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# Preschool Participation and Linguistically Diverse Learners' English Language and Literacy Acquisition

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# PRESCHOOL PARTICIPATION AND LINGUISTICALLY DIVERSE LEARNERS' ENGLISH LANGUAGE AND LITERACY ACQUISITION

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**Abstract**

Linguistically diverse learners are a rapidly growing subpopulation of the students currently served by schools and future forecasts indicate that population growth is expected to continue. Students who enter school speaking a language other than English need adequate time and opportunity to English. Furthermore, children who attain grade-level literacy by the third grade demonstrate greater achievement in school and life. Because language and literacy acquisition in the early elementary years leads to later success and English language learners (ELLs) need time and opportunity to master both, it is imperative that school systems focus on interventions to ensure both early and long-term success for ELLs. Participation in high quality prekindergarten programming may be a viable avenue to contribute to successful outcomes for linguistically diverse children in schools by offering extra time and opportunity during a child's journey to English mastery. This nonexperimental ex post facto study examined whether ELLs who participated in the publicly funded Colorado Preschool Program (CPP) through their school district were more likely to achieve grade-level language and literacy proficiency as measured by the Colorado English Language Acquisition (CELA) standardized assessment while taking poverty into account. Previously collected data were obtained from a database maintained by a school district an upper-middle class, large school district in Colorado. The final study sample consisted of 118 ELL students who had complete data from the 2004-2005 school year through the 2009-2010 school year.

Logistic regression results indicated that for each year a child participated in CPP, he or she was approximately two-and-a-half times more likely to demonstrate proficiency on the CELA test prior to the end of third grade ($p<.05$). Chi-square tests indicated that CPP participation and free and reduced lunch qualification were independent of one another. The findings of this study suggest that CPP may be a promising intervention to aid ELL students in achieving grade-level proficiency early in their educational careers.

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# Chapter One: Introduction

## Background

The number of linguistically diverse students being served by American schools has rapidly increased over the past few decades and does not show signs of slowing, (Goldenberg, 2008; Hawkins, 2004; Mays, 2008; Mohr, 2004; Short & Fitzsimmons, 2007; Xu & Drame, 2008) particularly with regard to the youngest demographics of students in American schools such as early childhood and early elementary aged students (Barnett, Yarosz, Thomas, Jung & Blanco, 2007). In 1990, one out of every twenty public school students was an English language learner (ELL), but as of 2008 one in nine public school students is now an English language learner (Goldenberg, 2008). This means 10.5% of students being served by K-12 educators in the United States are learning English in addition to their first language (Short & Fitzsimmons, 2007). Specifically in Colorado, the number of English language learners that schools served in kindergarten through twelfth grade grew more than 200% between 1993 and 2004 (Short & Fitzsimmons, 2007).

English language learners consistently perform below their peers in school (Baca & Cervantes, 1998; Goldenberg, 1996; Short & Fitzsimmons, 2007; Xu & Drame, 2008) most likely because they are unable to read and write proficiently in English, thus limiting ability to fully participate academically (August & Shanahan, 2006). In 2004,

only 44% of English language learners in American public schools graduated from high school (Short & Fitzsimmons, 2007). Immigrant populations also highly contribute to the high school dropout rate in the United States: 50% of students who do not complete the twelfth grade are immigrants from another country, particularly when GED counts are removed from diploma counts (Carniero & Heckman, 2003). Thus, the supply of high school graduates in the United States is not keeping up with the demand for skilled workers (Carniero & Heckman, 2003). Even more important, the United States and the world are greatly in need of a multilingual workforce (August & Shanahan, 2006; Quintanar-Sarellana, 2004) with one in five jobs currently tied somehow to international trade (Soderman & Oshio, 2010). Linguistic minority students, if more successful in school, would be a strong workforce asset that would offer invaluable skill sets to the global economy due to bilingual or multilingual capabilities. However, lack of graduation and grade attainment greatly hinder this outcome.

Lack of grade attainment and success in school often leads to further difficulty in one's adult life (Alexander, Entwisle & Horsey, 1997; Goldenberg, 2008; Slavin, Lake, Chambers, Cheung & Davis, 2009). Inability to read and write or lack of high school completion can lead to a higher risk for participation in criminal activity and incarceration (Alexander et al., 1997; DelliCarpini, 2006) as well as higher rates of poverty and participation in welfare programs (Alexander et al., 1997). Because achievement in school can be elusive for students who speak a first language other than English, linguistically diverse inmates represent the fastest growing incarcerated population in need of educational intervention in the United States (DelliCarpini, 2006).

School systems and policy makers must mobilize to implement interventions that aid linguistically diverse learners to achieve in school, thus setting them up for future success in life beyond the classroom (Silverman, 2007). Research indicates that participation in early childhood programs is linked to later school success, particularly for at-risk students by way of cultivating a positive attitude toward learning as well as fostering early literacy and numeracy skills (Barnett, 1995; Herb & Willoughby-Herb, 2001; Weikart, 1996). In addition, researchers working with incarcerated populations recommend early intervention as a means to reduce the number of people who participate in criminal careers as adolescents and adults (Farrington & Welsh, 1999; Zara & Farrington, 2009).

**Problem Statement**

It seems as though fostering the development of a broad range of language skills including oracy and literacy at an early age benefits children over time in a myriad of ways. Offering preschool may be a good way to offer these opportunities for second language learners. Because of the presence of a variety of first languages represented in a single school setting or because of lack of resources (such as qualified teachers who are competent pedagogically and linguistically in both L1 and L2) first language maintenance programming is not always a logistical possibility, but that is not to say that children should not be given opportunities to learn in the L2 in formal educational settings. It is still imperative that cognition and literacy skills be fostered early on, particularly when linguistically diverse students are considered at-risk due to other factors such as poverty, lack of parental education, and lack of life experiences. Because

research indicates that ELLs benefit from formal early childhood schooling experiences (Barnett et al., 2007; Molfese, Modglin & Molfese, 2003; Rimm-Kaufman, Pianta & Cox, 2000; Uchikoshi, 2006) *and* take a number of years to acquire a second language (Cummins, 1979a, 1999), it would seem that preschool experiences would help to foster English language and literacy acquisition in ELLs by offering an extension of time of exposure to English in an academic setting.

**Purpose of the Study**

Limited studies examine the effects of early childhood education on the long-term educational trajectories of English language learners. Rather, most long-term studies focus on the impact of preschool on students with other risk-factors. However, due to Cummin's (1979a, 1999) and Collier's (1995) findings that students require somewhere between four and eight years to acquire academic language, it would seem that early childhood education would be an important intervention to examine for linguistically diverse students because it provides more exposure to academic language by offering extra time beyond just elementary school in an educational setting prior to the start of most high-stakes testing and the third grade reading and writing benchmarks that are highly important to students' later success. If a large portion of long-term academic success is dictated by literacy ability in the third grade *and* ELL students require at least five years of formal school exposure to acquire cognitive academic language proficiency, then the standard four years provided between kindergarten and third grade would seem inadequate for students of linguistically diverse backgrounds. Thus, one way to possibly remedy the need for more exposure to language and academics prior to third grade would

be to offer preschool as an intervention that provides more time for children who might not otherwise receive quality exposure to the second language. The purpose of this study was to fill a gap in the research by addressing the use of preschool as a way to extend the time that ELLs have in educational settings to demonstrate proficiency in English *prior* to the third grade.

**Research Question**

In light of the needs of linguistically diverse students in the United States as well as research that indicates that early childhood education programming is an effective intervention for students with risk-factors for school failure, this study examined whether linguistically diverse students who participated in a state-sponsored preschool program offered through the students' school district were more successful in acquiring early language and literacy in English than their peers who did not participate in the preschool program. The research question for this study was: Does participation in the Colorado Preschool Program enhance the likelihood that ELLs will pass CELA prior to the third grade while controlling for the covariates of free and reduced lunch, gender, and ethnicity?

**Study Assumptions**

The following assumptions guided the development of this study.

1. Children who master grade-level literacy by the third grade are at an advantage to succeed later in school and life.

2. Participation in formal early childhood programming prior to kindergarten improves educational and lifetime trajectories of participants by helping them to achieve grade-level proficiency early in their educational careers.
3. Early childhood education programming is beneficial, in particular, for children who are considered at-risk.
4. Although bilingualism is viewed as an asset, children who come to school from linguistically diverse backgrounds need extra support and time to master English, thus dubbing English language learner status as a risk-factor for difficulties in school.
5. Offering early childhood education as an intervention may improve the educational trajectories of linguistically diverse learners by offering more time and exposure to English during the critical language acquisition period.
6. The CELA assessment is a reasonable dependent variable in that proficiency on CELA is assumed by the state of Colorado to indicate a child's ability to successfully participate in a school setting that employs English as the medium of instruction.

**Definitions of Terms**

At-Risk: a student who comes from a background in which one or more of his or her demographics suggests risk for school failure as indicated by statistical data of students with similar backgrounds

Bilingual: an individual who speaks two languages; lack of consensus exists about how capable one must be in both languages; some (e.g. Kohnert & Bates, 2002) argue that true bilingualism is achieved when an individual can alternate between languages with ease

Early Childhood Education: educational programs that serve students prior to kindergarten; typically programs include preschool and junior kindergarten, but can start as early as birth

Early Intervention: programs that identify at-risk populations and then provide extra services to aid achievement

English Language Learner (ELL): a student who is learning English, but learned another language or languages first

First Language (L1): the language a student first heard or first spoke, usually the language of the home

Grade Attainment: the grade-level of school completed by a student

Grade Retention/In-grade Retention: when a student repeats a grade due to lack of achievement

Head Start: a federally-funded early childhood program designed to target at-risk populations with early intervention programming

Home Language: the language primarily spoken in a student's home or primarily used by his or her family; can also refer to the majority language of a student's home country

Junior Kindergarten: a type of early childhood education program that typically serves four or five year olds prior to the start of the kindergarten year

Linguistically Diverse Student: a student who does not speak or is learning to speak the language of the majority culture around him or her

Low Resource Home: a household considered to be of low socioeconomic status

Positive Externality: long-term cost savings to taxpayers (Kraft & Furlong, 2007)

Second Language (L2): the second language a bilingual or multilingual individual acquires

Socioeconomic Status (SES): the level of a family's financial earning and the social class that this dictates

Universal Prekindergarten (UPK): state or local government-sponsored early childhood programs that are open to students who live in the local jurisdiction without cost to the family; typically programs target students who are identified at-risk

**Overview of the Dissertation**

This study examined whether participation in the Colorado Preschool Program promoted the likelihood of linguistically diverse learners demonstrating English proficiency as measured by the Colorado English Language Acquisition exam prior to the end of third grade when taking poverty into account. Chapter One includes background information, the statement of the problem, the purpose of the study, the research question, study assumptions, and definitions of terms. Chapter Two is a review of the literature on

language acquisition, educational risk-factors, the importance of third grade literacy achievement, and early childhood education. The third chapter outlines hypotheses, study design, participants, and procedures. Chapter Four offers an explanation of data transformation, analysis of the data, and check of statistical assumptions. Finally, Chapter Five is a discussion of findings, limitations, implications, and recommendations for future research.

## Chapter Two: Review of the Literature

There is much debate about how to best serve the rapidly growing population of English language learners in the United States. Currently, no definitive answers exist. However, due to the importance of literacy acquisition by third grade, providing more time for learning opportunities through early childhood programming in formal school settings may be one avenue to helping ELLs acquire the English they need to be successful. This literature review will examine the various aspects involved in this concept including: dominant language learning theories, programming options, other risk-factors often associated with linguistically diverse populations, the importance of third grade literacy acquisition, previous research on early childhood education (particularly as an intervention for at-risk populations), early childhood education as an intervention for ELLs and finally, the history of the Colorado Preschool Program.

### Language Acquisition Theories

Because learning a language is not only complex, but a task that nearly all humans acquire naturally, the acquisition process is not fully understood. However, a number of widely regarded theories exist in the literature regarding the ways in which first and second languages (L1 and L2) are acquired, the time periods in which they are best acquired, and the length of time it takes to fully master them.

**Brain research and critical acquisition periods.**

Recent brain research (Bloch et al., 2009) indicates that a person's first and second languages seem to be stored in the same two areas of the brain: Brocha's area and Weirneke's area. Brain images of simultaneous bilinguals (people who learned two languages at the same time in life) demonstrated a higher total activation of Broca's and Wernike's areas than that of sequential bilinguals (people who learned one language and then another; Bloch et al., 2009). It seems that simultaneous language acquisition increases the multilingual repertoire in the brain by creating the same cerebral system paths for both L1 and L2 (Bloch et al., 2009). This new information is particularly important when exploring how to best serve bilingual students when coupled with separate research (Chipongian, 2000; Collier, 1995; Kohnert & Bates, 2002; Soderman & Oshio, 2010) that indicates languages are easier to master at a young age, oral functioning between L1 and L2 is more equitable in the early developmental years, and the age at which L2 is acquired is more important than which language(s) are being learned (Bloch et al., 2009; Chipongian, 2000). In light of these findings, it seems as though educational programming that fosters *both languages simultaneously* (rather than in succession) while children are young is the best way to ensure success in dual acquisition.

It is widely believed that there are windows in which the human brain must acquire certain skills that naturally occur within the human species due to greater brain plasticity at different ages (Bruer, 1999). This seems to be true for first language, which barring neurological abnormalities or lack of exposure in extreme cases, all children acquire with ease. Certain linguistic components such as phonological contrasts, the bulk

of a linguistic inflectional system, and major syntactic structures are believed to be acquired prior to age five (Chipongian, 2000; Saracho & Spodek, 1983). Meanwhile, there seems to be no critical period for vocabulary acquisition (Chipongian, 2000). Rather, humans are able to memorize and employ new words throughout their lives (Bruer, 1999; Chipongian, 2000). Although researchers argue that there is a progressive decline in the ability to acquire L2 over time (Bruer, 1999), there is never a "closing of the window" where it is impossible (Bruer, 1999; Chimpongian, 2000). It is believed that approximately 5% of adults are not limited by a critical language period, but are capable of mastering L2 after puberty (Bruer, 1999). However, in general, the younger a child is when exposed to language, the more likely she will acquire native-like fluency (Bruer, 1999; Cummins, 1979a; Saracho & Spodek, 1983). When considering the acquisition of two languages in light of critical acquisition theory, the brain research recently published by Bloch et al. (2009) seems to indicate that simultaneous acquisition of L1 and L2 in the preadolescent years is most favorable to achieve full bilingualism.

**Social versus academic language.**

Jim Cummins introduced the theory of a difference between the language needed for everyday interactions and that required to function in academic settings, naming them *Basic Interpersonal Communication Skills* (BICS) and *Cognitive Academic Language Proficiency* (CALP), respectively. Basic Interpersonal Skills include the ability to hold basic conversations, express personal needs, and interact socially (Cummins, 1979a), while Cognitive Academic Language Proficiency is the ability to function at high cognitive, linguistic, and literate levels in a language, as is demanded in academic

settings (Cummins, 1979a). Cummins (1999) argues that minority language speakers generally take between five and ten years to acquire CALP in a second language, while only requiring one or two years to acquire Basic Interpersonal Communication Skills (Cummins, 1979a, 1999).

Barring major cognitive issues, BICS are easily acquired (Collier, 1995; Cummins, 1979a). Therefore, Cummins cautions that BICS can act as a "linguistic façade" because it may seem a person can speak a language, yet this is only true in undemanding settings. With BICS, a speaker can rely on paralinguistic and situational cues in addition to linguistic content to determine what is being communicated (Collier, 1987). On the other hand, CALP takes longer and is more difficult to master because it demands higher levels of cognitive functioning (Collier, 1987); therefore students require intense instruction in their second language for a number of years before mastering L2 academic language. For example, Collier (1995) found that immigrant students who had two to three years of formal schooling in their L1s, needed five to seven years to master CALP in a second language (an earlier study indicated four to eight years [Collier, 1987]).

Some researchers (Barnett et al., 2007; Cummins, 1999; Goldenberg, 1996; Mahon, 2006; Uchikoshi, 2006) argue that student ability to function in L1 is highly correlated to ability to function in L2. First and second language CALP, in particular, are highly related, therefore a child with CALP in L1 can more easily acquire CALP in L2. This typically occurs when students received instruction in their first language prior to participation in school settings employing the second language (Cummins, 1979a).

Cummins (1999) terms this *Common Underlying Proficiency* or CUP. CUP argues for first language mastery prior to the introduction of a second language, particularly in formal academic settings because L1 and L2 abilities are highly correlated (Cummins, 1979b, 1999; Ferdman et al., 1994; Nguyen, Shin & Krashen, 2001). In other words, if a student is academically proficient in her first language, she will be able to graph tasks in the L2 onto schema acquired in the L1, thus more quickly acquiring the L2 (Garcia-Vazquez, Vazquez, Lopez & Ward, 1997; del Carmen Salazar, 2008). Therefore, older learners who have mastered L1 can use this to their benefit when attempting to learn L2 (Cummins, 1979a; del Carmen Salazar, 2008).

Although Cummins's BICS and CALP theories and Collier's research in support of them are often cited in second language research, it is important to note that they are not perfect, nor have they been proven. Aukerman (2007) points out that BICS and CALP are dependent on context, blurring the distinction between the two. What might be seen as BICS in one situation (e.g. a farmer using language specific to farming) might be seen as CALP in another (e.g. learning farming terminology in an academic setting). Aukerman (2007) points out that language is always used in *some* context, contrary to Cummins's idea that CALP is decontextualized language. If language is always contextualized and the context dictates what is BICS and what is CALP then the difference in the amount of time necessary to acquire each becomes more difficult to ascertain (Aukerman, 2007; MacSwan, Rolstad & Glass, 2002).

Distinction can become even more blurred in the context of early childhood education because preschoolers are learning all types of language simply because of their

young age, regardless of whether they are in an academic setting. This is true not only for BICS and CALP but also for L1 and L2; for example, Hawkins (2004) points out that children who are just beginning to acquire a second language may engage in parallel play with majority language speaking peers and pick up academic phrases learned by listening to the teacher (Hawkins, 2004). This may aid students who are of linguistically diverse backgrounds to begin to acquire second language skills, even if they are only social in nature regardless of whether they take place in an academic setting.

Aukerman (2007) also suggests that CALP may be nothing more than the ability to perform on academic tests. Because content knowledge and language knowledge are intertwined, the ability to perform well on measures of first and second language may have less to do with a student's linguistic abilities and rather be credited to a student's ability to tap into content knowledge.

Finally, Aukerman (2007) argues that L2 CALP does not necessarily graph onto L1 CALP, contrary to Cummins's CUP theory. Because all language is contextual, all content and linguistic knowledge does not necessarily transfer readily. Rather, students may use different language for different purposes (Aukerman, 2007).

**Social, cultural, environmental, and individual factors.**

Learning any language is a highly social phenomenon (Hawkins, 2004; Soderman & Oshio, 2010) and success in second language acquisition can depend on cultural, environmental, and affective factors.

Setting is one determinant in ability to acquire L2 because the purpose of language is to communicate with other human beings. It is imperative that educational

settings be nurturing, nonthreatening, and rich with linguistic input and opportunities to use the L2. It is impossible to demand competent linguistic output without strong linguistic input (Krashen, 1998) so classrooms should be filled with vocabulary, sociolinguistic opportunities, and high quality discourse (Collier, 1995). Like majority speakers, children who are acquiring another language need rigorous work assignments and literacy opportunities (Kieffer & Lesaux, 2007; Mohr, 2004) and practitioners should not defer participation in academic activities due to the need for additional language acquisition. Instead, students should be exposed to highly interactive academic programming in addition to language learning (Collier, 1995; Haneda, 2006). Language and academic processes should not be isolated from one another due to their interdependence (Collier, 1995) rather, language instruction and content instruction should be highly integrated (Collier, 1995) and language be used as a medium for content instruction (Potowski, 2004). Furthermore, synergistic acquisition may benefit children's long-term educational trajectories (Bowey, 1995; Chaney, 1998).

Another factor in acquiring language is that of a student's affect and attitude (Cummins, 1979a; Collier, 1995; Soderman & Oshio, 2010). Children who have positive attitudes towards use of the L2, interest in learning, and who seek opportunities to use L2 are more likely to acquire the second language as well as acquire it more rapidly (Commins, 1989).

Also, students who possess greater self-esteem, lower anxiety, and have fewer community prejudices to contend with acquire second language more quickly than peers with a less favorable environment and/or attitude (Collier, 1995; Goldenberg, 2008).

Therefore, if a student's affective filter is lowered he will more readily acquire language (Soderman & Oshio, 2010) than his peers with higher anxiety levels.

Finally, it is important to remember that each student brings different historical, social, and linguistic backgrounds to the classroom (Haneda, 2006; Potowski, 2004). Teachers must maintain high expectations for *all* learners as well as believe that ELLs can achieve cognitively and academically while acquiring a second language (Haneda, 2006; Mohr, 2004).

## Linguistically Diverse Learner Programs

Typically, three program types are used by American schools to foster academic achievement and second language acquisition for ELLs. The most widely employed programs include bilingual transition, dual immersion and structured immersion (Martinez-Wenzl, Perez & Gandara, 2010). All three models have their benefits and challenges. Although debate swirls around which is most effective, recent research (Slavin, Madden, Calderon, Chamberlain & Hennessy, 2010) indicates that the quality of implementation is actually the most important determinant of success, not program style.

### Bilingual transition.

Bilingual transition programs typically employ the L1 for the majority of the day in the primary grades and gradually release students to exclusive teaching in the L2 by the intermediate grades (Saunders, 1999).

Bilingual transition programs fit well with CUP theory by fostering L1 language and literacy acquisition when children are young, and then capitalizing on L1 mastery as children transition into using the L2 for academic purposes. In addition, the bilingual

transition model honors the mother tongue by focusing on L1 development (Avalos, Plasencia, Chavez & Rascon, 2007).

A challenge to bilingual transition implementation is the difficulty of finding qualified instructors. Often teachers are not properly equipped to teach in the L1 even if they are fluent bilinguals (Escamilla, 2006). This is likely a function of teacher preparation programs geared exclusively toward teaching in English. Teachers who happen to have an L1 background may be placed in a classroom to teach in the L1, but are never trained in the methods and content required to instruct in the language (Escamilla, 2006). Often, it is assumed that teachers who are trained in one language can use the same methods, structures, and pedagogical practices in another language. Yet this is not necessarily the case; as a function, teachers may find themselves asking students to complete tasks that they themselves are not prepared to execute because the pedagogical transfer from one language to another is not necessarily fluid (Escamilla, 2006).

**Dual immersion.**

Dual immersion programs group students from two different L1s in the same classroom. Instruction is offered a portion of the day in one L1 and another portion of the day in the other L1 so that all students are exposed to a bilingual curriculum (Thomas & Collier, 1999).

The greatest benefit of a dual immersion program is the fact that it nurtures bilingualism in *all* students, rather than only those of linguistically diverse backgrounds (Potowski, 2004). Students who are fully bilingual seem to achieve greater cognitive abilities, mental flexibility, and outperform monolingual peers on standardized tests in

the upper grades (Barnett et al., 2007; Bernhard, et al., 2006; Garcia-Vazquez et al., 1997; Potowski, 2004; Saunders, 1999; Thomas & Collier, 1999). In addition, dual immersion places emphasis on first language maintenance by honoring the use of L1 while still offering linguistic minority students the opportunity to learn the majority language (Skutnabb-Kangas & Sridhar, 1994). Furthermore, dual language programs benefit students of low socioeconomic status. In a study of a French/English dual immersion program, Holobow, Genesee and Lambert (1991) found no differences in the achievement scores of students who participated in dual immersion programming and were of a variety of socioeconomic statuses, indicating that dual immersion programming equalized access opportunities for students of diverse economic backgrounds.

To be most effective, an ideal dual immersion classroom composition should be a 50%/50% split of students from each L1 background; at minimum the split should be no greater than 30%/70% (Quintanar-Sarallena, 2004). This can prove a drawback for dual immersion program implementation in school districts without a substantial population of students with the *same* L1 background or a district with a wide variety of first languages. Also, as with bilingual transition programs, highly qualified teachers can be difficult to obtain. Ideally, all teachers would be bilingual (Skutnabb-Kangas & Sridhar, 1994) and qualified to teach in both languages (Quintanar-Sarallena, 2004).

**Structured immersion.**

Structured immersion programs teach in only the dominant community language. Students are placed in general education classrooms and a specialist offers extra language and literacy support to help linguistically diverse students obtain L2 proficiency.

One major benefit of this type of program is that systems with too few ELLs to fill bilingual transition or dual immersion classrooms still receive support services. Another benefit is that structured immersion is a good fit for systems where the population of linguistically diverse students brings with them a wide variety of home languages.

According to Baker's (see Baker, 1998) meta-analysis of 47 bilingual and Structured English Immersion programs, participants in the Structured English Immersion programs outperformed their peers who participated in bilingual programs on standardized tests 31 times out of the 47 programs examined. Also, Structured English Immersion allows teachers who do not speak students' home languages to offer instruction to ELLs (Baker, 1998; Echevarria, Vogt & Short, 2008).

A major drawback to the use of structured immersion is that it does not actively maintain a student's home language. Also, structured immersion is more expensive because it employs a support teacher in addition to the general education teacher (Thomas & Collier, 1999).

**Quality.**

Although each of the above program formats has its proponents (Martinez-Wenzl et al., 2010), some research indicates that *quality* may actually be a more important factor than program type in determining success for children.

A recent study conducted by Slavin and colleagues (2010) was groundbreaking in that it compared the test scores at fourth grade of children who had been *randomly assigned* to bilingual transition or Structured English Immersion programs in multiple

American cities. Findings indicated that L1 Spanish speakers learned to read English *and* Spanish equally well whether they participated in bilingual transition programs or Structured English Immersion programs for the first five years of elementary school (Slavin et al., 2010). Slavin and colleagues offer that what seems to matter most for children is not program type, but rather the quality of implementation and teacher practice (Salvin et al., 2010).

Uchikoshi and Maniates (2010) also make the case that program quality may be more important than program labels. In their study of Spanish and Chinese speaking students in bilingual second grade classrooms, ELLs scored as well or better than their monolingual peers on English measures (Uchikoshi & Maniates, 2010). The researchers point out that the literacy and general classroom environments that children were exposed to in the study were of average or above average quality and also focused on reading comprehension twice daily (once in each language; Uchikoshi & Maniates, 2010) thus elevating instructional rigor.

In light of these new findings, it seems as though the quality of instruction that students receive may be paramount to the type of program in which children participate (August & Shanahan, 2006; Martinez-Wenzl et al., 2010).

**Risk-factors for School Failure**

Often, English language learners are presented not only with the challenge of mastering a second language in order to be successful in school, but also carry with them one or more additional risk-factors for school failure (Chambers, Cheung, Slavin, Smith & Laurenzano, 2010) such as low socioeconomic status (SES), uneducated parents,

ethnic diversity, or lack of family support or enthusiasm. For example, in immigrant populations, a lack of English skills greatly contributes to low-SES (Baker, 1998) and the highest numbers of linguistically diverse students in the United States are of non-White ethnicity (Short & Fitzsimmons, 2007).

**Socioeconomic status.**

Socioeconomic status is one of the most significant predictors of school success and grade attainment (Ayoub et al., 2009; Downer & Pianta, 2006; Goldenberg, 2008; Justice, Mashbourn, Hamre & Pianta, 2007; Krashen & Brown, 2005; Morrison, Rimm-Kauffman & Pianta, 2003; Patterson, 2008; Pianta, Belsky, Vandergrift, Houts & Morrison, 2008; Reynolds, 1999; Rimm-Kaufman et al., 2000) and is rapidly increasing in the United States. As of 2002, approximately 20% of American children were living in poverty (Ryan et al., 2002). Poor children are at-risk for cognitive delays, school failure, and lower language acquisition (Silverman, 2007). Furthermore, the Nations Report Card indicates that one-third of fourth graders assessed nationwide qualify for the free lunch program *and* fourth grade students who receive free lunch are consistently the lowest achieving performers on the National Assessment of Education Progress (NAEP) reading tests year after year (National Center for Education Statistics, 2009).

Young children from households of poverty demonstrate fewer oral and preliteracy skills in the early school years than their peers from higher SES backgrounds. For example, first grade students from low-SES backgrounds who participated in a study conducted by Judith A. Bowey (1995) didn't understand the differences between phonology and orthography, had difficulty performing on onset and rime tasks,

demonstrated poor print production, poor decoding skills, lower comprehension abilities, possessed smaller working vocabularies, and knew less about letters than their higher SES peers.

In addition, children living in poverty are more likely to be exposed to lead in their homes (particularly in urban areas), be poorly nourished, and have less access to quality healthcare, all of which negatively affect academic capabilities (Ayoub et al., 2009; Ryan et al. 2002).

Without intervention, students of poverty tend to fall further and further behind their peers over time (Bernhard et al., 2006). For this reason, it is important for schools to provide rigorous higher-order thinking opportunities and strong literacy programs for children from low-resource homes (Patterson, 2008) particularly as an early intervention (Fielding, Kerr & Rosier, 2001).

**Parent education.**

Low educational achievement and grade attainment by parents is a risk-factor in and of itself for young children. In addition, low educational achievement is highly correlated to other family risk-factors such as poverty and incarceration (Ryan et al., 2002).

Lack of parental success in school and adult illiteracy can greatly affect a child's grade-level attainment (Goldenberg, 2008; Herb & Willoughby-Herb, 2001; Patterson, 2008). In particular, a mother's level of education is highly correlated to student achievement in school (Downer & Pianta, 2006; Morrison et al., 2003). On the other end of the spectrum, students with parents who obtain high levels of education and help their

students at home (in any language) are more likely to be successful in school (Bempechat, Graham & Jimenez, 1999; Krashen, 2005). Also, home, community, and school settings with more access to print materials (in any language) are correlated with higher academic achievement (Constantino, 2005; Krashen, 2005; Uchikoshi, 2006). The amount of materials available to students in the household is often associated with parental ability to read and socioeconomic status (Constantino, 2005). Furthermore, parents who participated in welfare programs were found to speak with their children less, participate in "parenting activities" fewer times per hour and produce lower quality utterances to their children than parents of higher SES (Hart & Risley, 1992). The different types of parent talk associated with demographic and cultural characteristics led to 13 million fewer language and life experiences for children of poverty in the study than their middle and upper class peers by the age of four (Hart & Risley, 1992).

In the United States, 43% of adults with scant literacy skills live in poverty and 75% of people who are unemployed possess few literacy skills or are illiterate (Weller, 2009). In addition, 50% of American immigrants demonstrate poor literacy skills *in any* language as well as little or no ability to speak English (Weller, 2009).; further compounding the risk of poverty, 60% of Spanish speaking students who have little or no English proficiency drop-out of school (Weller, 2009). Male high school dropouts earn approximately $7,000 to $11,000 per year while female high school dropouts earn between $4,000 and $9,000 (Tyler, Murnane & Willett, 2000).

Lastly, according to Margo DelliCarpini (2006), non-English speakers are the fastest growing subset of incarcerated adults in need of literacy skills (DelliCarpini,

2006) and 52% of incarcerated individuals do not have a high school diploma (Meiners and Reyes, 2008).

**Ethnicity.**

Being a student of minority status also presents a risk-factor for school failure (Morrison et al., 2003; Rimm-Kaufman et al., 2000). Although not all English language learners are non-White, many are. The majority of linguistically diverse learners in the United States today are of Hispanic descent (Short & Fitzsimmons, 2007) and Hispanic students were the lowest achieving racial group in the United States according to the Nation's Report Card (National Center for Education Statistics, 2009).

**Attitude.**

Familial and student attitudes towards education influence student achievement as well. Specifically, parent-child interactions influence children's linguistic and academic achievement (Alexander et al., 1997; Morrison et al., 2003; Peregoy & Boyle, 2000). A mother's positive interactions with her child can curb negative risk-factors (Morrison et al., 2003) while negative familial factors such as family stress, not valuing education, mobility, and frequent student absences can lead to student drop-out (Alexander et al., 1997).

Positive family attitude towards school and education is highly correlated to school achievement. For example, in a reexamination of the case of the Vietnamese and Hmong immigrant populations that arrived in the United States in the late 1970's, Stephen Krashen (2005) noted that immigrant students' school success was not necessarily tied to linguistic achievement, but rather to familial structural values that

contributed to the attainment of better grades. For example, families spent more time doing homework, older students helped younger ones, and there was access to print materials in the L1 in most homes (Krashen, 2005). All of these factors may be a function of cultural conditioning. According to Bempechat and colleagues (1999) educational values and academic conditioning vary by culture and in Krashen's (2005) study, hard work seemed to be a cultural value that led to grade attainment for immigrant students. In addition to immediate family values, shared participation in literacy activities between extended family members and children as well as formal supplemental academic activities including religious or heritage school enrollment were also positively associated with school achievement (Haneda, 2006; Peterson & Heywood, 2007).

Although not all ELLs carry other risk-factors, many do, and the compounding effects of multiple disadvantages must be considered when determining how to best serve linguistically diverse children.

**Third Grade Literacy**

Learning is a process that accumulates over time and quality and quantity of exposures to academic tasks lead to long-range school achievement; in other words, "student gains accrue as a function of more exposure to school" (Pianta et al., 2008, p. 367). Also, individual achievements when children are young tend to predict later school performance (Rimm-Kaufman et al., 2000). Students with little or no exposure to formal early learning seem to be at a disadvantage when they begin participation in high-stakes testing around third grade (Herb & Willoughby-Herb, 2001; Pianta et al., 2008). Meanwhile, students from low-resource homes require *extra time* to grow in formal

educational settings (Martinez-Wenzl et al., 2010; Rimm-Kauffman et al., 2000). Because achievement is determined early in one's educational career and tends to remain stable throughout formal schooling (Pianta et al., 2008), children who are at a disadvantage need early intervention to account for potentially disparate literacy achievement trajectories.

In their book, *The 90% Reading Goal*, Fielding, Kerr and Rosier (2001) point out that for 90-95% of poor readers, early intervention can increase skills to average levels and if intervention is delayed to the age of nine or later, 75% of struggling readers will continue to encounter difficulties through high school. Thus, the greatest opportunity to teach a student to read is in the early years. Fielding and colleagues (2001) posit that deferring intervention should be avoided at all costs and that educational systems and teachers should be proactive rather than remediate after third grade because a student's ability to gain lost ground after the early elementary years is very limited (see also Alexander et al., 1997).

Students who acquire literacy early in their academic careers enjoy more success in school and life than their peers who do not learn to read and write by the third grade (Slavin et al., 2009). Early literacy acquisition is crucial for educational success because proficient reading skills are required for learning content matter in the upper grades (Baca & Cervantes, 1998; Kieffer & Lesaux, 2007). Students who demonstrate reading fluency by third grade are more likely to be strong readers throughout their academic careers (National Institute for Literacy, 2008) and are also more capable of teaching themselves

advanced reading skills as well as learning by way of reading if they learn the orthographic and mechanical structures of written language early (Bowey & Miller, 2007).

**Early Childhood Education**

Some of the perceived benefits of early childhood education include earlier skill acquisition, cognitive and behavioral gains, higher grade attainment and graduation rates, lower remediation and special education staffing rates, lower incidence of criminal activity and incarceration, better financial achievement, and better quality of life. In addition, there seem to be financial benefits for the tax-paying public (Campbell et al., 2008). Early Childhood Education (ECE) seems to benefit students who are considered at-risk most when evaluating longevity data. However, not all data indicate long-term success. Some students demonstrate fade-out effects after preschool participation. Although student gains are made by the end of the preschool year, some studies indicate they aren't sustained into elementary school and beyond. This causes concern about the viability of ECE as an intervention for at-risk children. It is important to note that, like ELL programs, effects of ECE seem to be highly dependent on quality (Zigler, Gilliam & Jones, 2006). Programs that demonstrate certain quality factors seem to be more apt to produce long-term student achievement gains than those of seemingly lower quality. Furthermore, it seems as though sustained instructional quality into the elementary years is important for student success.

**Cognitive and academic abilities.**

A number of studies suggest that cognitive school readiness in kindergarten is promoted in children who attend formal early childhood education programs (Barnett et al., 2007; Gormley & Gayer, 2005; Herb & Willoughby-Herb, 2001; Pianta et al., 2008), and that high quality ECE is associated with stronger cognitive ability into the early elementary years (Barnett, 1995; Bernhard et al., 2006; Justice et al., 2007; La Paro & Pianta, 2000; Rimm-Kaufman et al., 2000).

Two foundational trial preschool programs: the High/Scope Perry Preschool Program and the Abecedarian Project have tracked preschool participant and control groups for decades. These early trial programs established a foundation for the case that ECE programs are effective interventions for at-risk students because they foster cognition, thus providing the preparatory tools necessary to succeed in school. One of the greatest advantages in studying these two programs is their true-experimental study design as well as the longevity data available on both treatment and control group participants over the last few decades. Both programs demonstrated cognitive gains in treatment group participants that remained important into the K-12 years and beyond (Barnett, 1995; Campbell & Ramey, 1994). For example, when examining 104 low-SES, minority students who participated in the Abecedarian Project, researchers found that children who participated in ECE treatment earned higher scores on cognitive and academic tests over time and preschool cognitive gains accounted for substantial

differences in individual development as measured by reading and math scores (Barnett, 1995; Campbell, Pungello, Miller-Johnson, Burchinal & Ramey, 2001; Campbell & Ramey, 1994).

In their meta-analytic review predicting competence in the early school years, La Paro and Pianta (2000) determined that 25% of the variance on kindergarten through second grade cognitive test scores could be predicted from whether or not students participated in prekindergarten programming. Students who participated in ECE programs demonstrated higher cognitive outcomes in early elementary school than students who did not.

The same seems to be true for even younger children who receive intervention. In a study of babies living in poverty, children who participated in early Head Start from birth to 36 months tested higher on cognitive tests than their peers who did not participate (Ayoub et al., 2009).

Also, Universal Prekindergarten (UPK) Programs demonstrate gains similar to model trial programs such as the Perry Preschool Program and the Abecedarian Project (Gormley & Gayer, 2005). Early longevity data from UPK programs is promising. In a meta-analysis of state-funded preschool programs, Gilliam and Zigler (2000) found that students who were served by UPK programs showed better attendance in later school years; lower in-grade retention rates; higher language, literacy, and math achievement in middle school; and more positive self-perception. For example, in Michigan, UPK participants were more likely to pass the Michigan Educational Assessment Program reading and math tests in the late elementary school years than peers who did not

participate in UPK (Xiang & Schweinhart, 2002). Another example can be found in the Tulsa UPK program, which produced substantial improvements in prereading, prewriting and premath skills, and increased knowledge, cognitive abilities, motor skills and language scores in students, fostering academic readiness upon elementary school entrance (Gormley & Gayer, 2005; Gormley, Phillips & Gayer, 2008). Students who participated in the Tulsa UPK program increased cognitive and knowledge test scores by the end of the preschool year (Gormley & Gayer, 2005). The same was true in Georgia, where students who attended UPK programs made statistically significant gains on cognitive tests after program participation (Gormley, 2005).

Waldfogel & Zhai (2008) uncovered similar results in their study of diverse students in seven different countries. Disadvantaged students were less likely to receive quality care in the absence of public funding, yet of those who were given the opportunity to participate in ECE, children from low-resource homes made more academic gains after attending preschool than their non-at-risk peers.

One area of intrigue is that students who participated in the Perry Preschool trial program not only gained IQ points initially (Barnett, 1985, 1995; Farrington & Welsh, 1999), but also (even if there was no difference in grade attainment as was true for Black males in the study) treatment group participants still earned more money and were more successful in obtaining employment, suggesting that participants' higher cognitive development as a result of treatment participation lead to the ability to persuade employers to hire them despite lack of a high school diploma (Tyler et al., 2000).

**Preliteracy skills.**

Justice et al., (2007) state that "participation in preschool programs providing high quality language and literacy instruction is considered one of the most viable mechanisms for improving at-risk children's transition to reading instruction and reducing their vulnerability for later reading difficulties" (p. 63). Evidence indicates that fostering specific preliteracy and language skills in early childhood enhances early literacy acquisition. Links between preschool-age verbal skills such as the ability to manipulate phonemes, larger oral vocabulary, and story sequencing are highly correlated with reading abilities in elementary school (Chaney, 1998; Fielding et al., 2001; Garcia-Vazquez et al., 1997; Herb & Willoughby-Herb, 2001). Students who understand concepts of print such as *English print runs from left to right*, *letters are different from words,* and *print carries meaning* are more likely to achieve success in elementary literacy (Chaney, 1998). Also linked are students' early handwriting abilities and later literacy acquisition (Blatchford et al., 1987; Chaney, 1998; Herb & Willoughby-Herb, 2001). Thus, evidence indicates that development of early language and preliteracy skills seems to benefit reading achievement (Magnuson, Ruhm & Waldfogel, 2007a).

A longitudinal study conducted with 343 students in London by Blatchford and colleagues (1987) determined that the level of concepts of print (including word matching, letter identification, word reading, oral vocabulary, and handwriting abilities) that a student possessed in preschool was highly correlated to his or her reading test scores at age seven. Researchers concluded that students who possess specific literacy

knowledge at the preschool level will enjoy more success in reading during the elementary school years.

Judith Bowey (1995) uncovered similar findings. In her study of phonological sensitivity and first grade reading achievement, Bowey determined that a student's phoneme manipulation abilities were correlated to first grade reading ability and that phonological awareness was directly related to word reading tasks in the first grade (Bowey, 1995). Bowey purports that enhanced student sensitivity to sound early in students' school careers correlates with literacy success later on (Bowey, 1995).

Another study conducted by Carolyn Chaney (1998) found that metalinguistic skills and level of print awareness at age three were good predictors of later reading achievement at age seven and that overall language development at age three was strongly correlated to first grade reading scores.

A study by Yuuko Uchikoshi (2006) determined that 56% of the within person variation (when employing linear growth modeling) in expressive vocabulary was associated with linear time. In addition, kindergarteners who participated in preschool or Head Start demonstrated better expressive oral vocabulary than children who stayed home prior to kindergarten and the difference persisted throughout kindergarten, despite additional interventions implemented during the kindergarten year, stressing the importance of *time* and *exposure* to language in the early years.

Finally, after surveying numerous studies, the National Early Literacy Panel (2008) suggested specific preliteracy skills in young children are directly related to conventional literacy skills in later years. These specific preliteracy skills include:

alphabet knowledge, phonological awareness, rapid letter and object naming, name writing, phonological memory, concepts of print, print knowledge, reading readiness, oral language ability, and visual processing ability. The panel pointed out that interventions that focus on code, shared reading, parent programs, language development, and formal early childhood programs seem to be most successful in helping children to attain literacy in elementary school (National Institute for Literacy & National Center for Family Literacy, 2008).

**Social skills and affect.**

Specific behavior measures on school readiness surveys (such as the ability to attend to a task) are linked to later student success (Barnett et al., 2007; Hamre & Pianta, 2001). Lack of school readiness can be attributed to behavior issues and scant early life experiences (Herb & Willoughby-Herb, 2001). However, Bradley and Gilkey (2002) found that students who participated in the Home Instructional Program for Preschool Youngsters (HIPPY) demonstrated better classroom behavior and received fewer school suspensions in elementary school when compared to their peers who did not participate in any form of ECE, despite the fact that the HIPPY format of implementation is home-based, not school-based, indicating that early childhood programming promotes the social skills necessary to bolster school readiness.

In addition, student affect plays a role in school success. In a meta-analysis of all state preschool programs in place from 1977 to 1998, Gilliam and Zigler (2000) determined that students typically showed higher self-perception ratings upon completion of early childhood education programming; more recent studies (Bernhard et al., 2006;

Herb & Willoughby-Herb, 2001; Campbell et al., 2001) confirm these findings. In particular, a study of the use of identity texts for literacy development in over 800 preschoolers in Florida found that program participation fostered positive self concept (Bernhard et al., 2006).

**Grade attainment.**

In the few studies that exist in which researchers tracked early childhood participants over a number of years, students who participated in ECE programs were more likely to achieve higher grade attainment and were more likely to graduate from high school. In the Perry Preschool study, adults who participated in the treatment group as young children demonstrated higher levels of grade attainment than those in the control group and were more likely to graduate from high school (Barnett, 1985; Struck, 1994; Weikart, 1996). In addition to the Perry Preschool Program, participants of the Chicago Child-Parent Centers preschool study were more likely to finish high school and less likely to be held back in-grade (Reynolds, Temple, Robertson & Mann, 2002). The same was true in the Abecedarian Project study, in which treatment participants were more likely to stay in school than students who did not receive early childhood education (Campbell et al. 2001). Raw data from a survey of UPK programs demonstrates that students who participated in state-funded programs were 3% less likely to drop-out of school prior to high school graduation (Gilliam & Zigler, 2000) and finally, Carniero and Heckman (2003) determined that Head Start participation led to a 28% increase in graduation rates and a 27% increase in the probability of attending college for students who participated in the program versus peers who did not.

**Remediation and special education.**

Downer and Pianta (2006) note that student abilities at 54 months are direct indicators of long-term success in school, suggesting that children who participate in ECE (particularly those who carry risk-factors) are less likely to participate in remedial interventions or be staffed into special education in K-12. Perry Preschool participants also demonstrated lower in-grade retention rates and fewer special education referrals over the course of their K-12 careers (Belfield, Nores, Barnett & Schweinhart, 2006) implying that students who participate in ECE are less likely to consume remediation resources in the K-12 years due to gains made in preschool (Magnuson et al., 2007a).

**Criminal activity.**

Some predictors of participation in criminal activity include poverty, low grade-level attainment, school drop-out, and low IQ (Zara & Farrington, 2009); yet, early childhood programming for pupils who might otherwise be at-risk seems to reduce these predictors in trial programs. Struck (1994) points out:

> Some early childhood intervention programs [such as the Syracuse University Family Development Research Program, the Yale Child Research Program, and the Houston Child-Parent Development Center] which have primarily focused on improving educational achievement . . . have shown the unexpected benefit of reducing later delinquency and criminal activity. (p. 137)

In addition, the Perry Preschool Program proved a successful antidelinquency program (Farrington & Welsh, 1999); treatment group participants demonstrated fewer arrests than control group counterparts in adulthood (Weikart, 1996).

One theory regarding the effects of early childhood program participation on lowered incidence of criminal activity is that at-risk participants reap the benefits of a

"snowball effect": When students function socially and achieve academically in an educational setting, it leads to success in other areas of life, reducing the need to participate in criminal activity (Zigler, Taussig & Black, 1992).

**Financial attainment and quality of life.**

Not only do long-term studies indicate higher grade attainment, superior graduation rates and fewer incidences of criminal behavior in treatment group participants, but also greater financial attainment and personal quality of life. In an examination of Abecedarian study participants in their adult years, David Weikart (1996) found that four times as many treatment group members as control group members earned over $2,000 per month, leading to higher lifetime earnings and tax brackets. In addition, three times as many treatment group members owned their own homes and two times as many treatment group members owned a second car (Belfield et al., 2006). Furthermore, control group members were more likely to receive welfare benefits than their treatment group counterparts (Weikart, 1996). Beyond earnings, treatment group members were more likely to show a greater commitment to marriage (Weikart, 1996), were less likely to smoke, and enjoyed superior overall health (Barnett & Masse, 2007).

**Positive externality.**

When all of the financial costs and benefits are taken into account, analyses indicate that paying for preschool benefits taxpayers by promoting positive externality (i.e. saving taxpayer costs in the long-run [Kraft & Furlong, 2007]).

One example can be found in the cost-benefit analysis of the Perry Preschool Program. For every $1.00 spent on preschool programming, society received a calculated

return on the investment of $12.90 over approximately forty years (Belfield et al., 2006). The financial return is attributable to savings from lower crime rates and incarceration costs, lower incidence of in-grade retention and special education referrals, higher lifetime earnings, higher tax brackets, and lower overall consumption of welfare (Belfield et al., 2006).

An analysis of the Abecedarian Project indicated that for every $1.00 spent on student programming, the benefit to society was a return of $2.50. This was due to treatment participants' higher wage earnings, partly because they were more likely to attend college, thus finding employment in higher paying jobs (Barnett & Masse, 2007). Also, treatment group participants were less likely to receive welfare benefits and consumed fewer K-12 resources (such as remedial program participation; Barnett & Masse, 2007).

Mark Cohen (1998) concluded that a typical career criminal costs society between 1.5 and 1.8 million dollars over the course of a criminal career and a high school drop-out costs between $243,000 and $388,000. Cohen included tangible costs in his analysis, but also pointed out that intangible costs such as pain, suffering, and lower quality of life are incurred as well. Cohen posits that dropping out of high school is highly correlated to juvenile delinquency and participation in criminal activity. On the other hand, high school graduates enjoy higher wages, fringe benefits from employment, leisure activities, the ability to learn independently outside of formal school settings, the ability to access self-help, better family relationships, superior development for their offspring, better family planning abilities, and more informed consumerism. In addition, the public

benefits when an individual graduates from high school due to a reduction in crime, increased savings rates, and increased charitable giving (Cohen, 1998).

**Fade-out.**

Despite the overwhelming number of studies that demonstrate positive long-range outcomes from ECE participation, some studies indicate that the benefits of early childhood education fade over time (Ryan et al., 2002); yet exactly *which* students are impacted by fade-out is still to be determined.

Magnuson, Ruhm and Waldfogel (2007b) found that typical pupils were more likely to be affected by fade-out effects while benefits persisted for at-risk students, particularly students from low-resource homes, because their families were less likely to facilitate early learning experiences (Magnuson et al., 2007b). Due to this finding, Magnuson and colleagues (2007b) advocate that prekindergarten programs focus on children from disadvantaged backgrounds because ECE programs offer children important opportunities during crucial formative periods that they may not otherwise be exposed to. Fade-out for typical children likely occurs because students from higher SES backgrounds enjoy more educated caregivers and richer print environments (Krashen & Brown, 2005) making intervention less necessary.

Oklahoma's state-wide UPK program offers a similar example. *All* participants demonstrated improvements in language, literacy, and mathematics (Barnett & Masse, 2007; Gormley, Gayer, Phillips & Dawson, 2005), but the largest positive impacts were on Hispanic, African-American, and Native American students, as well as students who

qualified for free or reduced price lunch, while there was only a modest impact on White, non-poor students.

Although it seems the more limited a family's resources, the more likely a child from the household will benefit from ECE (Campbell et al., 2001; Gormley & Gayer, 2005), there are instances where fade-out occurs for children with risk-factors as well. Elements beyond the scope of preschool such as poor educational experiences in elementary school or lack of parent support may be overriding factors in fade-out research when it comes to at-risk pupils (Shonkoff, 2000). Students who are at-risk need not only preschool intervention, but *also* high quality support in the elementary years (Portes, 2008). Subsequent attendance at poor schools after participation in ECE can negatively impact early gains (Carniero & Heckman, 2003; Neisser et al., 1996).

For example, children who participate in Head Start often demonstrate initial IQ gains, but then scores seem to drop in the early elementary school years (Neisser et al., 1996). More in-depth analysis of this phenomenon indicates that fade-out effects are not universal, but rather isolated to children of specific demographic profiles (Barnett, 1995). In their examination of Head Start fade-out effects, Currie and Thomas (2000) found that fade-out problems seem to be isolated to African-American students who are more likely to attend poor quality K-12 schools. As the probability a student attended Head Start rises, the mean quality of the elementary school he will later attend declines (Currie & Thomas, 2000). In addition, all statistically significant differences in achievement of Head Start children were *between* schools, *not within* schools, indicating further that low

quality elementary schooling may be to blame for the loss of preschool gains (Currie & Thomas, 2000).

**Importance of program quality.**

Although the Perry Preschool and Abecedarian studies determined that preschool participation can make a difference for treatment participants over the course of their lifetimes, the same is not necessarily true for widely implemented programs, as previously discussed. In addition to lack of sustained quality in K-12, researchers (Barnett, 1995; Maeroff, 2003) also point out that the controlled quality of trial programs is not always transferred into real-life early childhood level programming. The Abecedarian Project, for example, offered full-day classes over a number of years with highly qualified, well paid teachers (Barnett & Masse, 2007). Treatment group participants likely maintained IQ gains due to time and intensity of treatment (Campbell & Ramey, 1994). On the other hand, Barnett (1995) determined that Head Start programs tend to have high student-teacher ratios; don't necessarily employ certified, well compensated teachers, and only offer programming for part of the day and/or year. Plus, Head Start programs are not always housed in locations designed for young children (Zigler & Muenchow, 1992). These disparities in quality may be dictating lack of long-term success.

Although a deficiency in quality has hindered success for some programs, a number of UPK programs have enjoyed success similar to that of trial programs. UPK programs in Oklahoma boast statistically significant academic gains for program participants (as compared to peers) into the early elementary grades (Gormley, 2005),

which are likely a result of meeting a number of the quality standards set by foundational trial programs, especially considering 75% of the students who participate in the UPK program are eligible for free or reduced price lunch and 75% of Hispanic participants speak Spanish as a first language at home (Gormley, Phillips & Gayer, 2008). Tulsa UPK quality hallmarks include: teachers who are all certified in early childhood education with four-year degrees, teacher compensation at the same rate as that of K-12 teachers, high student standards, and programming that is linked to the K-12 system (Gormley et al., 2005, 2008).

Whether the program is a controlled trial or of standard implementation, it seems as though quality factors at the ECE level as well as sustained quality into the K-12 years may be determinants in the long-term success levels of students, particularly those considered at-risk. Although program developers can look to trial programs as models, more research is required to determine *exactly which* factors are the most important hallmarks of quality in an ECE program (Dockrell, Stuart & King, 2010; Uchikoshi & Maniates, 2010). Although more work is called for, some researchers have offered what they believe to be the most important attributes of quality ECE programming.

To begin, teacher factors such as warmth, experience, education, and on-going professional development seem to be of the utmost importance for student achievement (Chetty et al., 2010; Chambers et al., 2010; Cadima, Leal & Burchinal, 2010; Jimenez-Castellaños, 2010; Marulis & Neuman, 2010). Evidence indicates that educational experiences with strong teachers in the early years can greatly affect future educational outcomes (Hamre & Pianta, 2001). Analysts of the Perry Preschool Project and

Abecedarian Program state that intense interventions with high quality, well paid teachers may be credited with the success that treatment participants have enjoyed over their lifetimes. If widely implemented programs fail to achieve these same standards, then it is unlikely that they will enjoy the same success (Borman & Hewes, 2002).

Other suggestions for improvement include: offering competitive salaries and benefits to attract high quality staff, offering services for "multi-problem" families, strengthening health services (particularly in rural and high-poverty areas), reducing class size (Vogel et al., 2010), using sustainable, culturally appropriate curriculum, employing locally available teaching materials (Malmberg, Mwaura & Sylva, 2011), and building permanent spaces designed solely for early childhood education activities (Zigler & Muenchow, 1992) that are welcoming in order to foster positive school climate, community engagement, and overall pride (Jimenez-Castellaños, 2010). Lastly, expanding programming to include students of all socioeconomic statuses might ultimately benefit students of poverty by diversifying the types of peer interactions that occur in the classroom (Zigler & Muenchow, 1992).

Inconsistent program quality and the variable sustainability of ECE program benefits is in keeping with the argument that preschool intervention is not a magical, single solution to the complex problems faced by American education and society (Blair, 1999; La Paro & Pianta, 2000). Care must be taken not to expect that early childhood programming alone will eradicate all problems and unequivocally ensure success (Blair, 1999). Rather, high quality preschool is a *part* of the solution for closing the achievement gap. Formal prekindergarten education creates opportunities that children

may not be provided otherwise when they come from households where primary caregivers are unequipped to prepare them for school (Carniero & Heckman, 2003). However, sustained high quality interventions and subsequent support into the K-12 years are important for children to make and retain educational gains (Campbell et al., 2001; Fielding et al., 2001; Kieffer & Lesaux, 2010). Investment in prekindergarten programming reflects an investment in human capital by ensuring all children are offered the necessary opportunities to prepare them for school (Chambers et al., 2010; Currie & Thomas, 2000; Gormley, 2005).

**Early Childhood Education as an Intervention for English Language Learners**

Most studies that employ ECE as an intervention do so only with *native* English speakers and not ELLs, yet the implications for research conducted with English speakers is important for non-native speakers due to the fact that speakers of other L1s are likely to be isolated in parental or informal care settings (Gilliam & Zigler, 2001; Neidell & Waldfogel, 2009) where little or no English is used and because the prekindergarten years are considered a critical period for language acquisition (Borman & Hewes, 2002; Portes, 2008). Although not much research has examined ELLs' long-range achievement based on participation in ECE, the limited short-term studies available seem to indicate preschool or junior kindergarten participation has a positive effect on later language and literacy acquisition (Barnett et al., 2007; Molfese et al., 2003; Rimm-Kaufman et al., 2000; Neidell & Waldfogel, 2009; Uchikoshi, 2006).

For example, in a study conducted by Pagani, Jalbert, Lapointe and Hèbert (2006) of 201 linguistic majority and 108 linguistic minority four-year-olds in Canada, linguistic

minority students who participated in a junior kindergarten program increased a full standard deviation in the areas of language and math skills after one year of attendance. In addition, linguistic minority students who participated in junior kindergarten were "on par" with their linguistic majority peers in literacy and mathematics by the end of first grade (Pagani et al., 2006).

Another study by Reese, Gallimore, and Guthrie (2005) examined the reading trajectories of immigrant Latino students in transitional bilingual programs and determined that English language learners who received intense literacy instruction in kindergarten outperformed control group peers in the first grade and continued to do so through the eighth grade, indicating that early literacy intervention for ELLs equated to sustained gains over time.

Next, a study conducted by Waldfogel and Zhai (2008) examined the fourth grade math and science scores of children who participated in publicly funded preschool programs in Australia, Japan, the Netherlands, New Zealand, Norway, the United Kingdom, and the United States using the Trends in International Mathematics and Science Study (TIMMS) data. Results indicated that children from low-resource homes and students from linguistically diverse backgrounds (relative to the respective country in which they resided) benefited more from preschool participation than peers without risk-factors.

Although it did not focus on early childhood participation per se, a study conducted by Betts, Bolt, Decker, Muyskens, and Marston (2009) found that linguistically diverse children's ability to perform on standardized reading measures was

positively correlated with the number of years a child resided in the United States, suggesting length of exposure to the majority language aids in L2 literacy acquisition.

Whether or not formal L1 maintenance is possible, fostering academic language and preliteracy skills is important for young linguistic minority students (Collier, 1995) because language capabilities provide a strong foundation for the acquisition of literacy skills (Scientific Learning, 2003), and are ultimately necessary to access curriculum (Dockrell et al., 2010). Mastery of phonemic awareness, event sequencing, grammatical structures, syntax, semantics, and oral language comprehension are all precursors to mastering reading skills in any language (Avalos et al., 2003; Scientific Learning, 2003) but specifically children who master L2 oral skills demonstrate greater literacy acquisition in the L2 (Harper & Pelletier, 2008) indicating that ELLs may benefit from more time devoted to language attainment in the early years.

**History of the Colorado Preschool Program**

In 1988, the Colorado Preschool Program (CPP) was enacted by the General Assembly of the State of Colorado (Colorado State Department of Education, 2002). In 1989, the program's first evaluation was presented to the General Assembly (Edmiaston et al., 1989). Originally, the CPP program was implemented with 2,000 four and five-year-olds who demonstrated need in the area of language development (Edmiaston et al., 1989). Of the first year participants, 25% were English Language Learners, 50% minority, 25% from single-parent homes, 25% had a mother who did not complete high school, 20% had a father or adult male figure in the home that did not complete high school, and over 60% came from households with an income less than $20,000 per year;

26% were from rural locations and 74% from urban areas (Edmiaston et al., 1989). The 1989 report outlined the level of success the program experienced in its first year of implementation as well as areas of need for future success of the program. Some of the needs that were initially expressed in the document have now been met; these included the request that the program be integrated with other early childhood education programs and be housed in elementary schools to alleviate the potential of marginalizing students from disadvantaged backgrounds as well as expanding the program to serve a greater number of at-risk students (Edmiaston et al., 1989; Colorado Department of Education, 2003).

In 2002, an additional evaluation was presented to the Colorado General Assembly, this time by the Colorado Department of Education (CDE). This evaluation pointed out that the program had expanded to serve 14.8% of all four-year-olds in the state of Colorado and that the program at the time was implemented in 145 of Colorado's 178 school districts (Colorado Department of Education, 2003). In addition, the report stated that CPP produced noticeable student gains. For example, 52.31% of Hispanic students in Weld County who participated in the CPP program were proficient or advanced on the Colorado Student Assessment Program (CSAP) as third graders, as opposed to only 36% of Hispanic students who did not participate in CPP in the same district.

The 2003 report outlined further changes, including the expansion of the program to include three-year-olds who carried three or more risk-factors (Colorado Department of Education, 2003). Risk-factors for program eligibility included: low socioeconomic

status, homelessness, mobility, abuse or neglect in the household, parent drug or alcohol abuse, teen parents, low educational attainment by parents, poor social skills, poor language development, or English language learner status (Colorado Department of Education, 2003). The report indicated both an increase in the number of students served: 11,050 and the percentage of school districts actively participating state-wide: 86% (Colorado Department of Education, 2003). Survey data indicated that kindergarten teachers felt 83.3% of CPP graduates entered school "ready to learn" (Colorado Department of Education, 2003). In addition, CPP graduates identified as at-risk for experiencing school failure scored within 3% of the state average in the advanced category, and within 2% of the state average in the proficient category on CSAP in the third grade (Colorado Department of Education, 2003). Also, cost-benefit analysis indicated that taxpayers received a 4:1 return on investment because school districts could expect to save a projected $11,000 per pupil on remedial services (Colorado Department of Education, 2003). Lastly, parent feedback was overwhelmingly positive: 97-98% of parents believed the program was beneficial for their child.

Since 2003, the CDE has prepared a legislative report detailing the CPP annually. The 2004 report indicated that public school district programs served the most children at 63.45% (Colorado Department of Education, 2004) although local communities were given the flexibility to utilize programs they believed best fit the needs of their preschool aged students, thus creating diversity in service providers. Also in 2004, the *Results Matter* quality evaluation program was implemented. Results Matter data come from teacher and school self-report of quality indicators (Colorado Department of Education,

2006). Lastly, 70% of school districts reported that CPP participants scored better on third grade CSAP than district-wide averages (Colorado Department of Education, 2004).

In 2005, 86% of school districts participated in CPP, making for 8,050 slots that served 12.4% of Colorado's four-year-old population (Colorado Department of Education, 2005), but 6,336 eligible four-year-olds were still turned away due to lack of space (Colorado Department of Education, 2005). CPP programs averaged two and a half hours per day, four days per week, nine months per year and students who were eligible for CPP carried with them an average of 3.3 risk-factors (Colorado Department of Education, 2005). Exciting long-range trends emerged: The 1988 CPP cohort, who at the point of this report were high school seniors, were staffed into special education at the rate of 8.9%, versus 12% of similar non-CPP participants; CPP participants were retained in-grade at a rate of 11% versus 28% for peer groups nationally; and CPP students had a graduation rate of 87% versus the 81.8% state-wide average (Colorado Department of Education, 2005). Also impressive were McClave RE-2 school district data that indicated that 100% of students who participated in CPP were either proficient or advanced on the third grade CSAP, versus 67% of non-CPP graduates in the same district (Colorado Department of Education, 2005).

2006 brought participation from eight new school districts which meant the program expanded to serve 12,360 students: 10,860 in CPP and 1,500 in extended day kindergarten in 91% of school districts (Colorado Department of Education, 2006). In Colorado Springs District 11, 26% of CPP preschoolers were considered proficient or advanced on preschool language and literacy tests, but after CPP participation, 72%

scored proficient or advanced on the same scales (Colorado Department of Education, 2006). In addition, in Cripple Creek, 77% of first grade CPP graduates were proficient on the Dynamic Indicators of Basic Literacy Skills (DIBELS) phoneme segmentation test, while only 44% of their non-CPP peers were. On initial sound fluency measures, 62% of CPP graduates were proficient, while only 11% of their counterparts were, and 77% of first grade CPP graduates were considered on grade-level in literacy while only 44% of their peers were (Colorado Department of Education, 2006).

In 2007, Governor Bill Ritter unveiled the *Colorado Children's Amendment* which called for additional full-day kindergarten and preschool support for school districts around the state. The movement provided $84 million for ECE. In the press release, Ritter noted, "It . . . sends a signal to the rest of the country and the entire world that we're serious about getting ahead and staying competitive" (Office of the Governor of Colorado, 2007). In 2007, the Colorado Preschool Program was renamed the Colorado Preschool and Kindergarten Program (CPKP) and 15% of slots were allocated to provide full-day kindergarten (Colorado Department of Education, 2007). The program continued to grow and was provided through 94.9% of school districts state-wide, offering services to 17.4% of four-year-olds; however 7,931 children were still denied services due to lack of space (Colorado Department of Education, 2007). Public schools remained the largest service providers, offering 65.9% of available CPP slots (Colorado Department of Education, 2007). Also, the report indicated that 98% of parents agreed or strongly agreed that their child benefited from the CPKP program and 97% were more

comfortable participating in their child's education as a result of CPKP (Colorado Department of Education, 2007).

Program expansion continued into 2008, with 96.1% of school districts participating in CPKP. The program served 19.3% of the state's four-year-old children in preschool and 4% of five-year-olds in full-day kindergarten. Also, quality standards were set for programs receiving CPKP funding (Colorado Department of Education, 2008). The number of risk-factors that CPKP participants possessed on average grew to 3.6 (Colorado Department of Education, 2008); however, local school districts continued to report gains. For example, in Yuma County, only 17% of CPKP graduates were put on an individual literacy plan (ILP) in elementary school while 36% of non-CPKP graduates were (Colorado Department of Education, 2008).

In 2009, due to the economic climate, additional risk-factors were added for student eligibility; these included: mobility due to military relocation, parent incarceration, and families facing economic hardship from the recession (Colorado Department of Education, 2009b). The program served 27.8% of four-year-olds in 96% of districts including the Charter School Institute (Colorado Department of Education, 2009b). At the end of the CPP school year, 80% or more of all CPP students demonstrated proficiency in personal/social, language/literacy, mathematics, social studies, fine arts, and physical development/health domains (Colorado Department of Education, 2009b). With regard to longevity data, in Monte Vista, nearly all CPP participants scored proficient or advanced on Colorado Basic Literacy Act (CBLA) measures including DIBELS, Clay's Observational Survey, running records on leveled

texts and the Basic Early Assessment of Reading (BEAR) in the first grade (Colorado Department of Education, 2009b). In addition, in Denver Public Schools, of the six fifth-grade cohorts to participate in CSAP prior to 2009, CPP graduates outperformed their peers with similar demographic backgrounds on every reading, writing, and mathematics measure (Colorado Department of Education, 2009b).

The 2010 legislative report marked a new milestone for the CPKP program, as it was the first to include *statewide* longevity data from *all* participating school districts. In a sample of 5,000 students from the 2003-2004 preschool cohort, CPP graduates outperformed their peers consistently in the domains of reading, writing, and math on CSAP (Colorado Department of Education, 2010). In addition, CPP graduates from the 2003-2004, 2004-2005, 2005-2006, and 2006-2007 cohorts outperformed their non-CPP participating peers with similar risk-factors on CBLA measures (Colorado Department of Education, 2010). Finally, data demonstrated that children were making gains on language measures, cognitive tests, and closing the school readiness gap (Colorado Department of Education, 2010). According to the 2010 report, 28% of four-year-olds were served state-wide and there were 8,641 students turned away due to lack of space (Colorado Department of Education, 2010).

## Chapter Three: Methodology

This study attempted to discern whether more time and exposure to English by attending the Colorado Preschool Program (as offered through the school district from which data were pulled) improved the likelihood that English language learners would pass the Colorado English Language Acquisition (CELA) test prior to the end of the third grade. The research question for this study was: Does participation in the Colorado Preschool Program enhance the likelihood that ELLs will pass CELA prior to the third grade while controlling for the covariates of free and reduced lunch, gender, and ethnicity?

### Hypotheses

#### Research hypothesis.

Participation in the Colorado Preschool Program will significantly predict student proficiency status as measured by the Colorado English Language Acquisition test prior to the end of third grade when controlling for the covariates of free and reduced lunch, gender, and ethnicity.

#### Null hypothesis.

Participation in the Colorado Preschool Program will not significantly predict student proficiency status as measured by the Colorado English Language Acquisition test prior to the end of third grade when controlling for the covariates of free and reduced lunch, gender, and ethnicity.

## Design

Research literature indicates that preschool increases educational achievement throughout a student's K-12 career and beyond (Barnett, 1995; Campbell & Ramey, 1994), but very little longevity research has examined this phenomenon relative to English language learners, even though research with this focus is called for by expert panels (National Institute for Literacy, 2008). Pianta and colleagues (2008) suggest time and exposure to school increase academic success; but ELLs require *extra* time and exposure to master English as an additional language (Martinez-Wenzl, 2010). Furthermore, mastery of English language and literacy by third grade is desirable for ensuring long-term academic success (Fielding et al., 2001).

The current study employed nonexperimental ex post facto design (Gliner & Morgan, 2000) in order to determine if preschool attendance heightened the likelihood of ELLs demonstrating English language and literacy proficiency prior to the end of third grade. Although limiting in some respects, a nonexperimental design lent itself to this study for ethical reasons. Due to the fact that students who participate in ECE seem to benefit from the treatment, it would have been unethical to create a randomized trial and allocate program participation to only some students. Therefore, the study did not manipulate the independent variable (CPP). Rather, participation was treated as an attribute independent variable. Ex post facto design was utilized due to the fact that treatment (CPP participation) occurred prior to the design of the study.

## Participants

### Data collection and sampling procedures.

Kindergarten through third grade CELA data for all English language learners in cohorts that would have had the opportunity to participate in CPP in the primary grades and have participated in CELA since its inception were obtained from a large, upper-middle class school district in the state of Colorado. Data were provided from a database maintained by the school district for student record keeping.

CELAPro test score data for kindergarten through the third grade, CPP participation years, free and reduced lunch qualification, gender, and ethnicity were obtained for analyses. In addition, first language data were requested as a demographic descriptor. Finally, preschool participation year(s) and the school year in which the student was in the third grade were obtained for cohort verification.

All data set participants were (or currently are) eligible for English as a Second Language (ESL) services provided by the school district through a Structured English Immersion model, although students whose parents waived services and therefore do/did not actively participate in ESL programming were not disaggregated in the data analysis. All students were eligible for CPP participation whether they applied or not and whether they were admitted or not due to linguistic minority status as an outlined risk-factor for CPP participation by the Colorado Department of Education (2003).

### Ethics.

Permission to conduct this study was obtained from the head of the data and assessment division of the school district that provided data. In addition, this study was

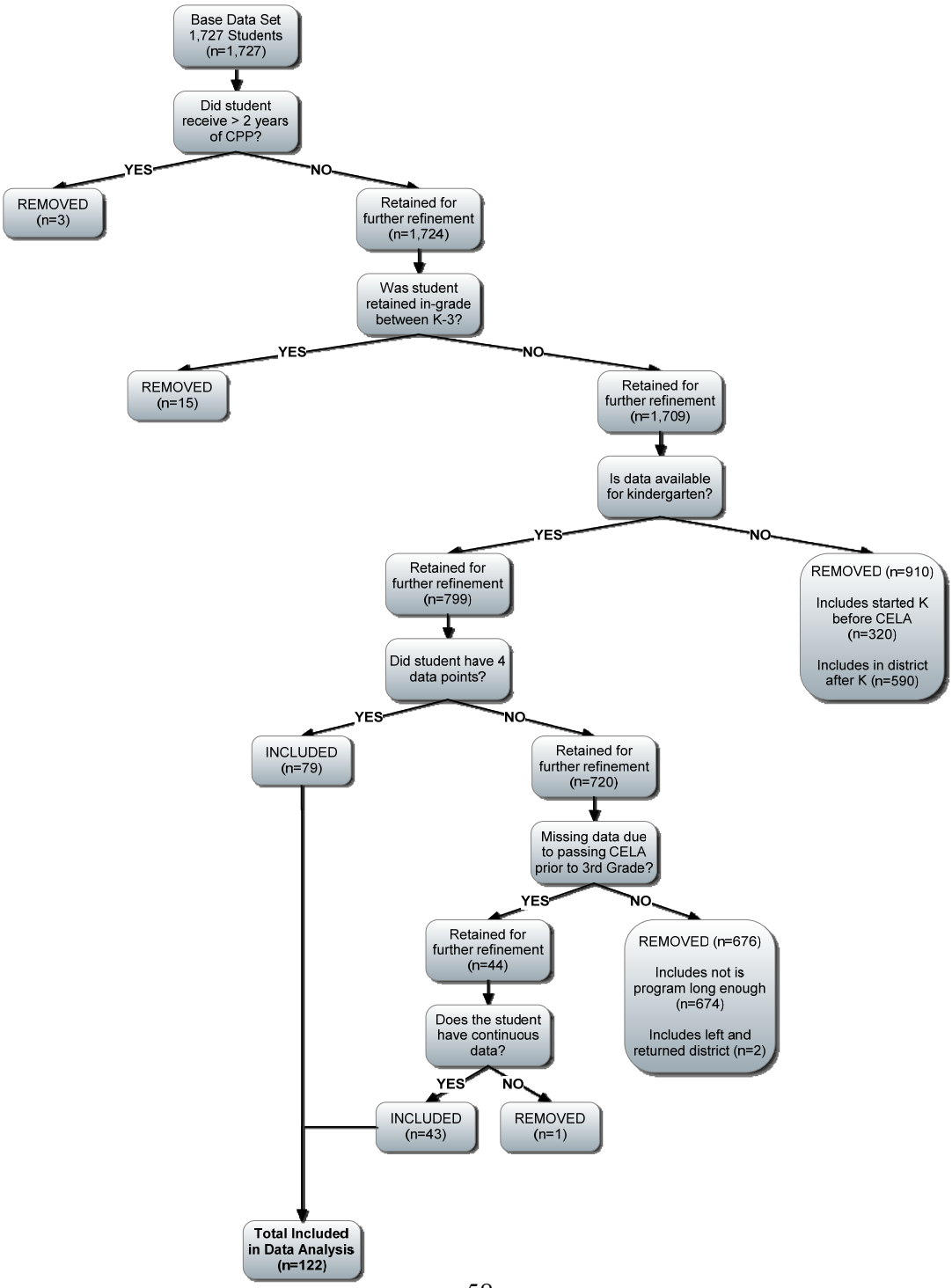
conducted under permission granted by the Institutional Review Board at the University of Denver. All data were labeled blindly by the data and assessment office at the school district to ensure that no student identities were revealed, nor possibly obtained.

**Sample.**

Students who participated in the CELA test at any point since its inception while enrolled in the primary grades at the school district that provided data made up the base sample. The original base sample included 1,727 cases. A list-wise deletion of cases with more than two years of CPP participation (n=3) or in-grade retention (n=15) was performed. Then, cases that were missing kindergarten data due to (a) age (i.e. students were too old when CELA was first implemented to have four years of data [n=320]) or (b) mobility (i.e. students moved into the district after the kindergarten year [n=590]) were removed. Next, cases that did not have four data points were examined. Children who were not old enough to have completed four years of elementary school (n=674), or who did not have continuous data (n=3) were removed. This left children who had four continuous data points (n=79) and those who had continuous data leading up to a CELA score of 5 but were missing subsequent data points due to demonstration of proficiency prior to the start of third grade (n=43) to be included for analysis. In other words, the clean sample contained only cases with a full four years of data (n=79) *unless* the student tested out of CELA prior to third grade and therefore was lacking subsequent data (n=43). This resulted in a clean sample with no missing data (n=122). Finally, outliers (n=4) were removed, resulting in a data set used for analysis that included 118 cases.

Students who had more than two years of CPP participation or were retained in-grade were removed because in-grade retention would have artificially offered extra time to acquire language (beyond the scope of the examination of this study). In addition, children who were retained in CPP (by participating more than two years) or who were retained in-grade may have had other educational needs that interfered with language acquisition. Students who were too young to have completed the third grade were removed because they would not have been given adequate time to allow for mastery of English and would have required imputed data for multiple years. Children who were missing data because they were too old when CELA was first introduced to have four data points were removed because they would have required imputed data for years in which CELA did not exist in the form used by the Colorado Department of Education. Finally, one of the controls for threat to internal validity was the same interim treatment between CPP and CELA measurement; cases that were not continuous in district did not meet this requirement because it was impossible to discern from the data set where students were if they were not in district and what type of ELL programming they received. A flowchart of data retention can be seen in Figure 3.1.

Figure 3.1
*Flowchart of Data Retention for Analysis*



**Demographics.**

The final data set (n=118) was similar in demographic make-up to the base sample data set of 1,727 cases. In the original data set, 48.4% of cases were female. Of the students included in the analyzed data set, exactly 50% of cases were female. Ethnicity varied only slightly between the full data set and the analyzed data set. Ethnicity breakdowns can be found in Tables 3.1 and 3.2. When ethnicity was dichotomized, only students whose parents indicated "White" remained in the "White" category; all other students were classified as "Non-White". The percentages of children who attended CPP were relatively similar between data sets and can be seen in Figure 3.2. Seventy-six first languages were represented in the original data set, but only 25 languages were represented in the examined data. However, percentages of the most common languages were similar. First languages represented in both data sets are depicted in Figure 3.3. In the original data set, 44% of cases qualified for free or reduced price lunch at some point. Similarly, of the data set analyzed, 42.4% of cases qualified for free or reduced price lunch at some point during the four elementary school years that the data set spans.

Table 3.1
*Ethnicity Comparisons Between Base Sample and Analyzed Sample*

| Ethnicity | Base Sample | Analyzed Sample |
|---|---|---|
| Native American | 0.4% | 0.8% |
| Asian/Pacific Islander | 22.5% | 31.4% |
| Black/African-American | 5.7% | 3.4% |
| Hispanic | 49.3% | 42.4% |
| White | 22.1% | 22% |

Table 3.2
*Dichotomized Ethnicity Comparisons Between Base Sample and Analyzed Sample*

| Dichotomized Ethnicity | Base Sample | Analyzed Sample |
|---|---|---|
| Non-White | 77.9% | 78% |
| White | 22.1% | 22% |

Figure 3.2
*CPP Participation*

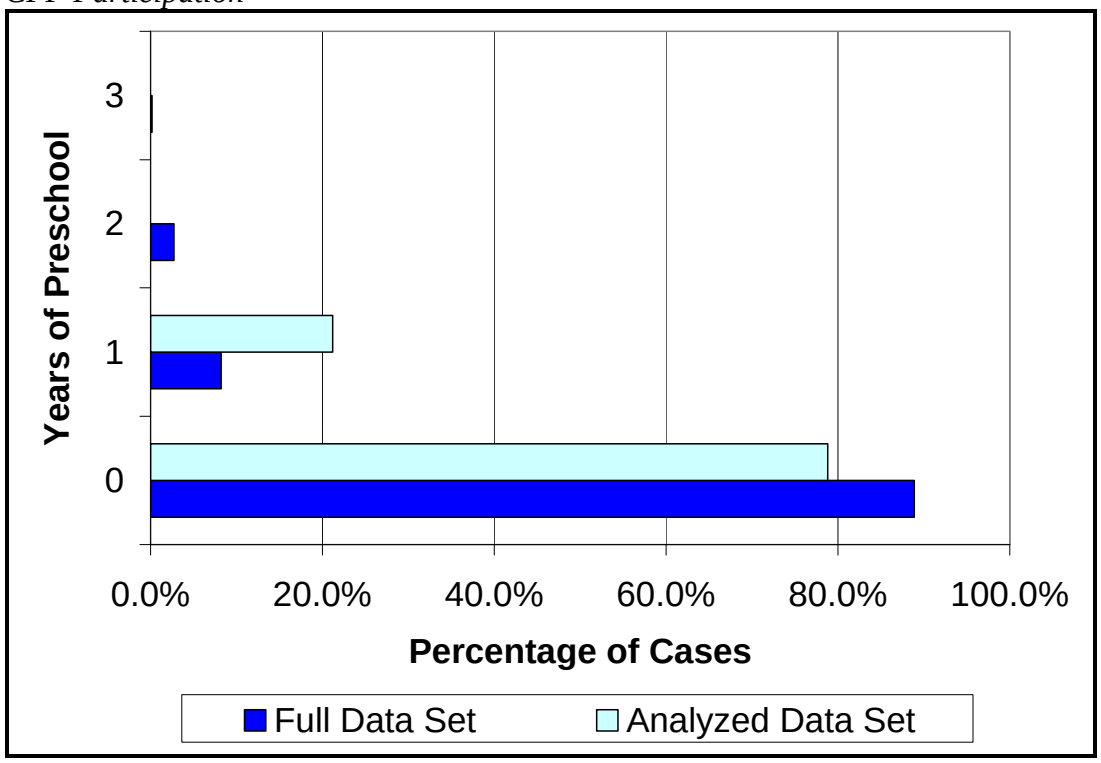
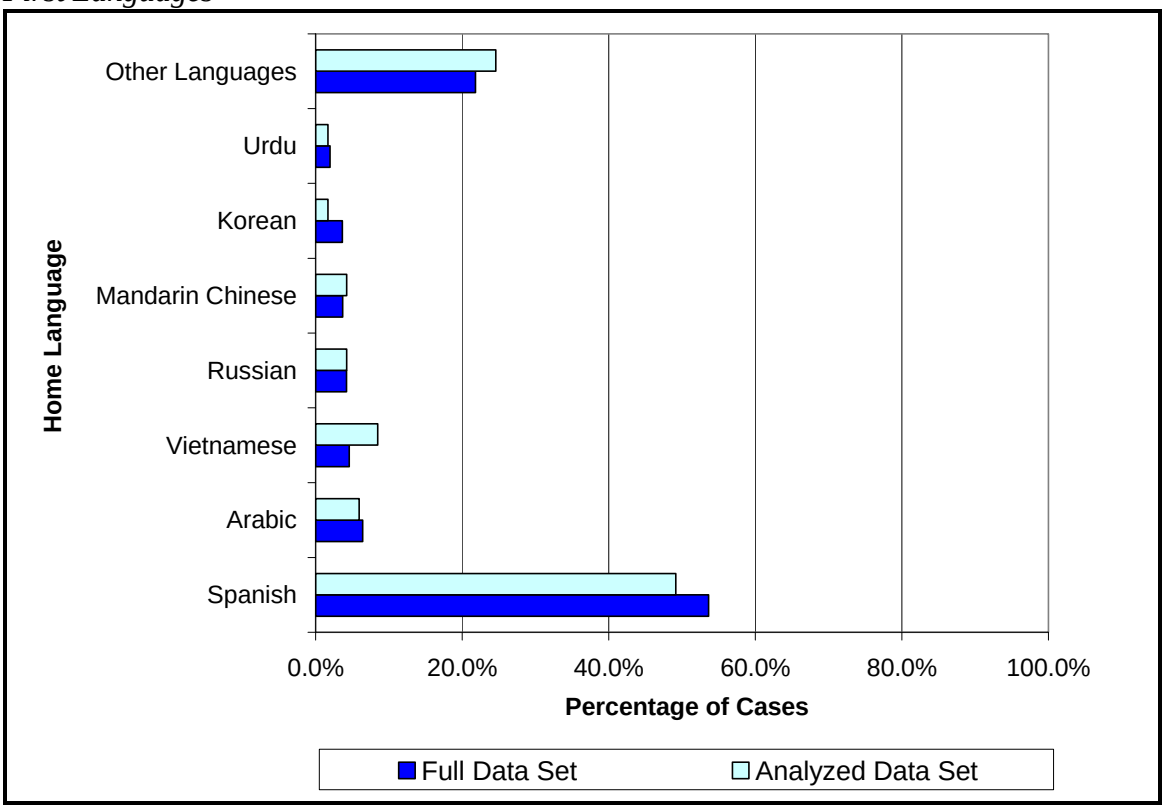


Figure 3.3
*First Languages*




*Note*. Languages with less than 2% representation were collapsed into the *Other* category.

**Setting.**

Data were obtained from a large school district in Colorado that spans upper-middle class suburban and rural communities. Approximately 59% of community residents hold a college degree. Housing in the area consists mostly of single-family homes and the median household income is $124,000 annually.

## Variables and Covariates

The independent variable examined in this study was participation in the Colorado Preschool Program. The dependent variable was performance on the Colorado English Language Acquisition test (artificially dichotomized to *proficient* and *not*

*proficient*). Free and reduced lunch qualification (artificially dichotomized to *qualified* [at some point over the four years of data] or *never qualified*), gender, and ethnicity (artificially dichotomized to *White/Non-white*) were taken into account as covariates. During the time between treatment and measurement, all students were exposed to the same type of ELL programming (Structured English Immersion) in the same school district. In addition, all cases in the examined data set were of the same cohort (i.e. were in the third grade for the 2009-2010 school year). In other words, all students started in the school district the same year (i.e. began kindergarten in 2006) and participated in similar programming over the *same four years*, therefore maturation was controlled for by between group design (Gliner & Morgan, 2000).

**Treatment: CPP.**

In the district from which study data were collected, the Colorado Preschool Program is embedded in the district's preschool program, which means students who receive state funding to participate are enrolled with students whose families pay tuition.

All CPP settings are situated in academic buildings: either K-12 school buildings, or a building designed specifically to house ECE programs. Each session lasts for two and a half to three hours and occurs two to three times per week. Each preschool employs a certified regular education teacher, special education teacher, speech language pathologist, occupational therapist, one or two educational assistants, and in some cases mental health professionals.

The preschool curriculum in the district being examined includes literacy instruction in phonemic awareness, comprehension strategies, letter formation, prewriting

skills, and practice with oral retell. Mathematics instruction includes premathematics concepts, puzzle completion, counting, and number formation. Also included in the curriculum are oral language development, gross and fine motor skill development, social skills instruction, personal hygiene, and school readiness skills development.

The preschool program does not employ ESL teachers, nor does it use curriculum specifically designed for linguistically diverse learners. However, because English is the medium of instruction, participation in CPP through the analyzed district provided linguistically diverse learners with extra exposure to English during the critical language acquisition period (see Borman & Hewes, 2002; Portes, 2008).

**Interim treatment: Structured English Immersion.**

During the time frame between the end of CPP treatment and CELA assessment administration, all students in the examined data set participated in the English as a Second Language program in the school district being examined, unless their parents waived ESL services (in which case they were still instructed in an English immersion setting, but did not receive extra interventions with a specialist). Structured English Immersion programming was of the same format for all children, controlling for potential threats to validity incurred by time and confounding interventions (Gliner & Morgan, 2000). All students were placed in general education classrooms where English was the medium of instruction and ESL teachers provided supplemental, tailored interventions. The ESL program employs only certified teachers who meet highly qualified teacher designations. All ESL teachers were paid on the same salary schedule and offered the same benefits as classroom teachers.

### Covariates.

The covariates of free and reduced lunch, ethnicity, and gender were taken into account as covariates in the model. Much of the extant literature indicates poverty is a strong indicator of educational performance (e.g. Ayoub et al., 2009; Justice et al., 2007; Patterson, 2008). Additionally, ethnicity has been associated with educational performance (e.g. Morrison et al., 2003; Rimm-Kaufman et al., 2000).

## Measurement

### Administration of the CELA.

The Colorado Department of Education adopted the Language Acquisition Scales (LAS) test for screening and measuring the progress of English language learners in Colorado schools and renamed the test the Colorado English Language Acquisition Assessment (CELA). The LAS is a criterion-referenced measure of English for linguistically diverse learners. The purpose of the exam is to determine if ELLs are capable of functioning independently in an academic setting that employs English as the language of instruction while accounting for students' maturation and cognitive levels (Colorado Department of Education, 2009a).

There are two formats of the test currently used in the state of Colorado: the CELA Placement Exam (*LAS Links Placement Test*) and the CELA Proficiency Exam (*LAS Links K-12 Assessments*). The CELA Placement Exam is used to determine if a student qualifies for ESL services; it is essentially a shorter version of the CELA Proficiency test (also known as the CELAPro), which is administered annually to all students who qualify for linguistically diverse learner intervention programs to gauge

progress toward English acquisition. All students who qualify for English language acquisition programs at the time the screener is administered (whether parents accept or waive intervention program services) participate in the proficiency test annually until they demonstrate full proficiency. Once a student demonstrates overall proficiency, he no longer participates in the annual CELAPro administration. There are multiple leveled versions of the screener exam: kindergarten; first grade; second and third grade; fourth and fifth grade; sixth, seventh and eighth grade; and ninth through twelfth grade. A pre-K test is available, but is not used universally in Colorado.

The exam measures four language domains: speaking, listening, reading, and writing. In addition, there are summative scores for comprehension (a combination of listening and reading), oral proficiency (a combination of speaking and listening), and a total composite score. The speaking portion of the CELAPro test is administered individually and the listening, reading, and writing portions can be administered individually or in a group setting. Each test requires approximately 120 minutes total per student to administer and is given annually by a student's teacher.

On the CELAPro, each subsection is scored individually and then a summative score is derived from totaling the sections. Using a system of cut scores in each subsection, children are designated as *Not Proficient* (score of 1 or 2), *Approaching Proficiency* (score of 3 or 4), or *Proficient* (score of 5). The two types of questions on the exam are constructed response and multiple-choice. Students must construct oral and written responses for the speaking and writing portions, respectively. Multiple-choice formats are used for the listening and reading portions after students have received

auditory input or read a passage. The proctor, using a rubric in the proctor's manual, assesses the oral responses. The McGraw-Hill Company grades written and multiple-choice responses.

**Reliability.**

The CELAPro is a reliable measure of English language and literacy acquisition constructs. Because a single score for the overall test is derived from four subtests (speaking, listening, reading, and writing), Chronbach's Alphas were computed by McGraw-Hill for the battery of the four subscores and composite scores derived from each. In addition there are multiple forms of the test for various grade-levels, each with their own cut scores. Chronbach's Alphas ranged as follows: speaking: .89-.94, listening: .64-.85, reading: .83-.90, writing: .83-.91, comprehension (composite of listening and reading): .83-.91, oral (composite of speaking and listening): .88-.93, and total overall composite: .92-.96 (Colorado Department of Education, 2009a). Reliability as measured by scale-score correlations for the kindergarten through second grade version of the test is .68-.90 and the third through fifth grade version of the test is .73-.92 (Colorado Department of Education, 2009a). Also, alternate form reliability between the long and short forms of the measure is above .90 (DeAvila & Duncan, 1991) and Tidwell (see DeAvila & Duncan, 1991) noted test results are in alignment with teacher perception of student ability.

**Validity.**

According to the CELAPro technical manual (Colorado Department of Education, 2009a) prepared by McGraw-Hill on behalf of the Colorado Department of Education,

content validity was established by determining correspondence between a nationwide curriculum review and the content of the LAS battery of tests. In addition, educational experts guided all phases of the design and development of the test to determine whether it measures appropriate knowledge and skills. An alignment analysis conducted by McGraw-Hill was conducted in 2008 to determine whether the exam was in harmony with the four Colorado state standard domains for English language learners (listening, speaking, reading, and writing). Of the K-2 and 3-5 tests, all beginning, intermediate, and advanced items were found to be 100% in alignment with state English language acquisition standards as determined by McGraw-Hill, the Colorado Department of Education, and an independent panel of English language acquisition experts (Colorado Department of Education, 2009a).

Due to the fact there are no external measures with which to correlate the CELAPro scores, internal construct validity of the CELAPro test was determined using intercorrelations among CELAPro scales for each grade span. Overall scale scores correlate with each of the four domains, as well as the oral and comprehension combined domains with a range of .68-.89 for the K-2 grade spans. The overall scale scores correlate with each of the four domains as well as the oral and comprehension combined domains with a range of .73-.91 for the 3-5 grade spans (Colorado Department of Education, 2009a).

In a study that compared the validity of the three most frequently used English language placement exams: the *Woodcock-Muñoz Language Survey*, the *Idea Proficiency Test (IPT)* and the *Language Acquisition Scales*, Pray (2005) administered all three tests

to *native* English speakers to see if each test produced valid inferences. The study was founded on the idea that normally developing native English speakers should receive scores that indicate they speak English proficiently. If native English speakers were unable to achieve valid scores, then the inferences derived regarding minority language speakers' English are inherently invalid. Of the three tests, the LAS was the *only* measurement that produced 100% valid inferences; all native speakers' results were in the range of *Fluent English Speakers* (Pray, 2005).

## Methods of Analyses

### Chi-square.

Chi-square analyses were conducted to determine independence of covariates, as well as the strength of association between the covariates retained in the model as significant predictors and CELA performance (using Cramer's V).

### Logistic regression.

Logistic regression analysis focused on the treatment of early childhood education as provided by the Colorado Preschool Program in the school district from which data were obtained as it corresponds to language and literacy acquisition for linguistically diverse students as measured by CELA test performance prior to the end of the third grade. The study employed forward-stepwise binary logistic regression because the research question outcome variable was binary (demonstrated proficiency by the end of third grade or did not demonstrate proficiency by the end of third grade). Logistic regression was used to predict the odds of belonging to the group of students who exit the

ESL program by way of demonstrating proficiency on the CELA test prior to the end of third grade based on CPP participation.

Because students no longer participate in the CELA test after they have demonstrated proficiency, some students "dropped out" of the data set between kindergarten and third grade. Therefore, students who scored an overall composite score of 5 on the CELA *anytime* between kindergarten and the end of third grade were considered a part of the *proficient* group, students who scored 1, 2, 3, or 4 in the years leading up to and including third grade were considered a part of the *not proficient* group by way of dichotomization.

Although dichotomization of the dependent variables results in inability to pinpoint at what grades children typically demonstrated proficiency, it addresses the research question as to whether extra time given by way of CPP increases the likelihood of belonging to the proficient group prior to the end of the third grade while still accounting for children who demonstrated proficiency *prior* to third grade (and thus have no subsequent scores available for analysis). Because this is a preliminary study, the focus was on whether or not preschool participation is a viable predictor of early language and literacy success for ELLs rather than at what point students exited ESL programming.

Free and reduced lunch qualification (at any point during the elementary years), gender, and ethnicity were treated as covariates. The alpha level for analysis was set at .05 for a two-tailed test.

## Chapter Four: Results

This study employed a nonexperimental ex post facto design in an attempt to determine the likelihood of ELLs belonging to the proficient group on the CELA test prior to the end of the third grade based on CPP participation, while accounting for poverty as indicated by free and reduced lunch qualification, ethnicity, and gender. Analyses included chi-square tests of independence, Cramer's V tests of strength of association, and logistic regression modeling to determine the predictive power of the independent covariates on the dependent variable. All analyses were conducted using Statistics Package for Social Sciences (SPSS) software (version 19).

### Data Transformation

The data set received from the school district included data for a total of 1,727 cases. Due to the fact that students who were missing data because they achieved an overall composite score of 5 on the CELA test (therefore exiting out of the ESL program so they did not take the CELA test in subsequent years) needed to be retained in the data set, a sort was conducted to create a new data set that included only children who had four years of CELA data (i.e. a score for kindergarten, first, second, and third grades) *or* who did not have four years of data *only* because the student scored an overall composite score of 5 (i.e. demonstrating English proficiency) *prior to* the third grade year (See *Sample* subsection in Chapter 3). This created the cleanest data set possible; it

included only students with complete data for preschool years through the third grade (n=122). The new data set spanned from the 2004-2005 school year to the 2009-2010 school year, and ultimately included only one cohort of children (students who completed third grade in 2010).

Whether or not students exited the ESL program prior to third grade was artificially dichotomized. Any student who scored an overall composite score of 5 on the CELA test in kindergarten, first, second, or third grade was considered proficient and any student whose scores remained at 1, 2, 3, or 4 during his kindergarten through third grade years was considered not proficient. This dichotomization was performed in order to accurately capture students who scored an overall composite 5 prior to the start of third grade as proficient rather than as missing data due to other factors.

Next, whether or not students received free or reduced lunch at any point or never qualified was artificially dichotomized. This dichotomization was performed because some children's status changed from year to year in the time period that they participated in the CELA test (e.g. a student may have had free lunch as a first grader in 2007-2008, but then received only reduced price lunch in 2008-2009 as a second grader due to the fact that a family must reapply each year and designation may change as a result of change in family income or changes in qualification thresholds).

Ethnicity was dichotomized to White/Non-White for use as a potential predictor in the logistic regression analyses because it is a nominal variable. The number of years a child participated in the CPP program (0, 1, or 2 years) was artificially dichotomized only for use in chi-square tests because when left as continuous 33.3% of fields contained

<5 values, therefore it is recommended that the independent variables be collapsed into fewer categories (Tabachnick & Fidell, 2007; Yockey, 2011). The variable remained continuous for logistic regression analyses.

Lastly, a preliminary multiple regression was conducted to calculate Mahalanobis distance to identify outliers. Four outliers were identified and removed, creating a final data set that included 118 cases. The outliers deleted had extreme Mahalanobis distances that ranged from 11.39 to 14.23, while the other 118 cases had a range of 1.15 to 4.00.

**Chi-square Analyses**

Chi-square tests of independence were conducted to determine whether there were statistically significant relationships between each of the covariates: CPP Attendance, free and reduced lunch qualification, ethnicity, and gender, and the dependent variable: CELA performance (see Table 4.1). In addition, crosstabs for each analysis can be found in Tables 4.2, 4.3, 4.4, and 4.5. When considering Pearson's chi-square, likelihood ratios, and linear by linear associations, preschool attendance and free and reduced lunch correlations were related to performance on the CELA test, however ethnicity and gender were not statistically significantly related. Cramer's V tests of association indicated that there was a moderate association (.246 for CPP and CELA and .234 for free and reduced lunch qualification and CELA) between the covariates that were statistically significantly related ($p$=.008 for CPP and CELA and $p$=011 for free and reduced lunch qualification and CELA). There was nearly no association between ethnicity (.048) nor gender (.034) and CELA performance.

Table 4.1
*Chi-Square Analyses*

| | Value | *p* |
|---|---|---|
| **CPP Attendance & CELA Performance** | | |
| Pearson Chi-Square | 7.13 | .008 |
| Likelihood Ratio | 7.24 | .007 |
| Linear-by-Linear Association | 7.07 | .008 |
| **Free/Reduced Lunch & CELA Performance** | | |
| Pearson Chi-Square | 6.47 | .011 |
| Likelihood Ratio | 6.57 | .010 |
| Linear-by-Linear Association | 6.42 | .011 |
| **Ethnicity & CELA Performance** | | |
| Pearson Chi-Square | .27 | .603 |
| Likelihood Ratio | .27 | .603 |
| Linear-by-Linear Association | .27 | .604 |
| **Gender & CELA Performance** | | |
| Pearson Chi-Square | .14 | .712 |
| Likelihood Ratio | .14 | .712 |

Table 4.2
*CPP Attendance & CELA Performance Crosstabulation Counts*

| | Not Proficient on CELA by 3rd Grade | Proficient on CELA by 3rd Grade | Total Counts |
|---|---|---|---|
| Never Attended CPP | 53 | 36 | 89 |
| Attended CPP | 9 | 20 | 29 |
| Total Counts | 62 | 56 | 118 |

Table 4.3
*Free/Reduced Lunch & CELA Performance Crosstabulation Counts*

| | Not Proficient on CELA by 3rd Grade | Proficient on CELA by 3rd Grade | Total Counts |
|---|---|---|---|
| Never Qualified for Free/Reduced Lunch | 30 | 40 | 70 |
| Qualified for Free/ Reduced Lunch | 32 | 16 | 48 |
| Total Counts | 62 | 56 | 118 |

Table 4.4
*Ethnicity & CELA Performance Crosstabulation Counts*

| | Not Proficient on CELA by 3rd Grade | Proficient on CELA by 3rd Grade | Total Counts |
|---|---|---|---|
| White | 13 | 14 | 27 |
| Non-White | 49 | 42 | 91 |
| Total Counts | 62 | 56 | 118 |

Table 4.5
*Gender & CELA Performance Crosstabulation Counts*

| | Not Proficient on CELA by 3rd Grade | Proficient on CELA by 3rd Grade | Total Counts |
|---|---|---|---|
| Female | 30 | 29 | 59 |
| Male | 32 | 27 | 59 |
| Total Counts | 62 | 56 | 118 |

## Logistic Regression Analyses

Two forward step-wise binary logistic regressions were conducted to determine which independent variables were predictors of proficiency as measured by the CELA test with an overall composite score of 5 prior to the completion of the third grade year. One test was done with outliers included (n=122) and the other with outliers removed (n=118). The test with outliers removed offered a slightly better model for classification of cases (60.7% with outliers vs. 62.7% without outliers) although both models were statistically significant at $p<.05$.

In addition, two binary logistic regressions were conducted with only the independent variable of interest: CPP; one was conducted with outliers included (n=122) and one with outliers removed (n=118). The model with outliers included was significant at $p<.01$ and with outliers removed at $p<.05$.

### Logistic regression with outliers included.

Only free and reduced lunch qualification and years in CPP ($M$=.27, $SD$=.52) were retained in the model as significant predictors of CELA performance (neither ethnicity nor gender was retained in the model). Regression results indicated that the overall model of the two predictors was statistically reliable in distinguishing between students who demonstrated proficiency by third grade and those who did not ($p<.05$). The log likelihood and Nagelkerke $R^2$ indices indicated that model fit was acceptable (-2 Log Likelihood=154.57, $\chi^2(2)=5.75$). The model correctly classified 60.7% of cases. Regression coefficients can be found in Table 4.6.

**Logistic regression with outliers removed.**

The prediction model was improved with the exclusion of outliers. Again, only free and reduced lunch qualification and preschool participation (*M*=.28, *SD*=.52) were retained in the model. With outliers removed (n=118), the model correctly classified more cases (62.7%) and the overall model was slightly improved (-2 Log Likelihood of 151.20, $\chi^2(2)=12.08$). The model was still significant at $p<.05$. Regression coefficients can be found in Table 4.6.

**Logistic regressions with only the independent variable of CPP.**

Finally, logistic regressions were conducted with only the independent variable of interest: CPP participation, with and without outliers, (both can be seen in Table 4.6). With outliers included, the model correctly classified 63.1% of cases (-2 Log Likelihood of 160.32 and $\chi^2(2)=7.99$) and with outliers removed, the model correctly classified 61.9% of cases (-2 Log Likelihood of 156.24 and $\chi^2(2)=7.04$). The models again were statistically significant. The model with outliers included was significant at $p<.01$ and with outliers removed at $p<.05$.

Table 4.6
*Logistic Regression Analyses*

| | | | | | | 95% CI | |
|---|---|---|---|---|---|---|---|
| Variable | *B* | *Wald* | *df* | *p* | OR | LL | UL |
| CPP & Free and Reduced Lunch Covariates: Outliers Included | | | | | | | |
| Years in CPP | .96 | 5.53 | 1 | .019 | 2.61 | 1.32 | 6.36 |
| F/R Lunch | -.93 | 5.58 | 1 | .018 | .39 | .18 | .85 |
| CPP & Free and Reduced Lunch Covariates: Outliers Removed | | | | | | | |
| Years in CPP | .91 | 4.98 | 1 | .026 | 2.48 | 1.12 | 5.51 |
| F/R Lunch | -.89 | 4.91 | 1 | .027 | .41 | .19 | .90 |
| CPP Only Covariate: Outliers Included | | | | | | | |
| Years in CPP | 1.06 | 7.00 | 1 | .008 | 2.89 | 1.32 | 6.39 |
| CPP Only Covariate: Outliers Removed | | | | | | | |
| Years in CPP | 1.00 | 6.22 | 1 | .013 | 2.72 | 1.24 | 5.97 |

Note. *OR*=odds ratio; *CI*=confidence interval; *LL*=lower limit; *UL*=upper limit

**Check of Assumptions of Logistic Regression**

Because logistic regression is a test of probabilities between 0 and 1 rather than an actual linear function (Agresti, 2007), logistic regression does not make the same key assumptions of most general linear models that are based on ordinary least squares (Statistics Solutions, 2011). Logistic regression does not require the assumptions of normality, linearity, nor homoscedasticity (Mertler & Vannatta, 2010). In addition,

logistic regression can handle all levels of variables, as well as mixed variable levels in the same analysis (Tabachnick & Fidell, 2007).

However, logistic regression does make the following assumptions: a binary dependent variable, correct coding of the dependent variable, parsimony, lack of multicoliniarity, linearity of independent variables and log odds, large sample size in relation to the number of independent variables used, and absence of outliers in the model.

**Binary dependent variable.**

The present study question demanded a binary dependent variable. According to Tabachnick and Fidell (2007), transformation of the dependent variable is acceptable if it is necessary to accurately address the research question, which it was in this case. Therefore, the continuous variable of CELA performance scores was dichotomized to *proficient* and *non-proficient*. The dichotomization of the dependent variable led to the selection of logistic regression as the method of statistical analysis.

**Dependent variable coding.**

Tabachnick and Fidell (2007) point out that dependent variable coding must reflect the variable of interest. In the present study, the variable of interest was demonstration of proficiency, which was thus coded as a 1 while the variable of not demonstrating proficiency was coded 0 (see Agresti, 2007).

**Parsimony.**

The current study attempted to achieve parsimony by including only independent variables most likely to be of significance when predicting the odds of group membership

(Mertler & Vannatta, 2010). In addition, a step-wise regression was performed to seek only the best predictor variables for retention in the model.

**Multicollinearity.**

A chi-square test was conducted to establish independence between preschool participation and free and reduced lunch qualification. Independence was established between the two variables by all measures. Pearson's $\chi^2$, the likelihood ratio, and the linear-by-linear association were all relatively small and all had large *p*-values (see Table 4.7). Crosstab counts for free and reduced lunch qualification and CPP attendance can be viewed in Table 4.8. Finally, Cramer's V was only .152, indicating low association between variables.

Table 4.7
*Chi-Square Analysis for Check of Multicollinearity*

| | Value | *p* |
|---|---|---|
| Free & Reduced Lunch and CPP Attendance | | |
| Pearson Chi-Square | 2.73 | .098 |
| Likelihood Ratio | 2.83 | .093 |
| Linear-by-Linear Association | 2.71 | .100 |

Table 4.8
*Free & Reduced Lunch and CPP Attendance Crosstabulation Counts*

| | Never Attended CPP | Attended CPP | Total Counts |
|---|---|---|---|
| Never Qualified for Free/Reduced Lunch | 49 | 40 | 89 |
| Qualified for F/R Lunch | 21 | 8 | 29 |
| Total Counts | 70 | 48 | 118 |

**Linearity of independent variables and log odds.**

A test of linear relationship between independent variables and log odds was performed by transforming the independent variable of years in CPP to the dichotomous variable of attended CPP or did not attend CPP (*CPP Y/N*), maintaining the dichotomization of free and reduced lunch, and re-running the logistic regression with both treated as categorical variables (Norušis, 2008; Statistics Solutions, 2011). The logistic regression model with covariates transformed to categorical independent variables can be seen in Table 4.9. The assumption of linear relationship between independent variables and log odds is important in order to avoid making a Type II error; because the logistic regression model (see Table 4.6) and the logistic regression model with transformed categorical covariates (see Table 4.9) both produce significant results *and* the null hypothesis is rejected, danger of making a Type II error is alleviated.

Table 4.9
*Logistic Regression with Categorical Covariates (Outliers Removed)*

| | | | | | | 95% CI | |
|---|---|---|---|---|---|---|---|
| Variable | *B* | *Wald* | *df* | *p* | OR | LL | UL |
| CPP Y/N | -1.08 | 5.36 | 1 | .021 | .34 | .14 | .85 |
| F/R Lunch | -.88 | 4.86 | 1 | .027 | 2.41 | 1.10 | 5.28 |

Note. *OR*=odds ratio; *CI*=confidence interval; *LL*=lower limit; *UL*=upper limit

**Sample size.**

Caution is suggested when interpreting results where the number of cases is small relative to the number of predictor variables (Mertler & Vannatta, 2010). A minimum of

10 (and conservatively 30) cases is suggested per independent variable used (Statistics Solutions, 2011). The minimum requirement of 10 cases per independent variable was met and the conservative parameter of 30 cases per independent variable was nearly met for four independent variables used in an analysis of 118 cases.

**Outliers.**

Logistic regression is highly sensitive to outliers (Tabachnick & Fidell, 2007), therefore a Mehalanobis check for outliers was run prior to the logistic regression to check for and subsequently remove outliers for the final logistic regression (Mertler & Vannatta, 2010).

# Chapter Five: Discussion

## Summary of Findings

Although effect sizes of findings were only moderate, all were statistically significant. The null hypothesis suggesting that student participation in the Colorado Preschool Program would not be a statistically significant predictor of proficient group membership on the CELA prior to the end of the third grade can be rejected. For each year that a linguistically diverse child attended CPP, he or she was two-and-a-half times more likely to pass CELA prior to the end of the third grade.

A finding of note is that CPP participation and free and reduced lunch qualification were independent of one another *and* CPP was both a more statistically significant predictor because its odds ratio was farther from "1" in the step-wise logistic regression model than the odds ratio of free and reduced lunch qualification (see Tabachnick & Fiddell, 2007) and a strong *independent* predictor of proficient group status when the logistic regression was conducted with the sole covariate of CPP. Because much of the extant literature (e.g. Ayoub et al., 2009; Justice et al., 2007; Krashen & Brown, 2005; Patterson, 2008) indicates that SES is an extremely strong determinant of school success, the fact that preschool participation was a stronger predictor is very important.

The results of this study are in keeping with the limited studies available (Pagani et al., 2006; Waldfogel & Zhai, 2008) that indicate preschool participation for ELLs is an important intervention as a part of an *overall* high quality educational experience (Portes, 2008; Salvin et al., 2010).

## Discussion of Design

This study employed a nonexperimental ex post facto design. Data were obtained from a school district database. The analyzed data set included CPP participation, free and reduced lunch qualification, gender, ethnicity, and CELA scores for kindergarten, first, second, and third grade (or as many CELA data points as were available prior to demonstration of proficiency). Chi-square and logistic regression analyses determined that CPP and free and reduced lunch qualification are independent of one another and both are statistically significant predictors of passing the CELA test prior the third grade. Gender and ethnicity were not significant predictors of proficiency, therefore not retained in the model.

### Bias.

Selection bias for treatment participation was a concern for this study. Although ex post facto design was desirable for ethical reasons (see *Design* section in Chapter 3), it eliminated control over which participants received treatment. Factors such as parent knowledge of the CPP program and access to CPP spots (see *History of the Colorado Preschool Program* section in Chapter 2) may have dictated which children received treatment.

**Threats to validity.**

A review of relevant literature indicates that parent education levels (and specifically a mother's literacy level) are highly correlated to a child's ability to learn to read and be successful in school (Downer & Pianta, 2006; Goldenberg, 2008; Morrison et al., 2003; Patterson, 2008). However, information of this nature was not available in the database. Parent literacy may have played a role in the outcome of the study, but was not measured due to lack of access.

A second threat to validity (also a result of omission from the database) is lack of complete information about children's ECE experiences prior to kindergarten. Just because students in the data set did not participate in CPP does not mean that they did not participate in *some form* of preschool. Children may have attended CPP in a different school district, in a different format (such as Head Start), or may have attended private preschool (including in other countries or states). Furthermore, no baseline data were available regarding second language proficiency prior to the kindergarten CELA data point.

**Measurement.**

Although the indicators of reliability and validity indicate that CELA is a quality exam for the purpose of screening linguistically diverse students' English acquisition, no test is perfect and researchers (Aukerman, 2007; McSwan & Rolstad, 2006; McSwan et al., 2002) suggest that any test of second language ability be interpreted with caution. In addition, CELA was the only outcome variable data point used. Other measurement

options for this particular study might have included CSAP, the Developmental Reading Assessment, Second Edition (DRA2), teacher perception, or grades.

## Discussion of Intervention

### Intended outcomes.

The main objective of CPP is to enhance school readiness for children who may not otherwise have access to the tools necessary to do so (Colorado Department of Education, 2010). Although it is impossible to know for sure whether CPP was the only factor that contributed to the outcome of this study, it is reasonable to believe from the findings that CPP met its intended objective.

### Alternative interventions.

CPP may not be the only avenue to help linguistically diverse children achieve L2 language and literacy prior to the end of third grade. Other interventions that might be employed separately or in conjunction with high quality ECE programming include family support programs or programs in which children experience community resources where they would be exposed to English (e.g. museums or performing arts programming).

### Fidelity of implementation.

Fidelity of implementation and intensity of treatment were not taken into account in this study due to ex post facto design and need for anonymity. Attendance rates, which students attended which CPP classrooms, which teachers taught which children, and whether students attended CPP for two days per week or three days per week were not included in this study.

### Quality.

Although this study design did not specifically investigate the level of quality of CPP in the school district, a surface level evaluation indicates that the program met many of the hallmarks that experts (e.g. Barnett & Masse, 2007; Gormley et al., 2005, 2008; Jimenez-Castellaños, 2010) suggest. For example, preschool teachers were certified, there was a wide array of support staff and specialists, the curriculum was expansive, children attended for a full school year, and classrooms were situated in modern academic buildings designed to house young children. In addition, subsequent years of schooling and intervention seemed to be of high quality. All classroom and ESL teachers met highly qualified teacher standards, ESL teacher pay was on the same scale as classroom teacher pay, and the school district is considered high performing.

## Limitations

### Alternative explanations.

Because the time of treatment and points of measurement were separated by a number of years, it is possible that other treatments such as quality general education programming and ESL interventions were responsible for proficiency by the third grade, rather than CPP alone. However, due to the extant literature (e.g. Currie & Thomas, 2000; Portes, 2008; Salvin et al., 2010) that suggests both quality ECE programming *and* quality elementary schooling are important for serving at-risk children, it is also possible that the two worked in tandem to produce results. Furthermore, there may have been other factors relative to CPP that improved children's chances of demonstrating

proficiency on the CELA test other than time of exposure to English alone such as social and emotional development and school readiness preparation.

**External validity.**

This study can only be generalized to the population of ELLs who are served by the school district from which data were pulled. It is also important to note that CPP is a specific preschool format offered only in the state of Colorado. Due to the heterogeneous population of ELLs in the school district, all students in the study participated in Structured English Immersion in the time between treatment and measurement and not bilingual transition or dual immersion programs, also limiting external validity.

**Context.**

The community and school district from which data were examined are unique. The community is wealthy (the per capita income is nearly double that of the national average) and highly educated (59% of residents hold college degrees), and the school district is high performing. District and community demographics are important contextual factors to consider when interpreting the results of this study for two reasons. First, exposures to English other than those available through formal education, such as the quality of community libraries (Constantino, 2005), or the frequency of linguistic interactions with native speakers, may have impacted English acquisition. Therefore, the opportunities for exposure to quality English were numerous, and not solely available in school, so children's linguistic capabilities might have been fostered in a number of settings that may be have contributed to successful language acquisition. Second, free and reduced lunch qualification was the best proxy available for measurement of poverty.

Because this study was done in a relatively wealthy area, immigrant populations may be of higher SES in their home countries, and also because the study was conducted during a period of economic recession, interpretations of poverty as an independent variable should be made with caution.

## Importance of Findings

The importance of determining how to best serve linguistically diverse learners in the United States cannot be understated. Children of mother tongue backgrounds other than English already make up over 10% of America's student population (Short & Fitzsimmons, 2007). In addition, ELLs are not faring well in school (Baca & Cervantes, 1998; Goldenberg, 1996; Xu & Drame, 2008) which may result in lower quality of life and a greater financial burden to society (Alexander et al., 1997; Belfield et al., 2006; Goldenberg, 2008; Slavin et al., 2009). The results of this study indicate early childhood education programming may be a viable avenue to improve ELLs' academic trajectories.

In addition, the findings of this study are in keeping with the positive findings of studies conducted by school districts and the Colorado Department of Education with respect to the success of students during the K-12 years after they have participated in CPP programming around the state (see *Review of the Literature*, Chapter 2).

### Applications.

Very little longevity research specifically focuses on ECE as an intervention for ELLs. This study contributes to the gap in the literature and is in keeping with the previous findings that do exist to indicate preschool participation aids in the acquisition of L2 (e.g. Waldfogel & Zhai, 2008).

The unique demographics of the data examined in this study help fill a gap in the literature. Much of the available research on the population of English learners in the United States focuses on Hispanic and low-SES populations (e.g. Duran, Roseth & Hoffman, 2010; Reese et al., 2005; Garcia-Vazquez et al., 1997). Although these subpopulations make up the majority of linguistically diverse learners in the U.S. (National Center for Education Statistics, 2009), it is still important to understand how to best serve *all* children. The unique demographics in this study contribute to this end.

High quality ECE programming seems to offer positive externality to taxpayers (Barnett & Masse, 2007; Belfield et al., 2006) and increase quality of life for at-risk participants (Belfield et al., 2006; Weikart, 1996). However, the Colorado Preschool Program has regularly turned applicants away due to lack of space (Colorado Department of Education, 2003; 2004; 2005; 2006; 2007; 2008; 2009b; 2010). Although the effect sizes offered by the results of this study are small, the implications of the results are not. Findings of this study suggest continued investment in CPP is in the interest of children as well as the tax-paying public.

In addition, even the high quality preschool program employed as the treatment in this study maintained no trained ESL teachers and no curriculum specifically designed for ELLs. If preschool is going to be treated as an intervention for linguistically diverse learners, as it has in the state of Colorado since 1989 (Edmiaston et al., 1989), then early childhood teacher preparation programs and professional development must focus on how to best serve ELLs. Introduction of ESL programming into the early childhood

education setting may further improve the impact of preschool participation on linguistically diverse learners' English acquisition.

Lastly, as Luis Moll and colleagues (Moll, Amanti, Neff & Gonzalez, 1992) posit with the *Funds of Knowledge* concept, English language learners enrich classroom environments by bringing perspective and culture that might otherwise be absent. By offering linguistically diverse learners access to preschool programming, ELLs benefit, but also offer a wealth of knowledge to their peers and staff.

**Recommendations for Future Research**

The study sample for this project was severely decreased for a number of reasons. Access to a larger base sample and/or the examination of CELA scores in the future after more students have had an opportunity to participate would strengthen the study design. Also, a qualitative or mixed methods approach to examine other levels of analysis (i.e. CPP sites) would be a welcome extension. Although time and exposure during the critical acquisition period seem to help children acquire L2, research that determines the exact quality hallmarks of preschool programs that most contribute to success are still needed. The results of this study indicate that preschool seems to influence achievement prior to third grade; however, additional research may be helpful in determining *at what point* young linguistically diverse students who participate in preschool demonstrate English proficiency. Also, it would be important to examine how many risk factors students carried with them and how this relates to CELA performance; furthermore, a future study may examine which risk factors are best mediated by early childhood experiences. In addition, this study did not take parental literacy levels into account

because that information was not maintained in the accessed database. Study of the impact of parent education specifically on ELLs would fill a gap in the current literature. Lastly, Kieffer and Lesaux (2010) determined that at-risk students who demonstrate proficiency in the early elementary years may require intervention again in the later years. Research to determine the rate at which ELLs *retain* language and literacy proficiency would be a desired contribution.

**Conclusions**

Although the effect sizes in this study were only moderate (particularly with regard to Cohen's cutpoints [Yockey, 2011]), implications for practice are still important considering that it is important to take the practical significance of study findings into account, not just statistical significance in isolation (Ravid, 2011). High quality early childhood programming seems to benefit linguistically diverse learners by offering more time and exposure to English, which in turn aids in academic achievement. Continued allocation of resources to sustain preschool programs for ELLs who would not otherwise attend them is an important investment in the future.

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