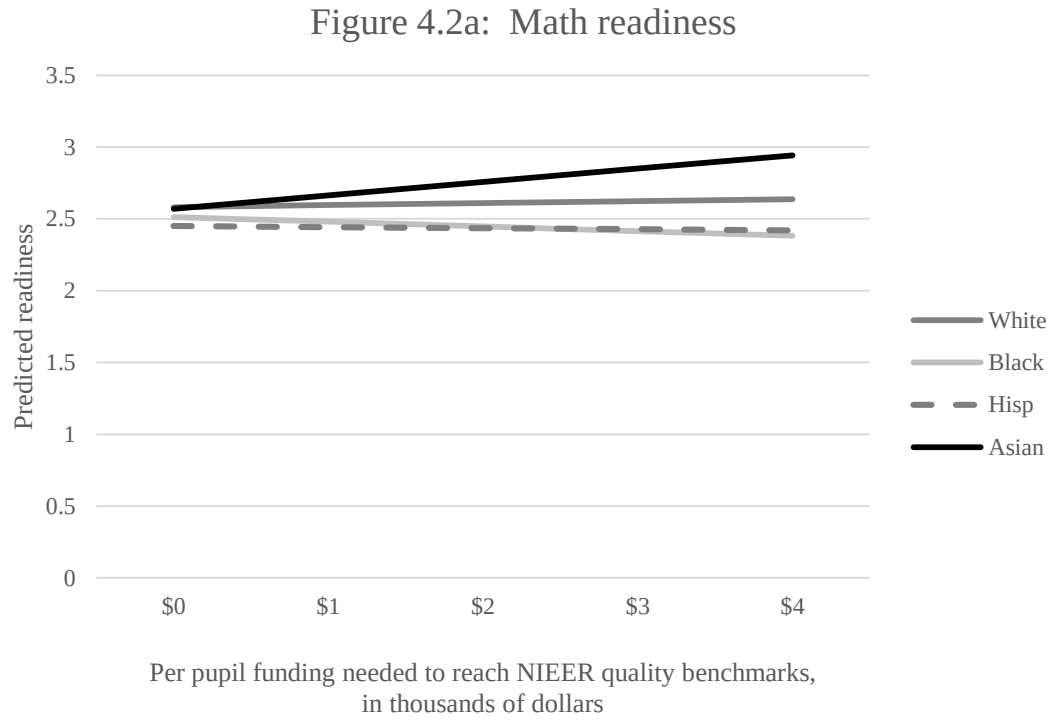


Figure 4.2. Predicted values of readiness across estimated values of per pupil funding needed to reach NIEER quality benchmarks by race/ethnicity.



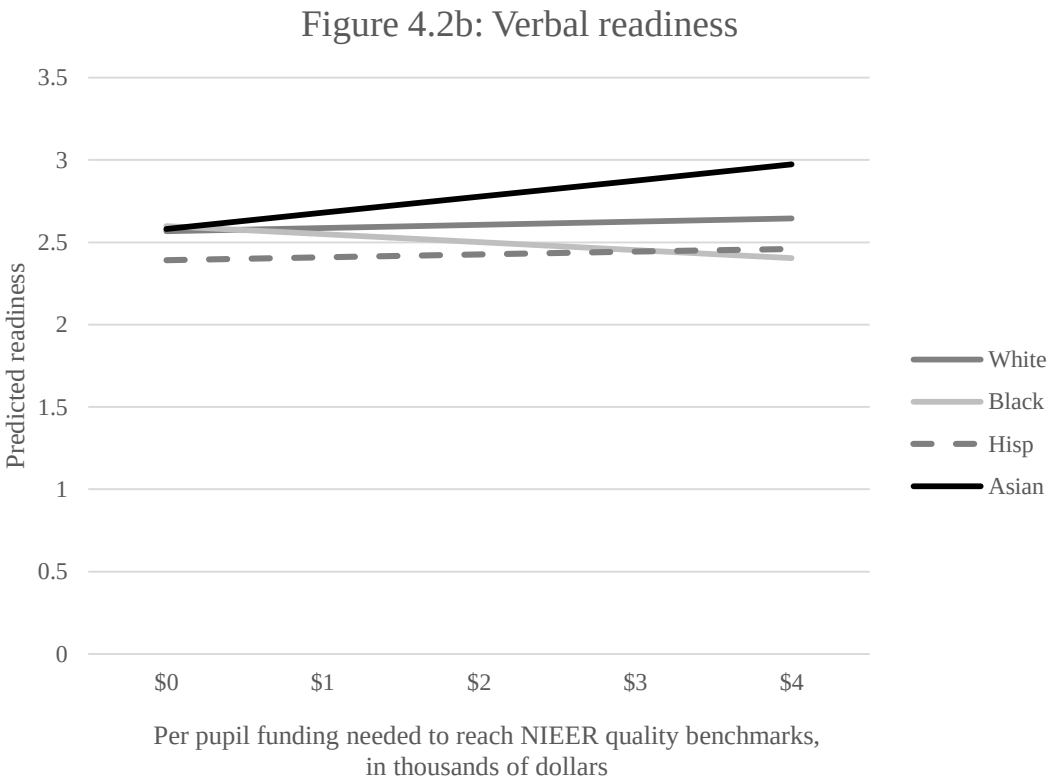
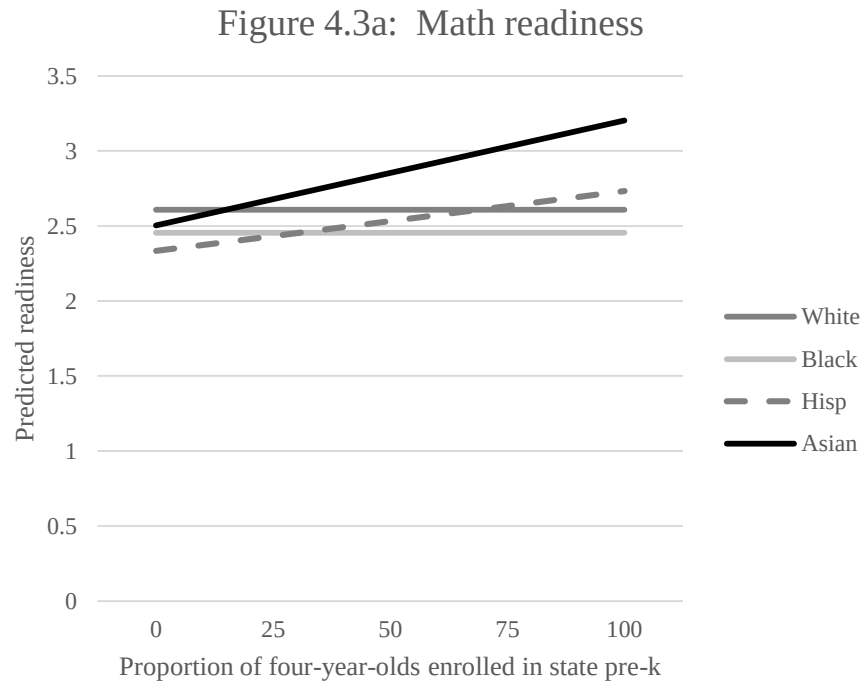
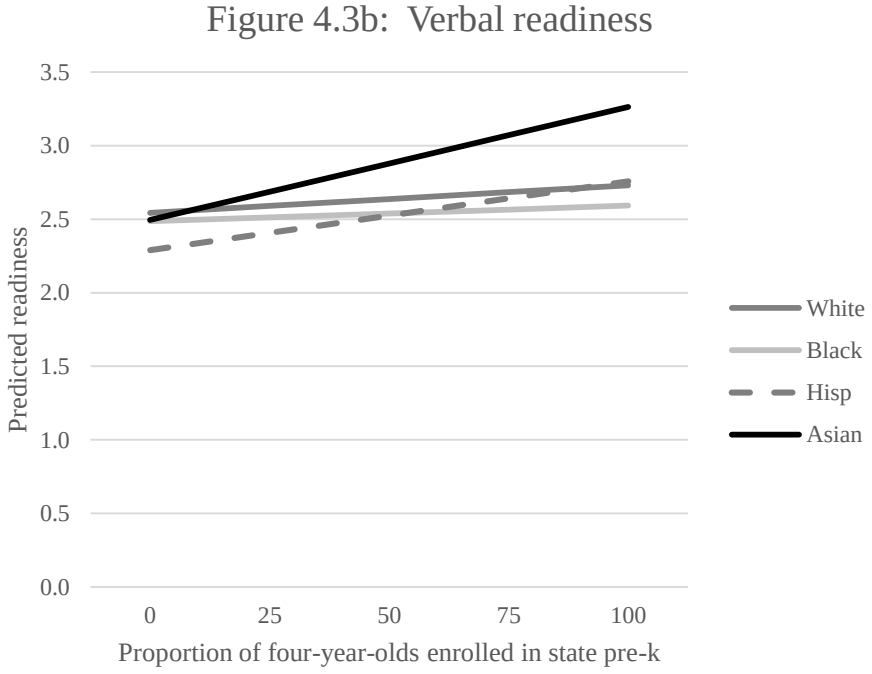


Figure 4.3. Predicted values of readiness across estimated values of proportion of four-year-old students in a state enrolled in state-funded pre-k by race/ethnicity.





CHAPTER 5. CONCLUSION

Across studies, this dissertation assess how the educational climate crated by early childhood education policies may be associated with ensuring students are prepared to learn upon kindergarten entry. Using data on two cohorts of kindergarten students and state-level policy data, the present study evaluates sociodemographic changes in school readiness and the association between early childhood policy and two of its intended outcomes: student enrollment in organized care and student readiness for school. This study further investigates whether all students benefit from state-level policies regarding early childhood education and services or whether some racial/ethnic groups see differential benefits to living in a state with greater investment in early childhood education.

There are several key findings from these studies that I will highlight here. First, as observed in Chapter 2, students in most sociodemographic groups were more ready in 2010-2011 than in 1998-1999. But, with the exception of one group on one outcome (children of mothers with less than a high school education, on the indicator of approaches to learning), students in many groups were not improving quickly enough to eliminate between group disparities in the second cohort. Notably, the gap between White and Black students and Between White and Hispanic students is decreasing, which, I argue may reflect the increase in early childhood education programs targeted to at-risk students in recent years.

But, the gaps between students of high and low socioeconomic status have remained stable over time period assessed in this study, with children whose mothers have some education beyond high school having greater readiness across measures than students whose mothers have a high school diploma or less at both time points. Similarly, students in the highest income quartiles had higher readiness scores than their peers in the lowest income quartile in both 1998-

1999 and 2010-2011. White this unfortunately means that disparities remain between these groups, it also suggests that gaps between groups have not significantly grown during this time.

The second finding of note is about racial/ethnic differences in enrollment in organized care as presented in Chapter 3. Black students who live in states that offer unrestricted access to state-funded pre-k have higher odds of enrollment in organized care than students of all other racial/ethnic groups who live in similar states. In part, this result may reflect the already high rate of enrollment of Black students in organized care and the additional boost that non-enrolled Black students may receive from living in states with unrestricted access to pre-k. For the Black students who were not previously enrolled, any barriers to enrollment, including financial constraints or within family expectations of home care during early childhood, may be eliminated in these states as no-cost care is offered and the norms in these states reflect the expectation of student participation in early childhood programs.

Unexpectedly, in states offering restricted access to state-funded pre-k, Asian students have higher odds of enrollment than students in other racial/ethnic groups. Though I anticipated Black and Hispanic students in these states would have higher odds of enrollment than their peers because they are more likely to be in the at-risk groups that are targeted by programs in states offering restricted access to pre-k, this finding from Chapter 3 may reflect the wide diversity of the Asian population. A number of ethnic groups within the Asian population have greater odds of membership in a risk group targeted by state-funded pre-k programs, including low income, low parental education, or limited English proficiency (Xie and Goyette, 2014).

The analyses of the relationship between state-level policies and student outcomes in Chapters s3 and 4 demonstrate that, despite arguments to the contrary and a dearth of research in this area, early childhood education policies at the state level may in fact trickle down to reach

students. Though it may be helpful to understand the mechanisms that more directly connect policy to students, such as specific teacher training programs, educational curricula, or even the alleviation of financial strain on families, knowing these mechanisms may be informing us *how* a policy is successful rather than *whether* it is successful.

Finally, the analyses in Chapters 3 and 4 also demonstrate the importance of examining whether students in all groups benefit equally from the educational climate a state has created through its early childhood education policies.

In Chapter 4, I found that for cognitive school readiness, in most cases, students who were already advantaged were most likely to benefit from strong early childhood educational climates. White and Asian students, for example, were most likely to benefit from education climates that reinforced the importance of high quality education, as measured by living in a state that had 7 or more quality requirements of their state-funded pre-k programs. On the same vein, some students were more likely to suffer from state climates that resulted from inadequate investments in state-funded pre-k. Specifically, Black students who lived in states that needed greater funding to reach quality benchmarks had lower math and verbal readiness scores. But, for White, Hispanic, and Asian students, there was no adverse consequence of living in a state that needed additional funding to meet quality benchmarks. In fact, for Asian students, those who lived in states where greater funding was needed to meet benchmarks had higher scores than Asian students who lived in states where less funding was needed; this was the only group to experience an inverse relationship between funding needed and school readiness outcomes.

Moving forward, the three studies included in this dissertation jointly, and respectively, provide a strong base for understanding how children responded to educational initiatives directed at early childhood during a time of significant educational reform. But, I recognize

these studies are not exhaustive, they also lead to additional questions that provide potential areas of future research to build the findings observed here.

Specifically, when considering the findings of Chapter 2, I suggest three potential future directions for research to supplement this analysis. First, in order to more fully understand the between group differences observed in initial differences, endpoint differences, and trend differences in school readiness, a more in depth analysis of sociodemographic groups, including controls for child and family level background variables, may help provide a more comprehensive story about which students are making progress in eliminating disparities in readiness over time.

Second, I used findings in Chapter 2 where I discovered that some races/ethnicities had smaller disparities at 2010-2011 than in 1998-1999, to guide the analysis of racial/ethnic variations in enrollment and readiness in the subsequent chapters. But, in this chapter, students in a number of other sociodemographic groups also exhibited smaller disparities on some readiness outcomes at the endpoint of the study than at the start, including maternal education and family structure. Therefore, analyzing these sociodemographic characteristics in the same vein as I did race in Chapters 3 and 4 may be one step toward understanding why students in some groups are able to narrow readiness gaps.

Finally, I suggest building on the analysis in Chapter 2 by predicting the slopes (trends in readiness) for each sociodemographic group, rather than relying solely on single time point analyses. While the analysis as it stands is an important first step in understanding where growth is occurring within sociodemographic groups, and where disparities are shrinking between groups, I suggest using early childhood educational policies that were enacted in the early 2000s to predict whether some initiatives are associated with steeper slopes/faster growth than others.

Building on the findings of Chapters 3 and 4, there are also a number of future directions for these studies. First, in instances where findings were counterintuitive, I plan to delve more deeply into understanding whether the patterns observed are reflecting an omitted variable. In particular, one unexpected finding was that Asian students had higher readiness scores when living in a state that needed a greater amount of additional funding to reach all ten NIEER quality benchmarks. For these students, I suggested that external investments by the family in their education may partially explain why these students are successful in an adverse situation.

Similarly, some similar patterns emerged between groups that typically have disparate educational outcomes. Notably, Hispanic and Asian students both exhibited higher odds of enrollment in organized care when living in states where a higher proportion of four-year-old children were enrolled in state-funded care. These patterns may reflect a common trait that is shared by these groups that may be associated with both the state-level policy and the odds of enrollment in care. Specifically, Asian and Hispanic student populations often have a high proportion of immigrant children, or children who have immigrant parents. Thus, an important future direction for this study is to examine whether this shared trait may be driving the relationship between these groups and the odds of enrollment in organized care.

In a number of ways, the results of this dissertation provide an optimistic picture of the result of early childhood educational initiatives over the last decade. Across sociodemographic groups, most students were more ready for school in 2010-2011 than they were approximately a decade prior. Given the significant investment in early childhood education by states and the federal government, this is promising news. Further, it appears that a number of state-policies are associated with improved outcomes for children, including higher odds of enrollment in organized care and higher math and verbal school readiness.

However, disparities between groups remain on indicators of math readiness, verbal readiness, and approaches to learning (non-cognitive readiness). Though some education policies appear to benefit all students, a number of policies appear to have differential returns that may result in already advantaged students maintaining their advantage. Though disheartening, these findings are not entirely unexpected. One of the leading arguments against providing universal pre-k in the United States is that it will result in advantaged students maintaining their advantage, or gaining greater advantage, while doing little to decrease disparities between students (Barnett, Brown, and Shore, 2004; Gormley, 2005). As scholars and policy makers continue to ask questions about school readiness and whether early childhood policy initiatives are working to eliminate disparities between children, this analysis shows the importance of evaluating differential returns on our investments.

Appendix A

List of states and classification of type of access to state-funded pre-kindergarten.

State	Access to state-funded pre-k
Alabama	Unrestricted
Alaska	Restricted
Arizona	Restricted
Arkansas	Restricted
California	Restricted
Colorado	Restricted
Connecticut	Restricted
Delaware	Restricted
Florida	Unrestricted
Georgia	Unrestricted
Hawaii	None
Idaho	None
Illinois	Restricted
Indiana	None
Iowa	Unrestricted
Kansas	Restricted
Kentucky	Restricted
Louisiana	Restricted
Maine	Unrestricted
Maryland	Restricted
Massachusetts	Unrestricted
Michigan	Restricted
Minnesota	Restricted
Mississippi	None
Missouri	Restricted
Montana	None
Nebraska	Restricted
Nevada	Unrestricted
New Hampshire	None
New Jersey	Unrestricted
New Mexico	Unrestricted
New York	Unrestricted
North Carolina	Restricted
North Dakota	None
Ohio	Restricted
Oklahoma	Unrestricted
Oregon	Restricted
Pennsylvania	Unrestricted
Rhode Island	Unrestricted
South Carolina	Restricted
South Dakota	None
Tennessee	Restricted
Texas	Restricted

Utah	None
Vermont	Restricted
Virginia	Restricted
Washington	Restricted
West Virginia	Restricted
Wisconsin	Unrestricted
Wyoming	None

Appendix B

For Figure 4.1. Predicted differences in school readiness by race and state-funded pre-k quality requirements.

Panel 1: Math school readiness

	State-level policy regarding quality requirements	
Race/ethnicity	Low number of quality requirements (≤6)	High number of quality requirements (7+)
White	2.556	2.642
Black	2.417	2.494
Hispanic	2.437	2.451
Asian	2.607	2.770

Panel 2: Verbal school readiness

	State-level policy regarding quality requirements	
Race/ethnicity	Low number of quality requirements (≤6)	High number of quality requirements (7+)
White	2.545	2.639
Black	2.492	2.537
Hispanic	2.424	2.404
Asian	2.603	2.821

Notes: Based on Models 1 and 4 in Table 4.4 from the analysis of ECLS-K: 2010.

For Figure 4.2. Predicted differences in school readiness by race at various levels of financial investment needed to reach all 10 NIEER quality benchmarks

Panel 1: Math school readiness

	State-level investment needed to reach all quality benchmarks				
Race/ethnicity	None needed	$1,000	$2,000	$3,000	$4,000
White	2.582	2.596	2.609	2.623	2.636
Black	2.513	2.480	2.448	2.415	2.382
Hispanic	2.450	2.443	2.435	2.427	2.420
Asian	2.571	2.664	2.757	2.850	2.943

Panel 2: Verbal school readiness

	State-level investment needed to reach all quality benchmarks				
Race/ethnicity	None needed	$1,000	$2,000	$3,000	$4,000
White	2.568	2.587	2.606	2.625	2.644
Black	2.599	2.550	2.501	2.452	2.403
Hispanic	2.392	2.409	2.426	2.443	2.460
Asian	2.581	2.679	2.777	2.875	2.973

Notes: Based on Models 2 and 5 in Table 4.4 from the analysis of ECLS-K: 2010.

For Figure 4.3. Predicted differences in school readiness by race, at various proportions of students served by state-funded pre-k programs.

Panel 1: Math school readiness

	Proportion of four-year-old children in state served by state-funded pre-k				
Race/ethnicity	0%	25%	50%	75%	100%
White	2.608	2.608	2.608	2.608	2.608
Black	2.454	2.454	2.454	2.454	2.454
Hispanic	2.333	2.433	2.533	2.633	2.733
Asian	2.504	2.679	2.854	3.029	3.204

Panel 2: Verbal school readiness

	Proportion of four-year-old children in state served by state-funded pre-k				
Race/ethnicity	0%	25%	50%	75%	100%
White	2.544	2.590	2.637	2.683	2.730
Black	2.486	2.512	2.539	2.565	2.592
Hispanic	2.289	2.406	2.524	2.641	2.758
Asian	2.494	2.686	2.878	3.071	3.263

Notes: Based on Models 3 and 6 in Table 4.4 from the analysis of ECLS-K: 2010.

REFERENCES

Alexander, K. L., Entwisle, D. R., & Horsey, C. S. (1997). From first grade forward: Early foundations of high school dropout. Sociology of education, 87-107.

Allen, J. D. (2005). Grades as valid measures of academic achievement of classroom learning. The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 78(5), 218-223.

American Psychological Association, Presidential Task Force on Educational Disparities. (2012). Ethnic and racial disparities in education: Psychology's contributions to understanding and reducing disparities. Retrieved from http://www.apa.org/ed/resources/racial-disparities.aspx.

American Speech Langauge Hearing Association (2015). Overview of funding for pre-k-12 education. Retrieved from http://www.asha.org/Advocacy/schoolfundadv/Overview-of-Funding-For-Pre-K-12-Education/.

Ananat, E. O., Gassman-Pines, A., & Gibson-Davis, C. M. (2011). The effects of local employment losses on children's educational achievement. In G. Duncan and R. Murnane (Eds),Whither opportunity?: Rising inequality, schools, and children's life chances

Anderson, C. S. (1982). The search for school climate: A review of the research. Review of educational research, 52(3), 368-420.

Anderson, L. (2007). Congress and the Classroom: From the Cold War to" No Child Left Behind". Penn State Press.

Andrews, R. J., Jargowsky, P., & Kuhne, K. (2012). The Effects of Texas's Targeted Pre-Kindergarten Program on Academic Performance (No. w18598). National Bureau of Economic Research.

Annie E. Casey Foundation (2013). Kids Count Data Book. Retrieved from http://datacenter.kidscount.org/files/2013KIDSCOUNTDataBook.pdf.

Aud, S., Hussar, W., Johnson, F., Kena, G., Roth, E., Manning, E., Wang, X., and Zhang, J. (2012). The Condition of Education 2012 (NCES 2012-045). U.S. Department of Education, National Center for Education Statistics. Washington, DC. Retrieved from http://nces.ed.gov/pubsearch

Baeder, J. (2012). The magical thinking of state-level education goals. Education Week. Retrieved from http://blogs.edweek.org/edweek/on_performance/2012/10/the_magical_thinking_of_state-level_education_goals.html

Barnett, W. S., K. Brown, and R. Shore. (2004). The universal vs. targeted debate: Should the United States have preschool for all? New Brunswick, NJ: National Institute for Early Education Research.

Barnett, W.S., Carolan, M.E., Fitzgerald, J., & Squires, J.H. (2012). The state of preschool 2012: State preschool yearbook. New Brunswick, NJ: National Institute for Early Education Research.

Barnett, W.S., Carolan, M.E., Squires, J.H., Clarke Brown, K., & Horowitz, M. (2015). The state of preschool 2014: State preschool yearbook. New Brunswick, NJ: National Institute for Early Education Research.

Barnett, W. S., Epstein, D. J., Carolan, M. E., Fitzgerald, J., Ackerman, D. J., & Friedman, A. H. (2010). The state of preschool 2010. Retrieved from http:/Inieer. org/yearbook/pdf/yearbook.

Barnett, W. S., Hustedt, J. T., Robin, K. B., & Schulman, K. L. (2004). The state of preschool: 2004 state preschool yearbook. Retrieved from http://nieer.org/publications/state-preschool-2004-state-preschool-yearbook

Barnett, W. S., & Robin, K. B. (2006). *How much does quality preschool cost?*. National Institute for Early Education Research, Rutgers. Retrieved from http://nieer.org/resources/research/CostOfEffectivePreschool.pdf

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology, 51, 1173-1182.

Bassok, D., & Rorem, A. (2013, April). Is kindergarten the new first grade? The changing nature of kindergarten in the age of accountability. In Biennial Meeting of the Society for Research in Child Development.

Bierman, K. L., Domitrovich, C. E., Nix, R. L., Gest, S. D., Welsh, J. A., Greenberg, M. T., Clancy B., Nelson, K.E., and Gill, S. (2008). Promoting Academic and Social-Emotional School Readiness: The Head Start REDI Program. Child development, 79, 1802-1817.

Bishop, J. H., & Mane, F. (2004). Educational reform and disadvantaged students: Are they better off or worse off? CESifo Working Paper Series No. 1309. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=615566.

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. Annual Review of Psychology, 53, 371-99. Retrieved from http://search.proquest.com/docview/205754355?accountid=13158

Bradley, R. H., Vandell DL. (2007) Child care and the well-being of children. Archives of Pediatric and Adolescent Medicine, 161:669–676.

Brandon, P. D. (2004). The Child Care Arrangements of Preschool-Age Children in Immigrant Families in the United States. International Migration, 42(1), 65-87.

Bray, M., & Lykins, C. (2012). Shadow Education Private Supplementary Tutoring and Its Implications for Policy Makers in Asia. CERC Monograph Series in Comparative and International Education and Development, vol. 9.

Brennan, R., Kim, J., Wenz-Gross, M., & Siperstein, G. (2001). The relative equitability of high-stakes testing versus teacher-assigned grades: An analysis of the Massachusetts Comprehensive Assessment System (MCAS). Harvard educational review, 71(2), 173-217.

Brody, L. (2015). Mayor Trumpets High Demand for Pre-K. The Wall Street Journal. Retrieved from http://www.wsj.com/articles/pre-k-registration-rises-in-new-york-city-1426620441.

Brooks-Gunn, J., & Duncan, G. J. (1997). The effects of poverty on children. The future of children, 55-71.

Brooks-Gunn, J. & Markman, L. (2005). The contribution of parenting to ethnic and racial gaps in school readiness. The Future of Children, 15, 139-168.

Brown, S. L. (2004). Family structure and child well-being: the significance of parental cohabitation. Journal of Marriage and Family, 66(2), 351-367.

Burchinal, M. R. (1999). Child care experiences and developmental outcomes. The annals of the American academy of political and social science, 563(1), 73-97.

Burchinal, M., Vandergrift, N., Pianta, R., & Mashburn, A. (2010). Threshold analysis of association between child care quality and child outcomes for low-income children in pre-kindergarten programs. Early Childhood Research Quarterly, 25(2), 166-176.

Burtless, G. T. (1996). Does money matter?: The effect of school resources on student achievement and adult success. Brookings Institution Press.

Campbell, S. B., & von Stauffenberg, C. (2008). Child characteristics and family processes that predict behavioral readiness for school. Early disparities in school readiness: How families contribute to transitions into school, 225-258.

Cannon, J. S., Jacknowitz, A., & Karoly, L. A. (2012). Preschool and School Readiness: Experiences of Children with Non-English Speaking Parents. *Public Policy Institute of California*. Retrieved from http://eric.ed.gov/?id=ED531794

Capizzano, J. Adams, G. & Ost, J., 2006. Caring for Children of Color: The child care patterns of White, Black and Hispanic children under 5. (Occasional Paper Number 72). Washington, DC: The Urban Institute.

Carlson, M. J., & Corcoran, M. E. (2001). Family structure and children's behavioral and cognitive outcomes. Journal of Marriage and Family, 63(3), 779-792.

Caspe, M., Lopez, M. E., & Wolos, C. (2006/2007). Family involvement in elementary school children's education. Harvard Family Research Project. Retrieved from http://www.hfrp.org/publications-resources/browse-our-publications/family-involvement-in-elementary-school-children-s-education

Child Care Aware. (2013). Parents and the High Cost of Child Care: 2013 Report. Retrieved from http://usa.childcareaware.org/sites/default/files/Cost%20of%20Care%202013%20110613.pdf

Child Trends. (2012). Child care. Retrieved from http://www.childtrends.org/?indicators=child-care.

Child Trends Databank. (2014). Early childhood program enrollment. Retrieved from http://www.childtrends.org/?indicators=early-childhood-program-enrollment.

Cohen, D. K., & Hill, H. C. (2008). Learning policy: When state education reform works. Yale University Press.

Cohen, J., McCabe, L., Michelli, N. M., & Pickeral, T. (2009). School climate: Research, policy, practice, and teacher education. The Teachers College Record, 111(1), 180-213.

Coleman, J. S., Campbell, E. Q., Hobson, C. J., McPartland, J., Mood, A. M., Weinfeld, F. D., & York, R. (1966). Equality of educational opportunity. Washington, dc, 1066-5684.

Corak, M. (2013). Income inequality, equality of opportunity, and intergenerational mobility. The Journal of Economic Perspectives, 79-102.

County of Orange California (2002) Home-Based vs. Center-Based Care. Retrieved from http://bos.ocgov.com/childcare/homebased_centeredbased.asp

Crampton, F. E. (2009). Spending on school infrastructure: does money matter?. Journal of Educational Administration, 47(3), 305-322.

Curby, T. W., LoCasale-Crouch, J., Konold, T. R., Pianta, R. C., Howes, C., Burchinal, M., ... & Barbarin, O. (2009). The relations of observed pre-K classroom quality profiles to children's achievement and social competence. Early Education and Development, 20(2), 346-372.

Currie, J. (2001). Early childhood education programs. Journal of Economic perspectives, 213-238.

Danziger S, Chavez K, Cumberworth E. (2012). Poverty and the Great Recession. Stanford, CA: Stanford Center on Poverty and Inequality.

Darling-Hammond, L. (1991). The implications of testing policy for quality and equality. Phi Delta Kappan, 220-225.

Darling-Hammond, L. (1998). Unequal opportunity: Race and education. The Brookings Review, 16(2), 28.

Darling-Hammond, L. (2004). Standards, accountability, and school reform. The Teachers College Record, 106(6), 1047-1085.

Dauber, S. L., Alexander, K. L., & Entwisle, D. R. (1993). Characteristics of retainees and early precursors of retention in grade: Who is held back?. Merrill-Palmer Quarterly (1982-), 326-343.

David, M. E. (2007). Changing the educational climate: children, citizenship and learning contexts. Environmental Education Research, 13(4), 425-436.

Davis, J. W., & Bauman, K. (2011). School Enrollment in the United States: 2008. Population Characteristics. US Census Bureau.

DiPrete, T. A., & Jennings, J. L. (2012). Social and behavioral skills and the gender gap in early educational achievement. Social Science Research, 41(1), 1-15.

Dixon, S. D., & Beard, C. (2011). School Readiness: What Teachers Expect. What Parents Can Do. Retrieved from http://www.iidc.indiana.edu/styles/iidc/defiles/ecc/what_teachers_expect.pdf

Dotterer, A. M., Burchinal, M., Bryant, D., Early, D., & Pianta, R. C. (2013). Universal and targeted pre-kindergarten programmes: a comparison of classroom characteristics and child outcomes. *Early Child Development and Care*, *183*(7), 931–950.

Duncan G, Brooks-Gunn J. Consequences of growing up poor. Sage; New York, NY: 1997.

Duderstadt, J. J. (2009). Aligning American Higher Education with a Twenty-first-century Public Agenda. Examining the National Purposes of American Higher Education: A Leadership Approach to Policy Reform. Higher Education in Europe, 34(3-4), 347-366.

Duncan, G. J., & Magnuson, K. A. (2005). Can family socioeconomic resources account for racial and ethnic test score gaps?. The future of children, 15(1), 35-54.

Duncan, G. J., Morris, P. A., & Rodrigues, C. (2011). Does money really matter? Estimating impacts of family income on young children's achievement with data from random-assignment experiments. Developmental psychology, 47(5), 1263.

Early, D. M., Maxwell, K. L., Burchinal, M., Alva, S., Bender, R. H., Bryant, D., ... & Zill, N. (2007). Teachers' education, classroom quality, and young children's academic skills: Results from seven studies of preschool programs. Child development, 78(2), 558-580.

Education Commission of the States (2014). Child must attend kindergarten. Retrieved from http://ecs.force.com/mbdata/mbquestRT?rep=Kq1403.

Elementary and Secondary Education Act of 1965 § Public Law 89-10. Retrieved from http://www.gpo.gov/fdsys/pkg/STATUTE-79/pdf/STATUTE-79-Pg27.pdf

Engle, P. L., & Black, M. M. (2008). The effect of poverty on child development and educational outcomes. Annals of the New York Academy of Sciences, 1136(1), 243-256.

Entwisle, D. R., Alexander, K. L., & Olson, L. S. (2005). First Grade and Educational Attainment by Age 22: A New Story1. American Journal of Sociology, 110(5), 1458-1502.

Entwisle, D. R., Alexander, K. L., & Olson, L. S. (2007). Early schooling: The handicap of being poor and male. Sociology of Education, 80(2), 114-138.

Farkas, G. (2003). Racial disparities and discrimination in education: What do we know, how do we know it, and what do we need to know? *The Teachers College Record*, *105*(6), 1119–1146.

Finkel, M., Khadduri, J., Main, V., Pistilli, L., Solari, C., Winkel, K., & Wood, M. (2003). Costs and utilization in the housing choice voucher program. Washington D.C.: Abt Associates.

Fontaine, N. S., Torre, D. L., & Grafwallner, R. (2006). Effects of quality early care on school readiness skills of children at risk. Early Child Development and Care, 176(1), 99-109.

Fox, E. (2014). How New York's 1% get kids into preschool. CNN Money. Retrieved from http://money.cnn.com/2014/06/10/luxury/preschool-new-york-city/.

Fry, R. and Lopez, M. (2012). Hispanic student enrollments reach new highs in 2011. Washington, DC: Pew Research Center, Pew Hispanic Center. Retrieved from http://www.pewhispanic.org/files/2012/08/Hispanic-Student-Enrollments-Reach-New-Highs-in-2011_FINAL.pdf.

Fryer Jr, R. G., & Levitt, S. D. (2004). Understanding the black-white test score gap in the first two years of school. Review of Economics and Statistics, 86(2), 447-464.

Fuller, B., Kagan, S. L., Loeb, S., & Chang, Y.-W. (2004). Child care quality: centers and home settings that serve poor families. *Early Childhood Research Quarterly*, *19*(4), 505–527.

Galindo, C., & Reardon, S. F. (2006). Hispanic students' educational experiences and opportunities during kindergarten. Report to the National Task Force on Early Childhood Education for Hispanics. Tempe, AZ: Arizona State University.

Gamoran, A., & Long, D. A. (2007). Equality of Educational Opportunity A 40 Year Retrospective (pp. 23-47). Springer Netherlands.

Garcia Coll, C. T., Hoffman, J., & Oh, W. (1987). The social ecology and early parenting of Caucasian adolescent mothers. Child Development, 955-963.

Gault, B., Mitchell, A. W., & Williams, E. (2008). Meaningful Investments in Pre-K: Estimating the Per-Child Costs of Quality Programs. Pre-K Now Research Series. Pre-K Now. Retrieved from http://www.pewstates.org/projects/pre-k-now-328067.

Gormley Jr, W. T., Gayer, T., Phillips, D., & Dawson, B. (2005). The effects of universal pre-K on cognitive development. Developmental psychology, 41(6), 872.

Gormley Jr, W. (2005). The universal pre-K bandwagon. Phi Delta Kappan, 87(3), 246-249.

Gormley, W. T. (2008). The Effects of Oklahoma's Pre-K Program on Hispanic Children*. Social Science Quarterly, 89(4), 916-936.

Gracey, H. L. (1975). Learning the student role: Kindergarten as academic boot camp. The sociology of education: A sourcebook, 82-95.

Graue, E. (2009). Reimagining Kindergarten: Restoring a Developmental Approach when Accountability Demands Are Pushing Formal Instruction on the Youngest Learners. School Administrator, 66(10), 10-15.

Grunewald, R., & Rolnick, A. (2006). A proposal for achieving high returns on early childhood development. *Special Studies, Early Childhood Development. Minneapolis: Federal Reserve Bank of Minneapolis*. Retrieved from

Hair, E., Halle, T., Terry-Humen, E., Lavelle, B., & Calkins, J. (2006). Children's school readiness in the ECLS-K: Predictions to academic, health, and social outcomes in first grade. Early Childhood Research Quarterly, 21(4), 431-454.

Harris, P., Smith, B. M., & Harris, J. (2011). The myths of standardized tests: Why they don't tell you what you think they do. Rowman & Littlefield Publishers.

Hart, B., & Risley, T. R. (1995). Meaningful differences in the everyday experience of young American children. Paul H Brookes Publishing.

Haskins, R., & Rouse, C. E. (2005). *Closing achievement gaps*. Brookings Institution. Retrieved from http://www.brookings.edu/es/research/projects/wrb/publications/pb/20050301foc.pdf

Heckman, J. J. (2006). Skill formation and the economics of investing in disadvantaged children. Science, 312(5782), 1900-1902.

Heckman, J. J. (2011). The Economics of Inequality: The Value of Early Childhood Education. American Educator, 35(1), 31.

Heckman, J. J. (2012). Invest in early childhood development: Reduce deficits, strengthen the economy. *The Heckman Equation*. Retrieved from http://heckmanequation.org/sites/default/files/F_HeckmanDeficitPieceCUSTOM-Generic_052714.pdf

High, P. C. (2008). School readiness. Pediatrics, 121(4), e1008-e1015.

Hillman, N. W., Tandberg, D. A., & Fryar, A. H. (2015). Evaluating the impacts of "new" performance funding in higher education. Educational Evaluation and Policy Analysis, 0162373714560224.

Hinojosa, M. S. (2008). Black-white differences in school suspension: Effect of student beliefs about teachers. Sociological Spectrum, 28(2), 175-193.

Holloway, S. D., & Fuller, B. (1999). Families and child care: Divergent viewpoints. The Annals of the American Academy of Political and Social Science, 563(1), 98-115.

Howes, C., & Hamilton, C. E. (1993). The changing experience of child care: Changes in teachers and in teacher-child relationships and children's social competence with peers. Early Childhood Research Quarterly, 8(1), 15-32.

Hoy, W. K., & Hannum, J. W. (1997). Middle school climate: An empirical assessment of organizational health and student achievement. Educational Administration Quarterly, 33(3), 290-311.

Hustedt, J. T., & Barnett, W. S. (2011). Financing Early Childhood Education Programs: State, Federal, and Local Issues. *Educational Policy*, *25*(1), 167–192.

Hull, J. (2011) Starting out right: pre-k and kindergarten: full report. Retrieved from200 http://www.centerforpubliceducation.org/Main-Menu/Organizing-a-school/Starting-Out-Right-Pre-K-and-Kindergarten/Starting-Out-Right-Pre-K-and-Kindergarten-full-report.html

Indiana Department of Education. (undated). Is your child ready for mathematics in kindergarten? Retrieved from http://www.doe.in.gov/sites/default/files/kindergarten/ready-kindergarten-math-brochure.pdf

Institute of Museum and Library Services. (2013). Growing young minds: How Museums and - Libraries Create Lifelong Learners. Washington, D.C.: Institute of Museum and Library Services. Retrieved from http://www.imls.gov/assets/1/AssetManager/GrowingYoungMinds.pdf.

Irons, J. (2009). Economic Scarring.' The Long-term Impacts of the Recession, Washington, DC: Economic Policy Institute

Isaacs, J. B. (2012). Starting School at a Disadvantage. Retrieved from http://impact.sp2.upenn.edu/ostrc/newsletter/documents/StartingSchoolataDisadvantage_000.pdf

Isaacs, J., & Magnuson, K. (2011). Income and education as predictors of children's school readiness. Washington, DC: Brookings Institution.

Janus, M., & Duku, E. (2007). The school entry gap: Socioeconomic, family, and health factors associated with children's school readiness to learn. Early education and development, 18(3), 375-403.

Kang, S., & Bishop, J. (1984). The Effect of Curriculum on Labor Market Success Immediately after High School.

In D. Keating & C. Hertzman (Eds.), Developmental health and the wealth of nations: Social, biological, and educational dynamics (pp. 153–184). New York: Guilford Press.

Kim, J. (2012). Are Physical Education-Related State Policies and Schools' Physical Education Requirement Related to Children's Physical Activity and Obesity?. Journal of School Health, 82(6), 268-276.

Kochhar, R., Fry, and Taylor, P. (2011). Wealth gaps rise to record highs between whites, blacks, and Hispanics (Vol. 26). Washington, DC: Pew Research Center. July.

Kominski, R., Jamieson, A., & Martinez, G. (2001). At-risk conditions of US school-age children. Population Division, US Bureau of the Census.

Koretz, D. (2005). Alignment, high stakes, and the inflation of test scores. Yearbook of the National Society for the Study of Education, 104(2), 99-118.

Kurdek, L. A., & Sinclair, R. J. (2001). Predicting reading and mathematics achievement in fourth-grade children from kindergarten readiness scores. Journal of Educational Psychology, 93(3), 451.

Laskey, M. (2015) Waiting on Line for Free Preschool. New York Times. Retrieved from http://parenting.blogs.nytimes.com/2015/05/01/waiting-on-line-for-free-preschool/?_r=0.

Laughlin, L. (2013). Who's minding the kids? Child care arrangements: Spring 2011. Household Economic Studies. Washington, DC: U.S. Census Bureau

Lee, S. M., Burgeson, C. R., Fulton, J. E., & Spain, C. G. (2007). Physical education and physical activity: results from the School Health Policies and Programs Study 2006. Journal of School Health, 77(8), 435-463.

Loeb, S., Bridges, M., Bassok, D., Fuller, B., & Rumberger, R. W. (2007). How much is too much? The influence of preschool centers on children's social and cognitive development. Economics of Education review, 26(1), 52-66.

Lukemeyer, A., Crippen, K. J., & Archambeault, L. (2007). The impact of US national and state level policy on the nature and scope of k-12 virtual schooling. Retrieved from http://digitalscholarship.unlv.edu/sea_fac_articles/257/?utm_source=digitalscholarship.unlv.edu%2Fsea_fac_articles%2F257&utm_medium=PDF&utm_campaign=PDFCoverPages

Lunn, A. (n.d.). Necessary Reductions or Increased Support? Retrieved from http://web.stanford.edu/group/scspi/_media/working_papers/kornrich-lunn_necessary-reductions.pdf

Magnuson, K. A., & McGroder, S. (2002). The effect of increasing welfare mothers' education on their young children's academic problems and school readiness. *Joint Center for*

Poverty Research, Working Paper, 280. Retrieved from http://www.jonescollegeprep.org/ourpages/auto/2013/1/17/61972839/Effect%20of%20Increasing%20Welfare%20Mothers%20Education%20on%20their%20Young%20Childrens%20Problems%20and%20School%20Readiness.pdf

Magnuson, K. A., Meyers, M. K., Ruhm, C. J., & Waldfogel, J. (2004). Inequality in preschool education and school readiness. American educational research journal, 41(1), 115-157.

Malaspina, D. & Rimm-Kaufman, S. E. (2008). Early Predictors of School Performance Declines at School Transition Points. RMLE Online: Research in Middle Level Education, 31(9), 1-16.

McLanahan, S., & Percheski, C. (2008). Family structure and the reproduction of inequalities. Annu. Rev. Sociol, 34, 257-276.

McCoy, A. R., & Reynolds, A. J. (1999). Grade Retention and School Performance:: An Extended Investigation. Journal of School Psychology, 37(3), 273-298.

Miles, S., & Leinster, S. J. (2007). Medical students' perceptions of their educational environment: expected versus actual perceptions. Medical education, 41(3), 265-272.

Milligan, K., & Stabile, M. (2008). Do child tax benefits affect the wellbeing of children? Evidence from Canadian child benefit expansions (No. w14624). National Bureau of Economic Research.

Mistry, R. S., Benner, A. D., Biesanz, J. C., Clark, S. L., & Howes, C. (2010). Family and social risk, and parental investments during the early childhood years as predictors of low-income children's school readiness outcomes. Early Childhood Research Quarterly, 25(4), 432-449.

Moody, E. (2013). Secrets of a preschool admissions coach. Forbes. Retrieved from http://www.forbes.com/sites/learnvest/2013/06/18/secrets-of-a-preschool-admissions-coach/.

Morrissey, T. W. (2010). Sequence of child care type and child development: What role does peer exposure play?. Early Childhood Research Quarterly, 25(1), 33-50.

Murphy, D., Guzman, L., & Torres, A. (2014). America's Hispanic Children: Gaining Ground, Looking Forward. Retrieved from Child Trends America Hispanic Children: http://www.childtrends.org/wp-content/uploads/2014/09/2014-38AmericaHispanicChildren.pdf.

Musoba, G.D. (2004). The impact of school reform on college preparation: A multilevel analysis of the relationship between state policy and student achievement (Doctoral dissertation, Indiana University , 2004). Dissertation Abstracts International, 65, 3238

National Association of Child Care Resource and Referral Agencies. (*2010*). *Parents and the High Cost of Child Care: 2010* Update, Washington, DC. Available at http://www.naccrra.org/docs/Cost_Report_073010-final.pdf

National Child Care Information and Technical Assistance Center and National Association for Regulatory Administration (NCCITAC/NARA)(2010) The 2008 Child Care Licensing Study. Lexington, KY.

National Governors Association. (2015). The Governors Speak, 2015. Retrieved from http://www.nga.org/files/live/sites/NGA/files/pdf/2015/1504TheGovernorsSpeak.pdf.

National School Readiness Indicators Initiative. (2005). Getting ready: Findings from the national school readiness indicators initiative. Providence, RI: Rhode Island Kids Count.

NICHD Early Child Care Research Network. (2003) Do children's attention processes mediate the link between family predictors and school readiness?. Developmental Psychology, 39(3), 581-593.

Peattie, K. (2010). Green consumption: behavior and norms. Annual Review of Environment and Resources, 35(1), 195.

Peth-Pierce, R. (2001). A Good Beginning: Sending America's Children to School with the Social and Emotional Competence They Need To Succeed. The Child Mental Health Foundations and Agencies Network.

Phillips, M., Crouse, J., & Ralph, J. (1998). Does the Black-White test score gap widen after children enter school? In C. Jencks & M. Phillips (Eds.), The Black-White test score gap (pp. 229–272). Washington, DC: The Brookings Institution.

Pianta, R. C., Cox, M. J., & Snow, K. L. (2007). School readiness and the transition to kindergarten in the era of accountability. Paul H Brookes Publishing.

Pong, S. L., & Zeiser, K. L. (2012). Student engagement, school climate, and academic achievement of immigrants' children.

Qian, Z. (2013). Divergent paths of American families. US2010 Project, 5.

Rafoth, M. A., & NCSP, E. L. B. (2004). School readiness—Preparing children for kindergarten and beyond: Information for parents. *School and Home*. Retrieved from http://www.cherlking.com/downloads/School%20Readiness.pdf

Raghunathan, T. E., Solenberger, P. W., & Van Hoewyk, J. (2002). IVEware: Imputation and variance estimation software. Ann Arbor, MI: Survey Methodology Program, Survey Research Center, Institute for Social Research, University of Michigan.

Ramey, C. T., & Ramey, S. L. (1998). Early intervention and early experience. American psychologist, 53(2), 109.

de Ramirez, R. D., & Shapiro, E. S. (1998). Teacher ratings of attention deficit hyperactivity disorder symptoms in Hispanic children. Journal of Psychopathology and Behavioral Assessment, 20(4), 275-293.

Rao, A. R., & Monroe, K. B. (1989). The effect of price, brand name, and store name on buyers' perceptions of product quality: An integrative review. Journal of marketing Research, 351-357.

Raver, C. (2002). Emotions matter: Making the case for the role of young children's emotional development for early school readiness. Social Policy Report of the Society for Research in Child Development, 16(3), 1-20.

Raver, C., & Knitzer, J. (2002). What research tells policymakers about strategies to promote social and emotional school readiness among three-and four-year-old children. National Center for Children in Poverty. Facts in Action. Retreived from http://www. factsinaction. org/brief/braug021. htm.

Raviv, T., Kessenich, M., & Morrison, F. J. (2004). A mediational model of the association between socioeconomic status and three-year-old language abilities: The role of parenting factors. Early Childhood Research Quarterly, 19(4), 528-547.

Reynolds, A. J., Temple, J. A. & Ou, S. (2010). Preschool education, educational attainment, and crime prevention: Contributions of cognitive and non-cognitive skills. Children and Youth Services Review, 32, 1054-1063.

Rhode Island Kids Count. (2005). Getting ready: Findings from the National School Readiness Indicators Initiative, a 17 state partnership. Retrieved from

http://www.gettingready.org/matriarch/d.asp?PageID=303&PageName2=pdfhold&p=&PageName=Getting+Ready+-+Full+Report.pdf.

Ricciuti, H. N. (1999). Single parenthood and school readiness in White, Black, and Hispanic 6- and 7-year-olds. Journal of Family Psychology, 13(3), 450.

Roff, S. and McAleer, S. (2001). What is educational climate?. Medical Teacher, 23(4), 333-334.

Rouse, C. E., Brooks-Gunn, J., & McLanahan, S. (2005). Introducing the issue. The future of children, 15(1), 5-14.

Roza, M. (2010). Educational Economics: Where Do School Funds Go?. Urban Institute. 2100 M Street NW, Washington, DC 20037.

Samuels, C. (2014). Public Pre-K Can Put Squeeze on Private Providers. Education Week. Vol. 33 Issue 22, p1.

Samuels, C. (2014). New York City Kicks Off School Year With Massive Prekindergarten Expansion. Education Week. Retrieved from http://blogs.edweek.org/edweek/early_years/2014/09/new_york_kicks_off_school_year_with_massive_prekindergarten_expansion.html.

Schaps E (2005). The Role of Supportive School Environments In promoting Academic Success. In Getting Results: Update 5, Student Health, Supportive Schools, and Academic Success was developed by the Safe and Healthy Kids Program Office, California Department of Education. Available at: http://www.devstu.org/about/articles/getResults.html

Schneider, B., & Lee, Y. (1990). A model of academic success: The school and home environment of East Asian students. Anthropology and Education Quarterly, 21, 358–377

Schulman, K. (2000). The High Cost of Child Care Puts Quality Care out of Reach for Many Families. Issue Brief. Washington, DC: Children's Defense Fund.

Shapiro, T., Meschede, T., & Osoro, S. (2013). The roots of the widening racial wealth gap: Explaining the black-white economic divide. Institute on Assets and Social Policy.

Shonkoff, J. P., Boyce, W. T., & McEwen, B. S. (2009). Neuroscience, molecular biology, and the childhood roots of health disparities: building a new framework for health promotion and disease prevention. Jama, 301(21), 2252-2259.

Shonkoff, J. P., & Meisels, S. J. (1990). Early childhood intervention: The evolution of a concept. Handbook of early childhood intervention, 3-31.

Sieverding, M., Matterne, U., & Ciccarello, L. (2010). What role do social norms play in the context of men's cancer screening intention and behavior? Application of an extended theory of planned behavior. Health psychology, 29(1), 72.

Simon, M. H., and Makar, M. (2009). Nursery University. Documentary.

Smith, J. R., Brooks-Gunn, J., & Klebanov, P. K. (1997). Consequences of living in poverty for young children's cognitive and verbal ability and early school achievement. Consequences of growing up poor, 132-189.

Smith, L. K. (2014). Big Day for Early Childhood Education at the White House. Retrieved from http://www.hhs.gov/blog/2014/12/22/big-day-early-childhood-education-white-house.html

State of Minnesota (2015) "New Investments in E-12 Education Take Effect Today" Retrieved from http://mn.gov/governor/newsroom/pressreleasedetail.jsp?id=102-166792.

Stebbins, H., & Knitzer, J. (2007). State early childhood policies: Highlights from the improving the odds for young children project.

Stewart, E. A. (2003). School social bonds, school climate, and school misbehavior: A multilevel analysis. Justice Quarterly, 20(3), 575-604.

Stipek, D. (2006). No Child Left Behind Comes to Preschool. *The Elementary School Journal*, *106*(5), 455–466.

Stuber, J., & Schlesinger, M. (2006). Sources of stigma for means-tested government programs. Social Science & Medicine, 63(4), 933-945.

Sue, S. & Okazaki, S. (1990). Asian-American educational experience. American Psychologist, 45 (8), 913-920.

Taylor, L. & Fowler, W. (2006). A comparable wage approach to geographic cost adjustment. Washington DC: IES, U.S. Department of Education.

Thapa, A., Cohen, J., Guffey, S., & Higgins-D'Alessandro, A. (2013). A review of school climate research. Review of Educational Research, 83(3), 357-385.

Timar, T. B., & Roza, M. (2010). "A false dilemma": Should decisions about education resource use be made at the state or local level?. American Journal of Education, 116(3), 397-422.

Tramontana, M. G., Hooper, S. R., & Selzer, S. C. (1988). Research on the preschool prediction of later academic achievement: A review. Developmental Review, 8, 89-146.

Uline, C., & Tschannen-Moran, M. (2008). The walls speak: The interplay of quality facilities, school climate, and student achievement. Journal of Educational Administration, 46(1), 55-73.

U.S. Department of Education (2002). Executive summary: The No Child Left Behind Act of 2001. Retrieved from http://www2.ed.gov/nclb/overview/intro/execsumm.html.

U.S. Department of Education (2012). The Federal Role in Education. Retrieved from http://www2.ed.gov/about/overview/fed/role.html.

U.S. Department of Health and Human Services. (2012) Child Care and Development Fund: Fact Sheet. Retrieved from http://www.acf.hhs.gov/sites/default/files/occ/ccdf_factsheet.pdf

Vandell, D. (2004). Early child care: The known and the unknown. Merrill-Palmer Quarterly, 50(3), 387-414.

Varma, R., Tiyagi, E., & Gupta, J. K. (2005). Determining the quality of educational climate across multiple undergraduate teaching sites using the DREEM inventory. BMC medical education, 5(1), 8.

Votruba-Drzal, E., Coley, R. L., Koury, A. S., & Miller, P. (2013). Center-based child care and cognitive skills development: Importance of timing and household resources. Journal of Educational Psychology, 105(3), 821.

Wang, M. T., & Dishion, T. J. (2012). The trajectories of adolescents' perceptions of school climate, deviant peer affiliation, and behavioral problems during the middle school years. Journal of Research on Adolescence, 22(1), 40-53.

Willingham, D. T. (2012). Ask the Cognitive Scientist: Why Does Family Wealth Affect Learning?. American Educator, 36(1), 33-39.

Xie, Y., & Goyette, K. A. (2004). A demographic portrait of Asian Americans. New York: Russell Sage Foundation.

Erin Marie (Powell) Baumgartner

Pennsylvania State University
Department of Sociology
512 Oswald Tower
University Park, PA 16802

Phone: 708.846.7897
E-mail: erinmariebaum@gmail.com
Updated 07/2015

EDUCATION

Pennsylvania State University, University Park, PA — December 2015
Ph.D., *Dual-degree program in Sociology and Demography*
Dissertation committee: Michelle Frisco (chair), Katerina Bodovski, Emily Greenman, Valarie King

University of Illinois at Chicago, Chicago, IL — 2010
M.Ed., *Measurement, Evaluation, Statistics, and Assessment*

University of Chicago, Chicago, IL — 2008
M.A. Program in the Social Sciences, *Sociology*
Faculty advisor: Dr. Stephen Raudenbush

University of Notre Dame, Notre Dame, IN — 2004
B.B.A., *Marketing, second major in Sociology*, *cum laude*
Sociology GPA: 3.93 Overall GPA: 3.44

RESEARCH & TEACHING INTERESTS

Sociology of Education, Sociology of the Family, Social Stratification, Research Methods, Social Demography, Educational Role of the Family, Quantitative Methods

AWARDS

Huber-Form Scholarship, Pennsylvania State University — 2010-2012

Merit-based partial tuition scholarship, University of Chicago — 2007-2008

UNDER REVIEW

Alwin, Duane & Erin Baumgartner. "Concerted Cultivation vs. Natural Growth: Inequality, Parental Values, and Children's Use of Time".

Baumgartner, Erin. "Maternal Life Course Stage and Children's Non-Cognitive School Readiness".

Frisco, Michelle L., Erin Baumgartner, Jennifer Van Hook, & Molly Dondero. "Academic Achievement and Teacher-rated Behavior among White and Latino Elementary School Students in New and Established Latino Destinations".

IN PROGRESS

Alwin, Duane, Brett Beattie, Lee Hannah, & Erin Baumgartner. "Race, Religion and Parental Child-Rearing Values".

Baumgartner, Erin. "Making Gains? Changes and Stability in School Readiness from 1998 to 2010".

Baumgartner, Erin & Duane Alwin. "Maternal SES, Parental Child-Rearing Approaches and Children's Academic Achievement".

Baumgartner, Erin & Emily Pressler. "The Context of School Readiness: Understanding the Interaction of Parenting and Childcare in Preparing Children for Kindergarten".

Cundiff, Patrick & Erin Baumgartner. "The (Mis)Match between College Aspirations and High School Course Taking".

Greenman, Emily, Erin Baumgartner, and George Farkas. "Non-cognitive skill growth of Latino immigrants' children in elementary school".