

AN ABSTRACT OF THE DISSERTATION OF

Guadalupe Díaz for the degree of Doctor of Philosophy in Human Development and Family Studies presented on July 26, 2016.

Title: The Influence of Family Demographics and Individual Factors on School Readiness: A Focus on Low-Income Spanish-speaking English Language Learners

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English Language Learners (ELLs) represent a culturally and linguistically diverse population in US schools. ELLs enter kindergarten with a range of academic and self-regulation skills, but can face multiple challenges navigating the school context (Zwiers, 2013). Previous research documents that low-income ELLs lagged behind in academic achievement, self-regulation, and English language proficiency when compared to non-ELLs (Fuligni & Howes, 2011; Good, Masewicz & Vogel, 2010; Genesee, Lindholm-Leary, Saunders, 2006; Wanless, McClelland, Tominey & Acock, 2011). Additionally, evidence suggests that family demographic factors, such as parent education, residential mobility, and mother's employment influence low-income ELLs' school readiness. This dissertation expands on current literature by exploring these relations in a sample of low-income preschoolers and kindergartners using data from a research-based longitudinal study (the Kindergarten Readiness Study; study 1), and a large statewide assessment in Oregon (the Oregon Kindergarten Assessments; study 2).

The first study examined 1) how three demographic factors—parent education, residential mobility, and mother's employment—were related to the school readiness (early literacy, early math, and inhibitory control) of low-income children in preschool; and 2) how these relations might vary as a function of ELL status. Results indicated that after controlling for

age, gender, study location, ELL status, and ethnicity, parent education had a significant and positive relation to early math and early literacy, but not to inhibitory control. The relation between residential mobility and early math, however, varied as a function of ELL status. Specifically, children who were ELLs scored significantly lower on early math for each additional residential move compared to children who were not ELLs. There was not a statistically significant relation between mother's employment, residential mobility and school readiness (early math, early literacy, and inhibitory control). The relations between residential mobility and early literacy and inhibitory control did not vary as a function of ELL status, nor did the relation between parent education, and mother's employment, and school readiness.

The second study 1) compared how low-income Spanish-speaking ELLs performed on the Oregon statewide Kindergarten Assessments (early literacy, early math and self-regulation) when compared to low-income non-ELLs; and 2) explored the relations between English language proficiency and performance on kindergarten assessment for low-income Spanish-speaking ELLs. Results indicated that after controlling for ethnicity and gender, non-ELLs performed significantly higher than Spanish-Speaking ELLs in early math (administered in English for non-ELLs and Spanish for Spanish-Speaking ELLs) and early literacy (letter names & letter sounds; administered in English for both non-ELLs and Spanish-Speaking ELLs). Differences in self-regulation skills were not statistically significant between Spanish-Speaking ELLs and non-ELLs. Furthermore, children with higher English language proficiency scored significantly higher on measures of early literacy, early math, and self-regulation at beginning of kindergarten compared to children with lower English language proficiency. Overall, results provide an understanding of the influence of family demographic factors and individual factors on low-income Spanish-speaking ELLs' school readiness. These results can be used to inform

policy and practice aimed at supporting low-income Spanish-speaking ELLs and their families as they enter formal schooling.

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The Influence of Family Demographics and Individual Factors on School Readiness: A Focus on
Low-Income Spanish-speaking English Language Learners

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I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

Guadalupe Díaz, Author

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The Influence of Family Demographics and Individual Factors on School Readiness:
A Focus on Low-income Spanish-speaking English Language Learners

INTRODUCTION

English Language Learners (ELLs) represent a culturally and linguistically diverse population in US schools. ELLs enter kindergarten with a range of academic and self-regulation skills, but can face multiple challenges navigating the school context (Zwiers, 2013). Previous research documents that low-income ELLs lagged behind in academic achievement, self-regulation, and English language proficiency when compared to non-ELLs (Fuligni & Howes, 2011; Genesee, Lindholm-Leary, Saunders, 2006; Good, Masewicz & Vogel, 2010; Wanless, McClelland, Tominey & Acock, 2011). In addition to lower academic achievement, the current demographic shift in the US indicates growth in the number of students from non-English speaking backgrounds. As a result, national and state efforts are focused on improving and supporting the school readiness and academic outcomes of ELLs in the United States. ELLs are a growing portion of the student population and include about 10% of the nation's K-12 students (Migration Policy Institute, 2015). It is expected that the population of ELLs will continue to grow to comprise a substantial portion of the K-12 student population (Fry, 2008; Wolf, Kao, Griffin, Herman, Bachman, Chang & Farnsworth, 2008). Given the current educational difficulties and the expected rate of growth among ELLs, it is critical to understand the factors influencing low-income ELLs' school readiness to reduce the current achievement gap between low-income ELLs and non-ELLs. In this dissertation, ELLs will be used to identify students who are learning English. Although definitions can vary in general, ELLs are defined as being in the process of learning English and speak a first language other than English at home (Halle, Hair, Wandner, McNamara & Chien, 2012).

Family demographics and individual factors, such as parent education, poverty, English language proficiency, and self-regulation, have all been found to play a significant role in children's school readiness (Butler, Satenvens & Castellon, 2007; Espinosa, 2013; Espinosa, 2010; Genesse, Lindholm-Leary, Saunders & Christina, 2005; Wanless, McClelland, Tominey & Acock, 2011). For example, low-income ELLs score significantly lower than their English-speaking peers in early academic skills such as literacy and math when assessed in English (Genesse, Lindholm-Leary, Saunders & Christina, 2005; Espinosa 2010). Additionally, ELLs whose parents have lower education are more likely to have lower English language proficiency (Hakuta, 2000). Less research, however, has examined the relations between family demographic factors, individual factors, academic achievement and self-regulation in low-income Spanish-speaking ELLs in preschool and kindergarten.

This dissertation includes two primary studies. The first study examined 1) if three demographic factors—parent education, residential mobility, and mother's employment—were related to the school readiness (early literacy, early math, and inhibitory control) of low-income children in preschool; and 2) how these relations varied as a function of ELL status during the fall of the preschool year. Using data from a large statewide assessment in Oregon, the second study explored 1) how low-income Spanish-speaking ELLs performed on the Kindergarten Assessments (early literacy, early math and self-regulation) when compared to low-income non-ELLs; and 2) the relations between English language proficiency and performance on the Kindergarten Assessments for low-income Spanish-speaking ELLs (see appendix A for additional information on the measures for each study).

School Readiness

School readiness is defined as a set of skills that children need to be successful in kindergarten (Noble et al., 2012). Traditionally, the focus has been on academic skills, such as knowing letters and numbers, but skills including self-regulation and its components, and English language proficiency are also critical for low-income ELLs' success in kindergarten (Hoff, 2013; Lan, 2011; McClelland et al. 2010). Additionally, family demographic factors play a key role in developing the skills children need for kindergarten (Burchinal, Peisner-Feinber, Pianta & Howes, 2002; Duncan & Brooks-Gunn, 1997; Duncan & Magnuson, 2005; Entwisle & Alexander, 1997). Although previous research has established the importance of self-regulation and English language proficiency for high achievement, less research has focused on exploring the associations between English language proficiency, achievement, and self-regulation skills among low-income ELLs (Bailey, 2007; Blair, 2002). Previous research has established that family demographics matter for children's school readiness, but little is known about the potential influence of these family demographic factors on low-income Spanish-speaking ELLs' school readiness, and whether these relations differ for ELLs and non-ELLs (Espinoza, 2010). Therefore, the present studies explored the relation between family demographics and low-income Spanish-speaking ELLs' achievement and inhibitory control in preschool, and the relations between English language proficiency, achievement, and self-regulation skills among low-income Spanish-speaking ELLs in kindergarten.

Family Demographic Factors and School Readiness

Demographic characteristics often associated with lower academic achievement are also often related to ELL status. In the US, ELLs are more likely to be Spanish-speaking (79%), identified as Latino, and live in low-income families (Center for Public Education, 2007; Migration Policy Institute, 2010). Additionally, Latino families experience higher rates of

residential mobility and higher rates of unemployment (Child Trends, 2013; Herbers et al., 2012; Pew Hispanic Center, 2008). In the US, ethnic minorities disproportionately experience educational disparities, discrimination, and poverty. For example, 66% of English Language Learners live in poverty and have parents with lower educational attainment (Garcia-Coll, Meyer & Brillon, 1995; Grantmakers for Education, 2013; Gandara & Contreras, 2009; Pew Hispanic Center 2011; U.S. Census, 2011). Previous research has also documented the relations between living in poverty and academic achievement (Dearing, Berry & Zaslow, 2006; Evans & Rosenbaum, 2008). For example, children living in poverty are more likely to have lower academic achievement and are less prepared when entering kindergarten in the skills that are valued in US mainstream classrooms (Dearing et al, 2006; Evans & Rosenbaum, 2008; Zwiers, 2013).

In addition to poverty, family demographic factors such as parent education, residential mobility, and mother's employment play a critical role in the development of low-income children's school readiness (Brooks-Gunn, Berlin, & Fuligni, 2000; Christian, Morrison & Bryan, 1998; Davis-Kean, 2005; Magnuson, 2007). For example, higher levels of parent education have been correlated with higher achievement and higher rates of English language acquisition among ELLs (Abedi & Dietel 2004; Davis-Kean, 2005; Hakuta et al. 2000; Jepsen & de Alth, 2005). Parents who have higher education levels are more likely to have access to resources to provide a higher quality home learning environments that results in higher academic achievement compared to parents with lower levels of education (Davis-Kean, 2005; Magnuson, 2007). High rates of residential mobility have also been shown to be detrimental for children's school readiness (Cutuli et al., 2013; Obradovic et al., 2009; Voight et al., 2012). For example, children who experience multiple moves are more likely to perform poorly on math, literacy, and

inhibitory control in the fall of preschool compared to children moving less often (Schmitt, Finders & McClelland, 2015). Finally, the research on the influence of parent employment, and specifically mothers' employment, has indicated both positive and negative relations to children's outcomes (Brooks-Gunn, Han & Waldfogel, 2010; Crosnoe, 2004; Espinosa, 2010; Shierholz & Mishel, 2013). For example, some research has documented that employment among low-income mothers was associated with an increase in parenting quality and decrease in stress and conflict (Augustine, 2014; Turner, Guzman, Wildsmith & Scott, 2015). Other research indicated that mothers' full-time employment was associated with lower scores on measures of cognitive development (Brooks-Gunn, Han & Waldfogel, 2010).

Based on previous research indicating the disparities ELLs and their families experience, it is important to explore whether relations between family demographic factors and children's achievement and inhibitory control vary as a function of ELL status (Herbers et al., 2012; Pew Hispanic Center, 2008; McClelland & Wanless, 2012). A more adverse impact of cumulative risk for ELLs could be a potential reason for the variation in the influence of family demographic on achievement and inhibitory control between ELLs and non-ELLs (Hernandez, 2004; Mancilla-Martinez, Christodoulou & Shabaker, 2014). For example, ELLs are more likely to experience multiple risk factors, such as poverty, lower parent education, and parent unemployment, when compare to non-ELLs (Child Trends, 2013; Pew Hispanic Center 2011). Additionally, the effect of family demographic factors might be more likely to be detrimental for ELLs because their families might have less access to resources to address the influence of these factors (Hernandez, 2004). For example, ELLs are more likely to have parents who have unstable employment and are less likely to have the social network to find employment, which can extend periods of unemployment (Hernandez, 2014). Exploring ELL status as a moderator

can provide an insight into the additional challenges ELLs and their families may experience as they attempt to access resources and navigate the school context (Garcia-Coll, Meyer & Brillon, 1995; Gandara & Contreras, 2009).

Defining Self-Regulation and Inhibitory Control

Previous research has provided multiple definitions to conceptualize self-regulation in young children (Cole, Martin, & Dennis, 2004; Rueda, Posner, & Rothbart, 2004). Generally, self-regulation has been defined as a construct that includes the regulation of emotions, behaviors, and cognitions (McClelland, Cameron Ponitz, Messersmith & Tominey, 2010). The two studies in this dissertation focused on behavioral aspects of self-regulation, which stem from the executive function components of working memory, attention, and inhibitory control.

Working memory is defined as storing information while processing new information (Siegel & Ryan, 1989). For example, a child remembering multiple steps to complete an activity in the classroom is an example of working memory in the classroom context. *Attention* includes resisting distractions and shifting attention when necessary (Morrison, Cameron Ponitz & McClelland, 2010). In a classroom environment, the ability to maintain attention helps a child pay attention during large group time and shifting attention when it is time to transition to another activity. *Inhibitory control* refers to inhibiting an automatic response in favor of a more adaptive reaction (Morrison et al., 2010). A child raising his hand and waiting for the teacher to call on him instead of shouting the answer is an example of inhibitory control.

The three components of self-regulation: working memory, attention and inhibitory control have been documented as being essential for children to successfully function in a classroom (Blair, 2002). Moreover, for low-income ELLs, inhibitory control has been found to be a central aspect of self-regulation and plays a unique role in the development of English

language proficiency, self-regulation, and achievement (Bialystok & Viswanathan, 2009; Green, 1998). When learning two languages, as is the case with ELLs, both languages are always active (Costa, La Heij, & Navarrete, 2006; Green, 1998). Because of this, ELLs have to inhibit one language over the other, strengthening their inhibitory control (Bialystok, 2011; Poarch & va Hell, 2012). Thus, inhibitory control plays an essential role during the development of English language proficiency as a way to cognitively manage multiple languages and serves as the foundation to further develop self-regulation skills (Bialystok, 2011; Poarch & va Hell, 2012). Inhibitory control also makes unique contributions to academic achievement among diverse populations of children. For example, inhibitory control has been shown to uniquely predict math achievement and early literacy in kindergarten (Blair & Razza, 2007; Lan et al., 2011). Based on this, Study 1 explored the influence of three demographic factors on *Inhibitory control* as a key aspect of the school readiness of low-income Spanish-speaking ELLs in preschool. Study 2 examined if low-income Spanish-speaking ELLs performed differently in self-regulation skills at the start of kindergarten and explored the relation between English language proficiency and self-regulation skills for low-income Spanish-speaking ELLs.

Self-Regulation, Inhibitory Control and Academic Achievement

Previous research suggests that self-regulation can serve as a protective factor for children who experience risk factors and is a key factor for academic achievement (Lengua, 2002; McClelland, Acock, & Morrison, 2006). For example, one study found that children's learning-related skills, which include aspects of self-regulation and social skills, predicted reading and math between kindergarten and sixth grade, and growth in math and reading between kindergarten and second grade (McClelland, Acock, & Morrison, 2006). Additionally, self-regulation can be improved through interventions (Arnold et al., 2006; Blair, 2002; Blair &

Razza 2007; McClelland et al., 2007; Ponitz, McClelland, Matthews & Morrison, 2009; Raver et al., 2011). For example, previous research has documented that improving children's self-regulation through intervention programs can improve children's academic skills, especially for low-income ELLs (Schmitt, McClelland, Tominey & Acock, 2015; Tominey & McClelland, 2011). Although it is known that self-regulation can serve as a potential mechanism to support achievement of low-income ELLs, we know less about the relation between self-regulation and English language proficiency in this group of children.

Academic Achievement and English Language Proficiency

Recent educational efforts have focused on supporting and improving the academic achievement of low-income ELLs. Low-income ELLs are at the highest risk for difficulties in math and reading (Espinosa, 2007; Fitzgerald, 1993). Research has documented the multiple challenges low-income ELLs face when entering formal schooling, and the lack of sufficient teacher training, appropriate classroom materials, and school support to effectively teach the increasing number of ELLs (Chang, et al. 2007; Espinoza, 2010; Fuligni & Howes, 2011; Gandara, Maxwell-Jolly & Driscoll, 2005; Lucas, Villegas, Freedson-Gonzales, 2008; Stanovitch, Jordan, & Perot, 1998). For example, Gandara, Maxwell-Jolly and Driscoll (2005) found that teachers cited the lack of appropriate materials and training for working with ELLs as some of the main challenges for effectively addressing the academic needs of ELLs in their classrooms. Having the adequate training and materials to support the language development of ELLs has been documented as a potential strategy to address the achievement gap between low-income ELLs and non-ELLs (Vitiello, Downer & Williford, 2011; Burchinal, Field, Lopez, Howes & Pianta, 2011).

Addressing the achievement gap between low-income ELLs and non-ELLs has become critical for schools especially under the Every Student Succeeds Act, which demands disaggregation of student achievement by ELL status and requires schools to demonstrate a linkage between English language proficiency standards, and achievement standards (ESSA, 2016). Although there is no uniform definition of English language proficiency, in general, English language proficiency is defined as having the English language skills needed to access instruction and meet the language demands of the academic context in classroom settings (Butler & Bailey, 2007). Addressing the achievement gap between low-income ELLs and non-ELLs presents two main challenges: 1) understanding the academic development of low-income ELLs; and 2) having appropriate assessments to evaluate achievement and English language proficiency among low-income ELLs (Butler & Castellon-Wellington, 2000/5; Butler, Stevens & Castello, 2007; Espinosa, 2013; Genesse, Lindholm-Leary, Saunders & Christina, 2005; Stevens, Butler & Castellon-Wellington, 2000). For example, Stevens, Butler and Castellon-Wellington, (2000) found that when analyzing the relationship between English language proficiency and standardized assessments among ELLs, these assessments were only moderately correlated, but Hopkins, Thompson, Linquanti, Hakuta & August (2013) found a substantive and statistically significant relation between English language proficiency and standardized assessments. These results indicate the need to continue to explore the association between standardized assessments and English language proficiency.

In addition to the challenges with evaluating the achievement of low-income ELLs, it is critical to understand how factors such as English language proficiency influence the achievement of ELLs. Having a deeper understanding of how English language proficiency is related to achievement can help support the academic achievement of low-income ELLs

(Espinosa, 2013). For example, previous research has documented that achievement among ELLs can vary by English language proficiency levels and by the length of time it takes to achieve English language proficiency (Espinosa, 2010; Genesse, Lindholm-Leary, Saunders & Christina, 2005; Halle, Hair, Wandner, McNamara & Chien, 2012). ELLs with higher levels of English language proficiency have higher achievement in reading and math when compared to those with lower levels of English language proficiency (Espinosa, 2013; Chesterfield et al., 1983). Children who achieved English language proficiency by the time they entered kindergarten performed similarly in academic assessments when compared with their non-ELL peers (Espinosa, 2013; Chesterfield et al., 1983). Additionally, self-regulation has been documented to predict children's achievement and can serve as a protective factor for children experiencing challenges in the school context (McClelland & Wanless, 2012). Yet most research and interventions have focused on exploring the connections between literacy development and English language proficiency as a strategy to reduce the achievement gap between low-income ELLs and non-ELLs (Burchinal, Field, Lopez, Howes, Pianta, 2012; Hoff, 2013; Slavin & Cheung, 2005). Fewer studies have focused on understanding the relations between English language proficiency and self-regulation as a potential mechanism to support the school readiness of low-income Spanish-speaking ELLs.

Overview of Study 1

The first study in this dissertation examined the influence of three family demographic factors—parent education, residential mobility, and mother's employment—on preschool children's school readiness (early math, early literacy and inhibitory control), and if these relations varied as a function of ELL status. Specifically, study 1 used regression models to explore the relations between family demographic factors and school readiness. Additionally,

interactions terms were created between ELL status and each family demographic factor to determine if these relations varied as a function of ELL status. Data came from the Kindergarten Readiness Study (N=509) a longitudinal measurement study in the Northwest of the United States. Previous research has documented the key role family demographic factors play in the school readiness of children (Butler, Satenvens & Castellon, 2007; Cadima, Gamelas, McClelland & Peixoto, 2015; Espinosa, 2013; Espinosa, 2010; Genesse, Lindholm-Leary, Saunders & Christina, 2005; Wanless, McClelland, Tominey & Acock, 2011). Less research has explored how these relations varied as a function of ELL status. Therefore, study 1 explored if the relations between family demographic factors and school readiness (early math, early literacy, and inhibitory control) varied as a function to ELL status.

Overview of Study 2

The second study in this dissertation examined how low-income Spanish-speaking ELLs performed on the Oregon statewide Kindergarten Assessments (early literacy, early math and self-regulation) when compared to low-income non-ELLs, and the relations between English language proficiency and performance on Kindergarten Assessments for low-income Spanish-speaking ELLs. This study contributes to previous literature documenting 1) the continuous achievement gap between low-income Spanish-speaking ELLs and non-ELLs at the start of kindergarten, and 2) the importance of measuring the skills of ELLs in their native language to gain a complete understanding of their skills as they enter kindergarten. Additionally, this study examined the relations between English language proficiency and Kindergarten Assessments for low-income Spanish-speaking ELLs. Data for study 2 is a subsample of the Oregon Kindergarten Assessments ($n=21,623$), which provided a unique opportunity to explore these relations in a large statewide dataset. The Kindergarten Assessments include measures of early

math (administered in English for non-ELLs and in Spanish for Spanish-speaking ELLs), early literacy (letter names & letter sounds; administered in English for both non-ELLs and Spanish-speaking ELLs) and self-regulation (teacher rated). To examine the first research question, an Analysis of Covariance (ANCOVA) was conducted to examine potential differences in performance in the Kindergarten Assessments between low-income Spanish-speaking ELLs and low-income non-ELLs. Regression models with robust standard errors were conducted to explore the relation between English language proficiency and the Kindergarten Assessments. This study expands previous literature by examining the differences in achievement between low-income Spanish-speaking ELLs and low-income non-ELLs in a statewide dataset, and exploring the relations between English language proficiency and scores on statewide kindergarten assessments.

Overall, the results from the two studies in this dissertation provide insight on how relations between family demographic factors and school readiness may vary as function of ELL status. Additionally, they explore how low-income Spanish-speaking ELLs perform on the Oregon Kindergarten Assessments and the role of English language proficiency on these scores. Results of the two studies also highlight 1) the need to investigate the influence of family demographic factors in larger samples to create samples that might be comparable between ELLs and non-ELLs to more clearly explore these relations. Although, given the diversity in the ELL population, even with larger samples it might be difficult to find an appropriate comparison group (see Appendix B for explanation of Propensity Score Matching for study 1); and 2) the need to improve standardized assessments for ELLs to expand our understanding on the relations between achievement and English language proficiency among ELLs. As efforts to

address the educational needs of ELLs and their families continue it becomes increasingly important to better understand the factors that influence ELLs' academic development.

The influence of family demographic factors on school readiness:
Variation by Spanish-speaking English Language Learner status

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Abstract

The present study explored the relations between three family demographic factors—parent education, residential mobility, and mother’s employment—and school readiness (early math, early literacy, and inhibitory control) in a sample of low-income preschoolers. Additionally, it explored if the relations between family demographic factors and school readiness varied as a function of ELL status. Participants included a low-income sample of 509 preschool children of which 153 (30%) were identified Spanish-speaking ELLs by their teacher. Results indicated that after controlling for age, gender, study location, ELL status, and ethnicity, parent education had a significant and positive relation to early math and early literacy, but not to inhibitory control. There was not a statistically significant relation between mother’s employment, residential mobility and school readiness (early math, early literacy, and inhibitory control), but the relation between residential mobility and early math varied as a function of ELL status. Specifically, children who were ELLs scored significantly lower on early math for each additional residential move compared to children who were not ELLs. The relations between residential mobility and early literacy and inhibitory control did not vary as a function of ELL status nor did the relation between parent education and mother’s employment and school readiness. The current study contributes to existing literature by exploring if the relations between family demographic factors and school readiness vary by ELL status.

Introduction

Family demographics such as parent education, residential mobility, and mother's employment have been found to play a significant role in children's school readiness (Butler, Satenvens & Castellon, 2007; Cadima, Gamelas, McClelland & Peixoto, 2015; Espinosa, 2013; Espinosa, 2010; Genesse, Lindholm-Leary, Saunders & Christina, 2005; Wanless, McClelland, Tominey & Acock, 2011). For example, children whose parents have lower education are more likely to score lower in math, reading and vocabulary (Sektan et al., 2010). Moreover, previous research indicates that children who are English Language Learners (ELLs) are more likely to live in poverty and are at risk of disproportionately experiencing factors associated with lower academic achievement (U.S. Census, 2011; Genesse, Lindholm-Leary, Saunders & Christina, 2005; Espinosa 2010). For example, ELLs are more likely to have parents with lower educational attainment (Pew Hispanic Center, 2008). Previous research documenting the family demographic factors among low-income ELLs has been mostly descriptive, and less research has examined how the relations between family demographic factors and school readiness vary as a function of ELL status in preschool.

Multiple terms such as Language Minority students, Limited English Proficiency, English Learners, Dual Language Learners and ELLs are used to identify students who are learning English (Espinosa, 2010). For the present study, ELLs will be used to identify students who are learning English. ELLs in general are defined as being in the process of learning English and speak a first language other than English at home (Halle, Hair, Wandner, McNamara & Chien, 2012).

Characteristics of English Language Learners

Current demographic shifts in the US indicate an increase in the number of students who are ELLs entering the school system. Less research, however, has documented that the largest proportion of ELLs are under the age of 5, making the preschool context a key setting to support ELLs' school readiness skills (Garcia & Frede, 2010). ELLs are more likely to be Spanish-speaking (79%), identified as Latino, and live in low-income families (Center for Public Education, 2007; Migration Policy Institute, 2010). For example, 60% of ELLs live in poverty and have parents with lower educational attainment when compared to non-ELLs (Garcia-Coll, Meyer & Brillon, 1995; Grantmakers for Education, 2013; Gandara & Contreras, 2009; Hakuta, 2000, Pew Hispanic Center 2011; U.S. Census, 2011). ELLs are also more likely to experience disparities in school readiness skill such as math and reading at the start of kindergarten (Garcia & Frede, 2010). Additionally, ELLs and their families experience higher rates of residential mobility and higher rates of unemployment, which can disrupt children's school routines (Child Trends, 2013; Herbers et al., 2012; Pew Hispanic Center, 2008). Previous research has also documented the relations between living in poverty and academic achievement (Dearing, Berry & Zaslow, 2006; Evans & Rosenbaum, 2008). For example, children living in poverty are more likely to have lower academic achievement and be less prepared as they enter kindergarten (Dearing et al, 2006; Evans & Rosenbaum, 2008). Based on previous research documenting the large percentage of Spanish-speaking ELLs and the likelihood of disproportionately experiencing factors associated with lower academic achievement, the present study explored if the relations between family demographic factors and school readiness varied as function of being a Spanish-speaking ELL in a sample of low-income preschoolers.

ELLs and School Readiness

School readiness is defined as a set of skills that children need to be successful in kindergarten (Noble et al, 2012). Traditionally, the focus has been on academic skills, such as knowing letters and numbers, but skills including self-regulation, specifically inhibitory control, are also critical for low-income Spanish-speaking ELLs' success in kindergarten (Hoff, 2013; Lan, 2011; McClelland et al. 2010). Additionally, family demographic factors play a key role in developing the skills children need for kindergarten (Burchinal, Peisner-Feinber, Pianta & Howes, 2002; Duncan & Brooks-Gunn, 1997; Duncan & Magnuson, 2005; Entwisle & Alexander, 1997). Although previous research has established the importance and unique contribution of inhibitory control for high achievement, we know very little about the potential influence of these family demographic factors on low-income Spanish-speaking ELLs' school readiness and whether these relations differ for ELLs and non-ELLs (Espinoza, 2010). Therefore, the present study explored the relations between family demographics and school readiness and if these varied by ELL status in a sample of low-income preschoolers.

Inhibitory Control and Academic Achievement

Previous research has documented the unique contributions of inhibitory control for children's academic achievement (Blair & Razza, 2007; Bull, Espy, & Wiebe, 2008 Espy et al., 2004). Inhibitory control refers to inhibiting an automatic response in favor of a more positive adaptive reaction (Morrison et al., 2010). For example, a child raising her hand and waiting for the teacher to call on her instead of shouting answer is an example of inhibitory control and research indicates that inhibitory control predicts math, phonemic awareness, and letter knowledge (Blair & Razza, 2007). Additionally, inhibitory control has been documented to contribute to math performance in young children (Espy et al., 2004). Inhibitory control also makes unique contributions to the academic achievement among diverse populations of children.

For example, inhibitory control has been shown to uniquely predict math achievement and early literacy in kindergarten for low-income children and Chinese children (Blair & Razza, 2007; Lan et al., 2011).

Moreover, for low-income ELLs, inhibitory control has been found to be a central aspect for academic achievement and plays a unique role in the development of bilingualism, and achievement for ELLs (Bialystok & Viswanathan, 2009; Green, 1998). When learning two languages, as is the case with ELLs, both languages are always active (Costa, La Heij, & Navarrete, 2006; Green, 1998). Because of this, ELLs have to inhibit one language over the other, strengthening their inhibitory control (Bialystok, 2011; Poarch & va Hell, 2012). Thus, inhibitory control plays an essential role as a way to cognitively manage multiple languages and serves as the foundation for the necessary skills to be successful in kindergarten (Bialystok, 2011; Poarch & va Hell, 2012). Based on this, the present study explored the influence of three family demographic factors on inhibitory control as a key aspect of the school readiness of low-income Spanish-speaking ELLs in preschool.

Family Demographics & School Readiness

Family demographic factors, such as parent education, residential mobility and mother's employment, have been found to be especially important for school readiness in young children (Brooks-Gunn, Berlin, & Fuligni, 2000; Cutuli et al., 2013; Espinosa, 2010). These family demographic characteristics are often related to lower academic outcomes for preschool age children.

Parent Education

In addition to poverty, parent education plays a critical role in the development of low-income children's school readiness (Brooks-Gunn, Berlin, & Fuligni, 2000; Christian, Morrison

& Bryan, 1998; Davis-Kean, 2005; Magnuson, 2007). For example, higher levels of parent education have been correlated to higher achievement and higher rates of English language acquisition among ELLs (Abedi & Dietel 2004; Davis-Kean, 2005; Hakuta et al. 2000; Jepsen & de Alth, 2005). Parents who have higher parent education are more likely to provide high quality home learning environments and resources for their children that results in higher academic achievement compared to parents with lower levels of education (Davis-Kean, 2005; Magnuson, 2007). Previous research has documented parents of ELLs as having lower educational attainment when compared to non-ELLs and their families, which can have a significant influence on access to resources that influence the school readiness skills of young children (Pew Hispanic Center, 2008).

Residential Mobility

High rates of residential mobility have also been shown to be detrimental for children's school readiness (Cutuli et al., 2013; Obradovic et al., 2009; Voight et al., 2012). For example, children who experience multiple moves are more likely to perform poorly on math, literacy, and inhibitory control in the fall of preschool compared to children who move less often (Schmitt, Finders & McClelland, 2015). Research indicates that the negative effects of residential mobility may be the result of the disruption of school attendance and changes in access to community resources, all of which can negatively impact children's school performance (Herbers et al., 2012; Leventhal & Newman, 2010).

Employment

In addition to residential mobility, ELLs are more likely to live in low-income homes and their mothers are less likely to be employed (Espinosa, 2010), when compared to non-ELLs. Research on the influence of parent employment, and specifically mother's employment, has

indicated both positive and negative relations to children's outcomes (Brooks-Gunn, Han & Waldfogel, 2010; Crosnoe, 2004; Espinosa, 2010; Shierholz & Mishel, 2013). For example, some research has documented that employment among low-income mothers was associated with an increase in parenting quality and decrease in stress and conflict (Augustine, 2014; Turner, Guzman, Wildsmith & Scott, 2015). However, other research indicated that mothers' full time employment was associated with lower scores on measures of cognitive development (Brooks-Gunn, Han & Waldfogel, 2010).

Based on previous research indicating the disparities ELLs and their families experience, it is important to explore whether relations between family demographic factors and children's achievement and inhibitory control vary as a function of ELL status (Herbers et al., 2012; Pew Hispanic Center, 2008; McClelland & Wanless, 2012). A more adverse impact of cumulative risk for ELLs can be a potential reason for the variation in the influence of family demographic on achievement and inhibitory control between ELLs and non-ELLs (Hernandez, 2004; Mancilla-Martinez, Christodoulou & Shabaker, 2014). For example, low-income Spanish-speaking ELLs are more likely to experience multiple risk factors, such as poverty, lower parent education, and parent unemployment, when compare to non-ELLs (Child Trends, 2013; Pew Hispanic Center 2011). Additionally, the effect of family demographic factors is more likely to be detrimental for low-income Spanish-speaking ELLs because their families might have less access to resources to address the influence of these factors (Hernandez, 2004). For example, low-income Spanish-speaking ELLs are more likely to have parents who have unstable employment and are less likely to have the social network to find employment, which can extend periods of unemployment (Hernandez, 2014). Exploring ELL status as a moderator can provide an insight on the additional challenges low-income Spanish-speaking ELLs experience as they

attempt to access resources and navigate the school context (Garcia-Coll, Meyer & Brillón, 1995; Gandara & Contreras, 2009). Therefore, the present study focused on the relations among parent education, residential mobility, and mother's employment and children's academic outcomes and inhibitory control and how these relations varied as function of being a Spanish-speaking ELL.

The Present Study

The present study explored the relations between three family demographic factors—parent education, residential mobility, and mother's employment—and the school readiness (early math, early literacy, and inhibitory control) for a sample of low-income Spanish-speaking ELLs and non-ELLs in the fall of preschool. Additionally, it explored if the relation between family demographic factors and school readiness varied as a function of ELL status. Based on previous literature documenting the influence of these family demographic factors—parent education, residential mobility, and mother's employment—on children's school readiness, we expected significant relations between family demographic factors and children's school readiness (Brooks-Gunn, Berlin, & Fuligni, 2000). Specifically, we expected parent education to have a positive and statistically significant relation to children's school readiness, residential mobility to be significantly and negatively related to children's school readiness, and mother's employment to be significantly related to stronger school readiness in children although the research on this is mixed (Brooks-Gunn, Han & Waldfogel, 2010; Crosnoe, 2004; Espinosa, 2010; Magnuson, 2007; Schmitt, Finders & McClelland, 2015). Additionally, we expected that the relations between family demographic factors and school readiness varied as a function of ELL status. In all statistical analyses, we controlled for age, gender, ethnicity, study location, and ELL status based on previous research documenting significant relations among these factors

and children's school readiness (Grissom, 2004; Thompson, 2015; Størksen, Ellingsen, Wanless & McClelland, 2011; Wanless, McClelland, Tominey & Acock, 2011).

Methods

Participants

The sample for the present study consisted of 509 low-income children (50% male) and their families. All children were enrolled in Head Start programs, which was used to identify children as low-income. Teachers identified 30% ($n=153$) of the participating children as Spanish-speaking ELLs. Children who were identified as Spanish-speaking ELLs were 48% male, had an average of age of 54.28 months ($SD= 5.94$), 94% Latino (others included 4% White, 2% other), and had an average parent education level of 9.93 years ($SD= 2.95$). Children who were identified as non-ELLs (70%, $n=356$) were 51% male, had an average of age of 53.65 months ($SD= 6.04$), 59% White (others included 17% Latino, 18% Multi-racial, 6% other), and had an average parent education level of 12.78 years ($SD= 1.92$).

Procedure

The data for the present study were collected as part of a school readiness study in the Northwest of the United States. Children were assessed in early literacy, early math and inhibitory control in the fall of the preschool year. Teachers identified Spanish-speaking ELLs in their classroom. Bilingual research assistants assessed Spanish-speaking ELLs in Spanish in all measures. Parents completed a family demographics questionnaire during the preschool year.

Measures

Demographic Measures

Parent Education. Parents reported total years of educational attainment in a parent survey. If families were in a two-parent household, the highest education level was used for

either mothers or fathers. For ELLs, the average parent education was 9.93 years ($SD= 2.95$) and for non-ELLs the average parent education was 12.78 years ($SD= 1.92$).

Residential Mobility. Parent reported total number of moves in the past five years in a parent survey. Moves ranged from 0-5 ($M=1.09$ moves) for ELLs and 0-20 for non-ELLs ($M=2.43$ moves).

Mother's Employment Status. Mothers reported if they were employed in parent survey. For ELLs, 48% reported being unemployed and 52% reported being employed. For non-ELLs, 60% reported being unemployed and 40% reported being employed.

Achievement

Early Math. Children's early math was measured using the Applied Problems Subtest Woodcock Johnson Tests of Achievement-III (Woodcock & Mather, 2000) or the Problemas Aplicados Bateria III Woodcock- Muñoz (Muñoz-Sandoval, Woodcock, McGrew, & Mather, 2005). In a similar sample, the Applied Problems Subtest had Cronbach's alphas of 0.87 for ELLs and .85 for non-ELLs (Schmitt, Geldhof, Purpura, Duncan & McClelland, 2015).

Emergent Literacy. Children's emergent literacy was assessed using the Letter-Word Identification Subtest Woodcock Johnson Tests of Achievement-III (Woodcock & Mather, 2000) or the Identificacion de Palabras y Letras Bateria III Woodcock- Muñoz (Muñoz-Sandoval, Woodcock, McGrew, & Mather, 2005). In a similar sample, Letter-Word Identification Subtest had Cronbach's alphas of 0.83 for ELLs and .89 for non-ELLs (Schmitt et al., 2015).

Inhibitory Control

Inhibitory Control. Children's inhibitory control was measured using the Day-Night Stroop (Gerstadt, Hong, & Diamond, 1994). Children were instructed to respond to the

moon/star picture card as “day” and the sun picture card as “night.” In the current sample, Day-Nigh Stroop had a Cronbach's alpha of .90 for ELLs and .92 for non-ELLs.

Results

The present study examined the relations between three family demographic factors- parent education, residential mobility, and mother’s employment- on low-income preschoolers’ (Spanish-speaking ELLs and non-ELLs) achievement, and inhibitory control. Additionally, it explored if these relations varied by ELL status concurrently at the fall of preschool.

Analytic Strategy

Data analyses were conducted using Stata 13.0 (StataCorp., 2013). Concurrent regression models controlled for gender, age, study location, ELL status, and ethnicity. To explore the relation between the three family demographic factors on school readiness in the first research question concurrent individual regression models were conducted using the sem command with the maximum likelihood with missing values (mlmv) option to address missing data, which uses all available information to provide a maximum likelihood of estimation (Acock, 2012). For the second research question, interactions terms were created between ELL status and the three family demographic factors to explore if the relations between family demographic factors and school readiness varied by ELL status. Individual regression models were then conducted using the sem command with the maximum likelihood with missing values (mlmv) option to address missing data.

Missing Data: Data were missing on the following variables parent education (27%); residential mobility (29%); mother’s employment (25%); early math (8%); early literacy (0%); and inhibitory control (9%). Missing data were assumed to be missing at random (MAR). To examine the MAR assumption for these data, tests were conducted to determine if auxiliary

variables were related to missingness. Logistic regressions were run using dummy variables for variables with >5% missingness (0= not missing; 1=missing). Variables used to predict missingness included variables from the current analyses as well as demographic variables theoretically related to missingness (e.g., ethnicity, marital status, parental age). None of the auxiliary variables included in the model predicted missingness, therefore, it is reasonable to assume that missing data were missing at random. Maximum likelihood of estimation was used to handle missing data. Maximum likelihood uses all available information to reduce potential bias (Acock, 2012).

Descriptive Statistics. Means, standard deviations, and ranges for all study variables for low-income Spanish-speaking ELLs and low-income non-ELLs can be found in Table 1.1. Correlation for the combined sample of Spanish-speaking ELLs and non-ELLs can be found in Table 1.2. Correlations are provided in Table 1.3 for Spanish-speaking ELLs and for non-ELLs. Correlations for the combined sample indicated that parent education was significantly and positively correlated with early math and study location. Residential mobility and mother's employment were not significantly related to school readiness measures for the combined sample. Correlations indicated that for Spanish-speaking ELLs, parent education was significantly and positively related to early literacy and mother's employment status. For non-ELLs, parent education was significantly and negatively related to mobility, and positively related to early math and early literacy. Residential mobility and mother's employment were not significantly related to school readiness measures for low-income Spanish-speaking ELLs and non-ELLs. For residential mobility, additional diagnostics were conducted to assess the influence of potential outliers. Three outliers were excluded from the models. The pattern of results remained consistent with and without the three outliers.

Research Question 1: What is the relation between three *demographic factors*- parent education, residential mobility, and mother's employment status- on early literacy, early math and inhibitory control for low-income (Spanish speaking ELLs and non-ELLs) preschoolers?

Using concurrent regression models in the fall of preschool and controlling for age, gender, ethnicity, ELL status, and study location, the relations between parent education, residential mobility and mother's employment status and early literacy, early math and inhibitory control were evaluated in a sample of low-income preschoolers (Spanish-speaking ELLs and non-ELLs). Results indicated that parent education was significantly and positively related to early literacy ($\beta = .17, p = .005$) and early math ($\beta = .10, p = .052$) at the fall of preschool. Children whose parents had higher education scored significantly higher on measures of early literacy and early math than children whose parents had lower education. However, parent education was not significantly related to inhibitory control. Residential mobility and mother's employment were not significantly related to early literacy, early math or inhibitory control (see Table 1.4).

Research Question 2: Does the relationship between family demographic factors and emergent literacy, math and inhibitory control vary as a function of ELL status in a low-income sample of preschoolers?

To assess if the relations between family demographic factors, achievement and inhibitory control vary as a function of being classified as an ELL in a low-income preschool sample, interaction terms between parent education, residential mobility, and mother's employment and ELL status were created to include in concurrent regression models in the fall of preschool. After controlling for age, gender, ethnicity, and study location results indicated that

the relation between residential mobility and early math varied as a function of ELL status. Specifically, children who were ELLs scored significantly lower on early math for each additional residential move compared to children who were not ELLs (see Figure 1.1). In contrast, the relations between residential mobility and early literacy and inhibitory control did not vary as function of ELL status nor did relations between parent education and mother's employment and school readiness (early literacy, early math and inhibitory control; see Table 1.5).

Discussion

In the current study we explored the relations between three family demographic factors—parent education, residential mobility and mother's employment—and school readiness (early literacy, early math and inhibitory control). In addition, we explored if the relations between family demographic factors and school readiness varied as a function of ELL status. Results indicated that parent education was significantly and positively related to early literacy and early math. Children whose parents had higher education scored higher on measures of early literacy and early math than children whose parents had lower education, but parent education level was not significantly related to children's inhibitory control. In addition, residential mobility and mother's employment were not statistically significantly related to early literacy, early math and inhibitory control. Results also indicated that the relations between residential mobility and early math varied as a function of ELL status indicating that children who are Spanish-speaking ELLs scored lower on early math with each additional residential move. However, the relations between residential mobility and early literacy and inhibitory control did not vary as a function of ELL status, nor did relations between parent education, mother's employment and school readiness.

Family Demographic Factors and School Readiness

Previous research has documented the influence of these three family demographic factors—parent education, residential mobility and mother’s employment—for children’s school readiness. (Butler, Satenvens & Castellon, 2007; Cadima, Gamelas, McClelland & Peixoto, 2015; Espinosa, 2013; Genesse, Lindholm-Leary, Saunders & Christina, 2005). Consistent with previous research results indicated that parent education had a statistically significant relation to early math and early literacy for children in the fall of preschool (Davis-Kean, 2005; Magnuson, 2007). These results indicate the important relation between parent education and children’s academic achievement and suggest the importance of high quality parent education programs. In contrast to previous research, the present study did not find significant relations between parent education and inhibitory control. Exploring the relations between parent education, self-regulation, and each of the components (e.g. working memory, attention, inhibitory control) can provide a more comprehensive explanation of the role of parent education in the development of self-regulation for low-income Spanish-speaking ELLs. In addition, the relations between residential mobility, mother’s employment and measures of school readiness were not statistically significant in this sample of low-income of preschoolers (Brooks-Gunn, Han & Waldfogel, 2010; Obradovic et al., 2009).

The non-significant relations between parent education and inhibitory control and between residential mobility, mother’s employment, and measures of school readiness may indicate the need to explore these relations in samples that includes either only low-income ELLs or in larger datasets in which researchers can create comparable samples of ELLs and non-ELLs through matching methods such as propensity score matching. Evaluating these relations in samples of only ELLs can inform the need to include additional factors such as length of

residence in the US, immigration status, and/or discrimination experiences that can uniquely influence the experiences of low-income ELLs (Hill & Torres, 2010). Exploring these relations with larger datasets can help to further elucidate the relations between family demographic factors and measures of school readiness when including a larger percentage of low-income ELLs and low-income non-ELLs. Additionally, these results can potentially indicate the need to expand measures of residential mobility and mother's employment. For example, including reasons for residential mobility, number of hours employed, and length of unemployment can provide comprehensive information on the residential moves and employment of low-income preschoolers and their families. Because ELLs are more likely to have parents who experience unstable employment, they are less likely to have the social network and formal education to access other employment opportunities resulting in longer periods of unemployment. Additional information can help to elucidate the influence of these factors on low-income ELLs' school readiness.

English Language Learners Status

Although previous research on how the relations between family demographic factors and school readiness vary as function of ELL status is limited, the present study found that the relation between residential mobility and early math varied as a function of ELL status indicating that children who are Spanish-speaking ELLs score lower on early math for each additional residential move. Although low-income Spanish-speaking ELLs experienced fewer moves, it is possible that residential mobility has a more adverse impact on Spanish-speaking ELLs because these children and their families are less likely to have access to resources (Child Trends, 2013; Hernandez, 2004; Mancilla-Martinez, Christodoulou & Shabaker, 2014). For example, Spanish-speaking ELLs and their families are more likely to experience challenges such as language

barriers when attempting to access resources to ameliorate the effect of these factors (Hernandez, 2004). Differences by ELL status emphasizes the need to provide additional support for Spanish-speaking ELLs and their families to address the challenges experienced when accessing resources and navigating the school context.

The relations between residential mobility and early literacy and inhibitory control did not vary as a function of ELL status, nor did the relation between parent education and mother's employment and school readiness. These results may indicate that these family demographic factors may not have a different influence on children who are low-income Spanish-speaking ELLs when compared to non-ELLs. Based on the present results indicating that the influence of parent education did not vary as function of ELL status and previous research documenting the importance of parent education for achievement, it becomes increasingly important to support programs that promote parent education among low-income parents. Although the relations between residential mobility and early literacy and inhibitory control and parent education, mother's employment and school readiness did not vary as a function of ELL status, future research should continue to explore these relations in larger samples given that the current research on this is limited. Further exploring and elucidating the influence of family demographic factors among low-income Spanish-speaking ELLs can highlight the need to provide programs focused on supporting the needs of families in addition to the individual needs of the student in the school context.

Limitations and Future Directions

This study contributes information to understanding the relations between family demographic factors and school readiness and how the relations vary as a function of ELL status. The present study, however, had a number of limitations. For example, my measures of

mother's employment and residential mobility were limited. I only had one question asking if mothers were employed or not and one question asking the number of moves in the past five years. Future research should explore more comprehensive measures of employment and residential mobility. For example, exploring the different types of employment and exploring the influence of father's employment to obtain a comprehensive picture of whether mother's and father's employment influence children's school readiness differently. Additionally, further exploring the types of moves and reasons for moving could provide additional information to understand the influence of residential mobility on children's school experiences.

This study was also limited in the method for determining ELL status and in exploring ELL status for low-income Spanish-speaking ELLs. Children's teachers determined ELL status. Future research should include direct measures to assess English language proficiency and determine ELL status in preschool children. Additionally, these results only provide information for how the relations between family demographic factors and school readiness vary as a function of ELL status for low-income Spanish-speaking ELLs. It is essential to explore how these relations might vary for ELLs who speak other languages. ELLs who speak other languages might also have different experiences with residential mobility, parent education, and mother's employment. Understanding the relations between family demographics and school readiness for ELLs of other languages can provide information for programs and schools on the different experiences and needs of non Spanish-speaking ELLs.

Practical Implications

The findings of the present study have potential implications for programs, schools and policies aimed at addressing the needs of low-income Spanish-speaking ELLs and their families. Understanding how family demographic factors such as residential mobility differs for low-

income Spanish-speaking ELLs when compared to non-ELLs can help guide programs and efforts to address the achievement gap among ELLs as they enter kindergarten. These results indicate the need to address not only the needs of students as they enter school, but also the needs of the families to improve the school experiences of low-income Spanish-speaking ELLs and their families.

These results highlight the gaps that need to be address to better serve low-income ELLs in preschool. To serve ELLs in preschool there is a need to expand policies and practices that address the educational needs of these children. For example, the need to develop a formal defintion of ELL for children who are attending preschool and the challenges of assessing ELLs with standardized assessments. Currently, there is no formal defintion of ELL for children in preschool. To further understand the academic development of ELLs in preschool it is important to develop a clear and consitent defintion of ELL status. Developing a formal definition of ELL can provide guidance on academic expectations and language development of ELLs in preschool. Additionally, it can have implications for supports and services offered for children and their families. Additionally, providing teacher trainings focused on best teaching practices for ELLs can improve the educational experiences of ELLs in the preschool classroom. Providing teachers with additional training on teaching ELLs can improve the classroom instruction and help develop the academic and language foundation ELLs. Implementing policies and practices such as the ones described above can help to reduce the achievement gap for ELLs in preschool and help provide the necessary skills for kindergarten.

Conclusion

The current study contributes to existing literature by exploring the relations between three demographic factors—parent education, residential mobility, and mother’s employment—

and school readiness (early math, early literacy and inhibitory control) and how these relations vary as a function of ELL status. Efforts by schools, districts, and states to understand how the experiences of ELLs might differ from non-ELLs to provide adequate support for the unique needs of ELLs and their families has become a key aspect of school policies. Having an understanding of the needs of ELLs and their families can help to provide adequate resources and programing to address the additionally challenges ELLs and their families encounter as the navigate the school systems and make efforts to prepare their children for kindergarten.

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Table 1.1: *Descriptive Statistics for Major Study Variables (N=509)*

Variable	ELLs			Non-ELLs		
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range
Parent Education	9.93	2.95	2-15	12.78	1.92	8-21
Mobility	1.09	1.07	0-5	2.42	2.29	0-20
Employment	.51	.50	0-1	.40	.49	0-1
Early Math	337.00	31.81	301-442	395.57	27.35	318-449
Early Literacy	318.43	24.10	264-402	316.60	23.85	264-392
Inhibitory Control	23.05	8.76	0-32	19.41	9.93	0-32

Note. Employment status 1= employed 0=unemployed

Table 1.2: *Correlations for Major Study Variables (N=509)*

Variables	1	2	3	4	5	6	7	8	9	10
1. Parent Education	–									
2. Mobility	.09	–								
3. Employment	-.01	-.09	–							
4. Early Math	.23***	.04	.00	–						
5. Early Literacy	.10	-.08	-.03	.04	–					
6. Inhibitory Control	-.05	-.06	.02	.24***	.01	–				
7. Child age	.03	-.06	.10*	.46***	-.03	.23***	–			
8. Child gender	.03	.02	.03	-.09*	.02	-.09	-.06	–		
9. Child ethnicity	-.07	-.11*	.00	-.12*	-.01	.04	-.01	-.06	–	
10. Study location	-.12*	-.07	-.05	-.35***	.04	-.17**	-.37***	.00	.08	–

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

Table 1.3: *Correlations Between Main Study Variables for ELLs and non-ELLs (N=509)*

Variables	1	2	3	4	5	6	7	8	9	10
1. Parent Education	–	.07	.19*	.00	.15*	.02	.07	.15	-.08	-.05
2. Mobility	-.13*	–	-.01	-.17	-.13	-.14	-.06	-.11	.15	-.01
3. Employment	.04	-.06	–	.06	-.02	.06	.05	.03	.03	.00
4. Early Math	.21**	-.02	.04	–	.35***	.45***	.55***	-.10	-.15	-.27**
5. Early Literacy	.19**	-.06	.06	.54***	–	.15	.03	-.09	.02	-.01
6. Inhibitory Control	.06	.02	-.03	.26***	.34	–	.21*	-.15	.09	-.14
7. Child age	.08	-.06	.12*	.47***	-.06	.24***	–	.02	-.05	-.44***
8. Child gender	.01	.03	.03	-.08	.08	-.07	-.09	–	.08	-.17*
9. Child ethnicity	.02	-.06	-.03	-.10	-.00	.01	-.01	-.10	–	.11
10. Study location	-.14*	-.05	-.10	-.38***	.06	-.20***	-.35***	.07	.07	–

Note: Correlations for ELLs (n=153) are on the top of diagonal. Correlations for non-ELLs (n=356) are on the bottom of diagonal.

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

Table 1.4: *Final Regression Models for Demographic Factors Predicting School Readiness (N=509)*

Variable	<i>B</i>	<i>SE B</i>	β
Parent education			
Early Literacy	1.51	.54	.17**
Early Math	1.08	.56	.10*
Inhibitory Control	.15	.22	.04
Residential Mobility			
Early Literacy	-.77	.62	-.06
Early Math	-.57	.64	-.04
Inhibitory Control	-.01	.26	-.00
Employment			
Early Literacy	.31	2.46	.00
Early Math	-.30	2.53	-.00
Inhibitory Control	-.40	.05	-.02

Note. Individual regression models controlled for age, gender, study location, ELL status, and ethnicity.

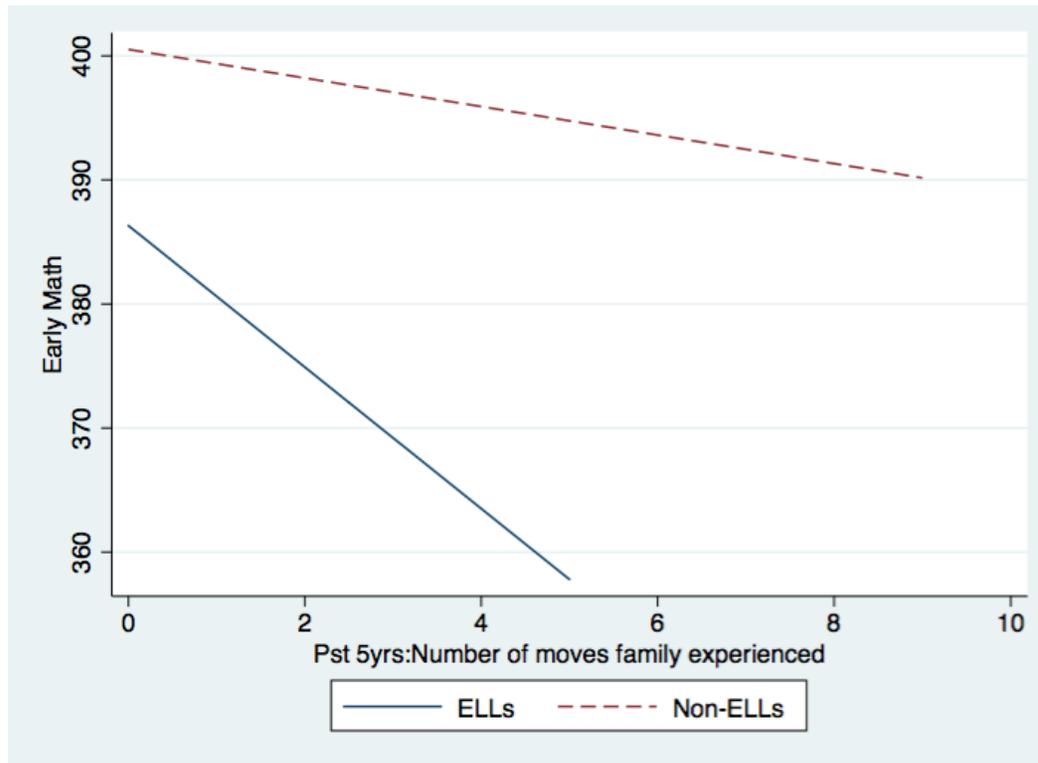
* $p < .05$. ** $p < .01$.

Table 1.5: *Final Regression Models for Demographic Factors Predicting School Readiness Variation by ELL Status (N=509)*

Variables	<u>Early Literacy</u>			<u>Early Math</u>			<u>Inhibitory Control</u>		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
ELLxParentEduc	1.96	.79	-.16	-2.02	1.10	-.37	-.15	.45	-.07
Parent Education	-.82	1.07	.22*	2.15	.81	.20**	.25	.32	.07
ELL status	14.81	12.64	.29	9.80	12.98	.16	6.12	5.22	.28
ELLxMobility	-1.83	2.17	-.06	-4.64	2.25	-.13*	-1.31	.97	-.10
Mobility	-.60	.64	-.05	-.17	.66	-.01	.12	.26	.02
ELL status	2.49	3.91	.04	-11.79	3.98	-.19**	5.46	1.65	.25***
ELLxEmp	-4.06	5.20	-.06	1.37	5.37	.02	1.73	2.20	.07
Employment	1.65	2.99	.03	-.74	3.06	-.01	-.96	1.25	-.05
ELL status	2.94	3.64	.06	-16.99	3.76	-.27***	3.06	1.52	.14*

Note. ELLxParentEduc= ELL and parent education interaction; ELLxMobility= ELL and residential mobility interaction; ELLxEmp=ELL and employment interaction. All models controlled for age, gender, ethnicity, study location and ELL status.
 * $p < .05$, ** $p < .01$, *** $p < .001$

Figure 1.1: *Interaction Between ELL Status and Mobility For Early Math in Fall of Preschool (N=509)*



Links between English language proficiency, achievement and
self-regulation: A focus on low-income Spanish-speaking English language learners in
kindergarten.

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Abstract

The present study compared children's performance on the statewide Oregon Kindergarten Assessments (early literacy, early math, and self-regulation) for low-income non-English Language Learners (non-ELLs) and low-income Spanish-speaking ELLs. Additionally, it explored the relations between English language proficiency and performance on Kindergarten Assessments for low-income Spanish-speaking ELLs. Participants included a low-income subsample of non-ELLs and Spanish-Speaking ELLs (n=21,623) entering kindergarten in the fall of 2013. Results indicated that, after controlling for ethnicity and gender, non-ELLs performed significantly higher in early math (administered in English for non-ELLs and Spanish for Spanish-Speaking ELLs) and early literacy (letter names & letter sounds; administered in English in both non-ELLs and Spanish-Speaking ELLs) than Spanish-speaking ELLs. There were no significant differences in self-regulation skills between Spanish-Speaking ELLs and non-ELLs. Furthermore, English language proficiency had a positive relation to low-income Spanish-speaking ELLs' scores on the Kindergarten Assessments. Specifically, children with higher English language proficiency scored higher on measures of English literacy, Spanish math, and self-regulation than children with lower English language proficiency at kindergarten entry. The current study contributes to existing literature by exploring the performance of low-income Spanish-speaking ELLs and non-ELLs on the Oregon Kindergarten Assessment and the role of English language proficiency on the achievement and self-regulation of Spanish-Speaking ELLs.

Links between English language proficiency, achievement and self-regulation: A focus on Low-Income Spanish-speaking English Language Learners in Kindergarten.

English Language Learners (ELLs) represent a culturally and linguistically diverse population in US schools. ELLs enter kindergarten with a range of academic and self-regulation skills, but can face multiple challenges as they enter kindergarten, such as lower academic achievement, lower self-regulation skills, and limited English language proficiency when compared to non-ELLs (Fuligni & Howes, 2011; Genesee, Lindholm-Leary, Saunders, 2006; Good, Masewicz & Vogel, 2010; Wanless, McClelland, Tominey & Acock, 2011). In addition to lower academic achievement, the current demographic shift in the US indicates growth in the number of students from non-English speaking backgrounds. These students are also more likely to be Spanish-Speaking ELLs and live in poverty, which is related to lower academic achievement and lower self-regulation skills (Dearing, Berry & Zaslow, 2006; Evans & Rosenbaum, 2008; Migration Policy Institute, 2015). As a result, a number of national and state efforts focus on improving and supporting the academic and linguistic needs of ELLs to reduce the achievement gap between ELLs and non-ELLs in the United States. In addition to current efforts to address the achievement gap among ELLs, states are also making efforts to develop kindergarten assessment measures to acquire information on children's early learning experiences. For example, the Oregon Kindergarten Assessments focuses on assessing achievement (early math and early literacy), as well as self-regulation and interpersonal skills (Oregon Kindergarten Assessment, 2015).

ELLs are a growing portion of the student population and include about 10% of the nation's K-12 students (Migration Policy Institute, 2015). In the state of Oregon, ELLs comprised 19% of kindergarten students in the 2013-2014 school year and about 10% of all K-12 students and of ELLs 74% are identified as Spanish-speaking (Oregon Department of Education, 2014). It is expected that the population of ELLs will continue to grow and make up a substantial portion of the K-12 student population (Fry, 2008; Wolf, Kao, Griffin, Herman, Bachman, Chang & Farnsworth, 2008). Given the current educational difficulties and the expected rate of growth among ELLs, specifically low-income Spanish-speaking ELLs, it is critical to understand the skills low-income Spanish-speaking ELLs have as they enter school in order to strengthen the academic achievement of this group. It is important to note that a variety of terms such as Language Minority students, Limited English Proficiency, English Learners, Dual Language Learners and ELLs are used to identify these students, but the term ELL has specific policy implications for services provided by schools for these students (Espinosa, 2010; Linquanti, Cook, Bailey & MacDonald, 2016). For the purpose of the present study, ELLs will be used to identify students who are learning English. ELLs are defined in federal laws and policies as an individual:

“ (A) who is aged 3 through 21; (B) who is enrolled or preparing to enroll in an elementary school or secondary school; (C)(i) who was not born in the United States or whose native language is a language other than English; (ii)(I) who is a Native American or Alaska Native, or a native resident of the outlying areas; and (II) who comes from an environment where a language other than English has had a significant impact on the individual's level of English language proficiency; or (iii) who is migratory, whose native language is a language other than English, and who comes from an environment where a language other than English is dominant; and (D) whose difficulties in speaking, reading, writing, or understanding the English language may be sufficient to deny the individual — (i) the ability to meet the State's proficient level of achievement on State assessments described in section 1111(b)(3); (ii) the ability to successfully achieve in classrooms where the language of instruction is English; or (iii) the opportunity to participate fully in society” (Every Student Succeeds Act (ESSA), 2016).

A variety of demographic and individual factors such as low-income status, English language proficiency, and individual self-regulation skills, have all been found to play a role in children's academic achievement and self-regulation (Butler, Satenvens & Castellon, 2007; Espinosa, 2013; Espinosa, 2010; Genesse, Lindholm-Leary & Christina, 2005; Wanless, McClelland, Tominey & Acock, 2011). Additionally, ELLs are more likely to come from low-income households, which may influence their learning opportunities (Grissom, 2004; Hakuta, Goto Butler & Witt, 2000; Zong & Batalova, 2015). For example, low-income ELLs score significantly lower than their English-speaking peers on early academic skills such as literacy and math when measured in English (Genesse, Lindholm-Leary, Saunders & Christina, 2005; Espinosa 2010). Additionally, ELLs who come from low-income families are more likely to have lower English language proficiency (Hakuta, 2000). Less research, however, has examined the relations between factors such as self-regulation, academic achievement, and English language proficiency in low-income Spanish-speaking ELLs in kindergarten. Using data from the Oregon Kindergarten Assessments, the present study examined performance on the Oregon Kindergarten Assessments and English language proficiency among low-income Spanish-speaking ELLs in kindergarten. Two questions were investigated: 1) how do low-income Spanish-speaking ELLs perform on the Kindergarten Assessments when compared to low-income non-ELLs; and 2) how does English language proficiency relate to Kindergarten Assessments scores for low-income Spanish-speaking ELLs.

Assessing the Skills of English Language Learners

Addressing the achievement gap among low-income ELLs presents two main challenges: 1) understanding the academic development of low-income ELLs, and 2) having appropriate assessments to evaluate achievement and English language proficiency among low-income ELLs

(Butler & Castellon-Wellington, 2000/5; Butler, Stevens & Castello, 2007; Espinosa, 2013; Genesse, Lindholm-Leary, Saunders & Christina, 2005; Stevens, Butler & Castellon-Wellington, 2000). Research has documented the challenges related to standardized testing for ELLs. On the one hand, issues with reliability, having adequate accommodations, and the role of language on the performance on standardized assessments have been documented (Boals, et al., 2015; Bronwyn, 2002; Linqanti, 2011). For example, Stevens, Butler and Castellon-Wellington (2000) found that when analyzing the relationship between English language proficiency and standardized assessments among ELLs, the assessments were only moderately correlated to English language proficiency. On the one other hand, but Hopkins, Thompson, Linqanti, Hakuta & August (2013) found a substantive and statistically significant relation between English language proficiency and standardized academic assessments. Limited information is currently available on ELLs' academic achievement and self-regulation skills as they enter kindergarten. Despite the challenges and mixed results around standardized assessments for ELLs, however, it is critical to gather information to obtain a better understanding of the academic development of ELLs. A better understanding of ELLs' academic development can inform programs and policies to provide appropriate academic and linguistic supports to ensure equitable educational experiences (Boals, et al., 2015; Linqanti, Cook, Bailey, & MacDonald, 2016). Therefore, the present study used Oregon's Kindergarten Assessments data to compare performance on Oregon's Kindergarten Assessments between low-income Spanish ELLs and low-income non-ELLs and explore the influence of English language proficiency on Kindergarten Assessments scores for low-income Spanish-speaking ELLs. Using standardized assessments, such as Oregon's statewide Kindergarten Assessments, provides a unique opportunity to extend previous research by providing a better understanding of the academic

development and self-regulation skills of large numbers of low-income Spanish-speaking ELLs as they enter kindergarten in the state of Oregon.

Defining Self-Regulation and English Language Proficiency

English language proficiency and self-regulation have been identified as key factors influencing the academic achievement of low-income Spanish-speaking ELLs (Linguanti, Cook, Bailey, & MacDonald, 2016; Wanless, McClelland, Tominey & Acock, 2011). Definitions for the English language proficiency and self-regulation for the present study are provided below.

English Language Proficiency. Currently there is no consistent definition of English language proficiency, which can vary by state, district, and school. For the purposes of the present study, English language proficiency was defined as having the English language skills needed to access instruction and meet the language demands of the academic context in classroom settings (Butler & Bailey, 2007; Linguanti, Cook, Bailey, & MacDonald, 2016). On average it takes students 4-7 years to obtain English language proficiency when entering kindergarten as ELLs (Hakuta et al., 2000; Thompson, 2015). Because students are officially identified as ELLs when they entered kindergarten, it is critical to explore the relations between English language proficiency, self-regulation skills, and academic achievement in kindergarten to identify the linguistic and academic supports needed for ELLs as they move through early schooling.

Self-Regulation. Previous research has provided multiple definitions to conceptualize self-regulation in young children (Cole, Martin, & Dennis, 2004; Rueda, Posner, & Rothbart, 2004). Generally, self-regulation has been defined as a construct that includes the regulation of emotions, behaviors, and cognition (McClelland, Cameron Ponitz, Messersmith & Tominey, 2010). The present study focuses on behavioral aspects of self-regulation, which stem from the

executive function components of working memory, attention, and inhibitory control. *Working memory* is defined as storing information while processing new information (Siegel & Ryan, 1989). For example, a child remembering multiple steps to complete an activity in the classroom is an example of working memory in the classroom context. *Attention* includes resisting distractions and shifting attention when necessary (Morrison, Cameron Ponitz & McClelland, 2010). In a classroom environment, the ability to maintain attention helps a child pay attention during large group time and shifting attention when it is time to transition to another activity. *Inhibitory control* refers to inhibiting an automatic response in favor of a more adaptive reaction (Morrison et al., 2010). A child raising his hand and waiting for the teacher to call on him instead of shouting an answer is an example of inhibitory control. The three behavioral components of self-regulation—working memory, attention, and inhibitory control—have been documented as being essential for children to be successful as they enter kindergarten (Blair, 2002). Previous research has documented self-regulation and English language proficiency as key aspects of academic achievement for ELLs (Bialystok & Viswanathan, 2009; Wanless et al., 2011). Therefore, the present study explored the relations between English language proficiency and self-regulation skills for low-income Spanish-speaking ELLs.

English Language Proficiency and Academic Achievement

Recent educational efforts have focused on supporting and improving the academic achievement of low-income ELLs. Low-income ELLs are at the highest risk for difficulties in math and reading (Espinosa, 2007; Fitzgerald, 1993). Research has documented the multiple challenges low-income ELLs face when entering formal schooling and the lack of sufficient teacher training, appropriate classroom materials, and school support to effectively teach the increasing number of ELLs (Chang, et al. 2007; Espinoza, 2010; Fuligni & Howes, 2011;

Gandara, Maxwell-Jolly & Driscoll, 2005; Lucas, Villegas, Freedson-Gonzales, 2008; Stanovitch, Jordan, & Perot, 1998). For example, Gandara, Maxwell-Jolly and Driscoll (2005) found that teachers reported the lack of appropriate materials and training for working with ELLs as some of the main challenges for effectively addressing the academic and linguistic needs of ELLs in their classrooms. Having adequate training and materials to support the language development of ELLs may be a potential strategy to address the achievement gap among low-income ELLs (Vitiello, Downer & Williford, 2011; Burchinal, Field, Lopez, Howes & Pianta, 2011).

Addressing the achievement gap between low-income ELLs and non-ELLs has become critical for schools, especially under educational laws and policies such as Every Student Succeeds Act, which demands disaggregation of student achievement data by ELL status. Additionally, the Every Student Succeeds Act requires schools to demonstrate student progress in language proficiency and achievement under their accountability system to ensure educational equity for ELLs (ESSA, 2016). In addition to the challenges with evaluating the achievement of low-income ELLs, it is critical to understand how factors such as English language proficiency influences the achievement of ELLs. A deeper understanding of how English language proficiency is related to achievement can support the academic and linguistic needs of low-income ELLs (Espinosa, 2013). Previous research has documented that achievement among ELLs can vary by English language proficiency levels and by the length of time it takes to achieve English language proficiency (Espinosa, 2010; Genesse, Lindholm-Leary, Saunders & Christina, 2005; Halle, Hair, Wandner, McNamara & Chien, 2012). ELLs with higher levels of English language proficiency have higher achievement in reading and math when compared to those with lower levels of English language proficiency (Espinosa, 2013; Chesterfield et al.,

1983). Moreover, children who achieved English language proficiency by the time they entered kindergarten performed similarly in academic assessments when compared to non-ELLs (Espinosa, 2013; Chesterfield et al., 1983).

Additionally, self-regulation has been documented as a predictor of children's academic achievement because it can serve as a protective factor for children experiencing challenges in the school context (McClelland & Wanless, 2012). Yet, most research and interventions have focused on exploring the connections between literacy development and English language proficiency as a strategy to reduce the achievement gap among low-income ELLs (Burchinal, Field, Lopez, Howes, Pianta, 2012; Hoff, 2013; Slavin & Cheung, 2005). Fewer studies have focused on understanding the relations between English language proficiency and self-regulation as a potential mechanism to support the academic achievement of low-income Spanish-speaking ELLs. The present study explored the influence of English language proficiency on Kindergarten Assessments scores among low-income Spanish-speaking ELLs in kindergarten.

Self-regulation and Academic Achievement

Previous research suggests that self-regulation can serve as a protective factor for children who experience risk and is a key component for academic achievement (Lengua, 2002; McClelland, Acock, & Morrison, 2006). For example, one study found that children's learning-related skills, which include aspects of self-regulation and social skills, predicted reading and math between kindergarten and sixth grade, and growth in math and reading between kindergarten and second grade (McClelland, Acock, & Morrison, 2006). Additionally, self-regulation skills can be improved through interventions (Arnold et al., 2006; Blair, 2002; Blair & Razza 2007; McClelland et al., 2007; Ponitz, McClelland, Matthews & Morrison, 2009; Raver et al., 2011). For example, previous research has documented that improving children's self-

regulation through intervention programs can improve children's academic skills, specifically for low-income Spanish-speaking ELLs (Schmitt, McClelland, Tominey & Acock, 2015; Tominey & McClelland, 2011). Although self-regulation can serve as a potential mechanism to support achievement of low-income ELLs, we know less about the relation between self-regulation and English language proficiency in this group of children.

The Present Study

The present study compared the performance of low-income, Spanish-speaking ELLs and non-ELLs on the Oregon statewide Kindergarten Assessments (literacy, math, and self-regulation) and also examined the relation between English language proficiency and Kindergarten Assessments scores for low-income Spanish-speaking ELLs. Based on previous literature documenting that low-income ELLs lag behind in achievement and self-regulation skills when compared low-income non-ELLs (Butler, Stevens & Castellon, 2007; Espinosa, 2010; Wanless, McClelland, Tominey, & Acock, 2011), we expected that low-income Spanish-speaking ELLs would have lower scores on the Kindergarten Assessments when compared to low-income non-ELLs. The relation between English language proficiency and Kindergarten Assessments scores among low-income kindergartens has not been previously evaluated, but previous research has documented the importance of English language proficiency for achievement (Halle, Hair, Wandner, McNamara & Chien, 2012; Schmitt, McClelland, Tominey & Acock, 2015). Therefore, we expected that English language proficiency would influence low-income Spanish-speaking ELLs' scores on the Kindergarten Assessments. In all statistical analyses, we controlled for gender and ethnicity because, based on previous research, documenting strong relations between gender, ethnicity, achievement, self-regulation, and

English language proficiency (Grissom, 2004; Thompson, 2015; Størksen, Ellingsen, Wanless & McClelland, 2011).

Methods

Sample

The sample for the present study was part of the Kindergarten Assessments data collected in the State of Oregon. The sample was composed of 43,072 entering kindergarteners in the 2013-2014 academic year. The present study focused on low-income Spanish-speaking ELLs and low-income non-ELLs entering kindergarten, which made up 50% (n= 21,623) of entering kindergarteners. Low-income was defined as qualifying for free and reduced-price lunch. Low-income Spanish-Speaking ELLs made up 24% (n= 5,225) of low-income kindergartens, 50% of low-income Spanish-Speaking ELLs were female, 97% Latino (others included 2% White, 1% Other) and 11% qualified for special education. Low-income non-ELLs (n=16,398) were 49% female, 69% White (others included 17% Latino, 7% Multi-Ethnic, 4% African American, 2% Native American; 2% Asian/Pacific Islander) and 13% qualified for special education.

Procedure

Before Spanish-speaking ELLs can be tested on the Kindergarten Assessments in Spanish, children have to be officially identified as Spanish-speaking ELLs by their attending district. After the district officially identifies children as ELLs, Spanish-speaking ELLs can be assessed in Spanish on the Kindergarten Assessments and their English language proficiency is assessed yearly.

Procedure to officially identify ELLs. Before the start of kindergarten children have to be officially identified as ELLs by each school district. During kindergarten registration, parents completed a home language survey to identify their child's home language. If any language

other than English was indicated as the home language, children's English language proficiency was evaluated using a state approved language assessment administered by the school. Districts can choose to use one of the following language proficiency assessments: Woodcock-Muñoz Language Survey, Idea Proficiency Test, Language Assessment Scale or the Stanford Proficiency Test. Currently the State of Oregon is moving towards using one assessment across the state. After children were officially identified as ELLs, Spanish-speaking ELLs were then tested in Spanish in the Kindergarten Assessments.

Procedure to administer Kindergarten Assessments. The data for the present study were collected as part of the Kindergarten Assessments in the state of Oregon administered in the fall (September-October) of kindergarten. All children entering kindergarten were evaluated in early math and early literacy: letter names & letter sounds within the first three weeks in the fall of the Kindergarten year. Early math was administered in English for non-ELLs or Spanish for ELLs and Early Literacy was only assessed in English for both ELLs and non-ELLs. Teachers rated children's self-regulation in the classroom within the first six weeks in the fall of kindergarten.

Procedure to assess English language proficiency. English language proficiency for the present study was assessed for Spanish-speaking ELLs in the winter (January-March) of kindergarten. Based on the English Language Proficiency (ELPA) assessment, children's English language proficiency can vary from beginner (level 1) to advance (level 5) in Kindergarten. On average it takes children one to two years to gain one level of English language proficiency (Martinez & Rew, 2015).

Measures

English Language Proficiency. Children's English language proficiency was measured in the winter (January-March) of kindergarten using the English Language Proficiency Assessment (ELPA) (Oregon Department of Education, 2015). ELPA scores are a composite score of four dimensions: writing, reading, listening and speaking. ELPA proficiency levels range from 455- 539 on the composite scale score or 1-5 on the composite performance level score, with level 1 (below 481)-beginner and level 5 (505 and above)-Advanced. In level 1 (below 480; beginning), English language proficiency is emerging and the student may be silent or respond in the first language to an English prompt. In level 2 (481-490; early intermediate), the student can express their wants and needs in words and phrases and can comprehend and follow one-step instructions. In level 3 (491-496; intermediate), the student is able to speak and write using more social language with some accuracy and fluency and academic language is emerging. In level 4 (497-504; early advanced), the student demonstrates fluency in grade level information and is able to use social and academic language with increase accuracy and fluency. In level 5 (505 or above; advanced), the student is able to speak and write using grade level academic language with accuracy and fluency. Previous work has found the ELPA to be a valid and reliable assessment for diverse populations including low-income Spanish-speaking ELLs reporting marginal reliability coefficients ranging from .92 to .94 (Oregon Department of Education, 2014).

Academic Achievement.

Early Literacy Skills (English only). Early literacy skills were measured using the easyCBM letter names and letter sounds (Anderson et al., 2014; Lai et al., 2010). *easyCBM Letter names* evaluates how many upper and lower case letters students can identify in one minute. *easyCBM Letter sounds* evaluates the number of upper and lower case letter sounds a

student can produce in one minute. Scores can range from 0-100. The assessment was administered in English for Spanish-speaking ELLs and non-ELLs. Previous work has found the easyCBM Letter names and letter sounds to be a valid and reliable measure of early literacy for diverse populations reporting reliability coefficients ranging from .87-.90 (Alonzo, Gonzalez, & Tindal, 2013; Lai, et al., 2010; Anderson et al., 2014).

Early Math Skills (Bilingual English/Spanish). Early math skills were measured using the easyCBM Mathematics. This assessment includes numbers and operations such as counting, simple addition, simple subtraction, and recognizing number patterns (Anderson et al., 2014; Anderson, Alonzo, & Tindal, 2011). It is composed of 16 multiple-choice questions. Scores on the easyCBM Mathematics range from 0-16. The assessment was administered in English for non-ELLs, Spanish for Spanish-speaking ELLs. Previous work has found the easyCBM Mathematics to be a valid and reliable measure of early math for diverse populations with a Cronbach's alpha of .83 (Anderson et al., 2010; Anderson, Alonzo, & Tindal, 2011).

Self-Regulation. Children's self-regulation was measured using teacher ratings on the Child Behavior Rating Scale (CBRS). The CBRS is composed of 10 items and assesses a child's behavior and interaction in the classroom (Bronson, Tivnan, & Seppanen, 1995). The scale is on a 5-point scale, with 1 indicating the children *never* display certain behaviors, and 5 indicating the children *always* display certain behaviors. Total scores can range from 10 to 50 and average scores can range from 1-5, with higher scores indicating higher teacher rated self-regulation. In the current sample, the self-regulation scale of the CBRS had a Cronbach's alpha of .97 for low-income Spanish-speaking ELLs and .97 for low-income non-ELLs.

Results

The present study compared the performance on the statewide Oregon Kindergarten Assessments (English literacy, bilingual math, and self-regulation) for low-income non-ELLs and low-income Spanish-speaking ELLs. Additionally, it explored the relations between English language proficiency and performance on Kindergarten Assessment for low-income Spanish-speaking ELLs.

Analytic Strategy

Data analyses were conducted using Stata 13.0 (StataCorp., 2013). For research question one, using a subsample of low-income children (Spanish-speaking ELLs and non-ELLs) ($n=21,623$), an analysis of covariance (ANCOVA) controlling for gender and ethnicity was used to assess the differences in performance on the Kindergarten Assessments between low-income non-ELLs and low-income Spanish-speaking ELLs. For research question two, a subsample of low-income Spanish-speaking ELLs ($n=5,225$) was used. Due to the nested structure of the data (children nested in schools), regressions with robust standard errors were used to measure the relations between English language proficiency and performance on the Kindergarten Assessments for low-income Spanish-speaking ELLs (*ICCs* ranged from .09-.11). Missing data were addressed using listwise deletion for each of the models. Each variable had less than 2% missing data or less than 105 cases for Spanish-speaking ELLs and less 330 cases for non-ELLs¹.

Descriptive Statistics. Means, standard deviations, and ranges for all study variables for low-income ELLs and low-income non-ELLs can be found in Table 2.1. Correlations are provided in Table 2.2 for Spanish-speaking ELLs and Table 2.3 for non-ELLs. Correlations

¹ Models were also conducted using multiple imputation to address missing data using special education, gender and ethnicity as auxiliary variable. The auxiliary variable in the dataset are limited and none are correlated at the recommended .4. The pattern of results remain the same using multiple imputation or listwise deletion, therefore, results are reported using listwise deletion.

indicated that, for Spanish-speaking ELLs, early math was significantly and positively related to early literacy (letter sounds & letter names), and to self-regulation. For Spanish-speaking ELLs, early literacy (letter sounds & letter names) was significantly and positively related to self-regulation. Additionally, English language proficiency was significantly and positively related to early math, early literacy (letter sounds & letter names) and to self-regulation. For non-ELLs, early math was significantly and positively related to early literacy (letter sounds & letter names), and self-regulation. In addition, early literacy (letter sounds & letter names) was significantly and positively related to self-regulation for non-ELLs. For Spanish-speaking ELLs and non-ELLs, gender (1= male; 0=female) was negatively and significantly related to self-regulation.

Research Question 1: How are low-income ELLs performing on Kindergarten Assessments (early math, early literacy: letter sound & letter names, and self-regulation) when compared to low-income non-ELLs in Oregon?

Using an analysis of covariance (ANCOVA) and controlling for gender and ethnicity results indicated statistically significant differences on the performance on the Kindergarten Assessments for low-income Spanish-speaking ELLs and low-income non-ELLs.² For early math, results indicated non-ELLs scored significantly higher than Spanish-speaking ELLs $F(1, 20724) = 200.43, p = .001$ with adjusted means of 8.88 for non-ELLs and 7.90 for Spanish-speaking ELLs. For literacy: letter names, results indicated that non-ELLs scored significant higher $F(1, 20416) = 725.13, p = .001$ than Spanish-speaking ELLs with adjusted means of 24.59

² In addition to the ANCOVA, we conducted a Mann–Whitney U nonparametric test to further assess the performance on the Kindergarten Assessments between low-income Spanish-speaking ELLs and low-income non-ELLs. The pattern of results remained consistent with significant differences in performance for early math and early literacy and non-significant differences in self-regulation skills.

for non-ELLs and 15.78 for Spanish-speaking ELLs. For literacy: letter sounds, results indicated a non-ELLs scored significant higher than Spanish-speaking ELLs $F(1, 20213) = 252.76, p = .001$ with adjusted means of 7.67 for non-ELLs and 5.00 for Spanish-speaking ELLs. Finally, for self-regulation, results indicated a non-statistically significant difference on self-regulation scores $F(1, 21172) = 3.50, p = .06$ between low-income non-ELLs and Spanish-speaking ELLs with adjusted means of 3.92 for non-ELLs and 3.88 for Spanish-speaking ELLs (see Table 2.4).

Research Question 2: What is the influence of English language proficiency on performance on Kindergarten Assessments (early math, early literacy: letter sound & letter names, and self-regulation) among low-income Spanish-speaking ELLs in kindergartners?

Individual regression models with robust standard errors controlling for gender and ethnicity indicated that, for low-income Spanish-speaking ELLs, English language proficiency influenced scores on the Kindergarten Assessments. Specifically, English language proficiency as measured by the ELPA was significantly related Spanish early math ($\beta = .32, p = .001$); English early literacy: letter sounds ($\beta = .30, p = .001$); early literacy: letter names ($\beta = .37, p = .001$); and teacher rated self-regulation ($\beta = .23, p = .001$) (see Table 2.5). In other words, children with higher English language proficiency scored significantly higher on the Kindergarten Assessments than children with lower English language proficiency in the fall of kindergarten.

Discussion

In the current study using data from the Oregon Kindergarten Assessments, we compared the performance of low-income Spanish-speaking ELLs and low-income non-ELLs on the Kindergarten Assessments (early math, early literacy: letter sound & letter names, and self-

regulation). In addition, we explored the influence of English language proficiency on Kindergarten Assessment scores for low-income Spanish-speaking ELLs. Results indicated statistically significant differences in early math (administered in English for non-ELLs and Spanish for Spanish-Speaking ELLs) with non-ELLs scoring higher than Spanish-speaking ELLs, and in early literacy (letter names & letter sounds; administered in English in both non-ELLs and Spanish-Speaking ELLs) with non-ELLs scoring higher than Spanish-speaking ELLs. Differences in self-regulation skills between low-income non-ELLs and low-income Spanish-Speaking ELLs were not statistically significant. Additionally, English language proficiency had a positive influence on low-income Spanish-speaking ELLs' Kindergarten Assessments scores, indicating that children with higher English language proficiency scored significantly higher on the Kindergarten Assessments than children with lower English language proficiency. Results of this study extended previous research to include a large statewide sample of over 20,000 low-income children and suggest that these relations are present in large diverse samples of children in Oregon.

Performance on Kindergarten Assessments

Consistent with past research documenting the achievement gap between Spanish-speaking ELLs when compared to non-ELLs (Fuligni & Howes, 2011; Espinoza, 2010; Genesse, Lindholm-Leary, Saunder, 2006), we found significant differences in performance on the Kindergarten Assessments between low-income non-ELLs and low-income Spanish-speaking ELLs. After adjusting for gender and ethnicity, we found significant differences in early math as measured by the bilingual easyCBM Mathematics with non-ELLs (adjusted $M=8.88$) performing higher than Spanish-speaking ELLs (adjusted $M=7.90$). As expected, we also found significant differences in performance in early literacy as measured by English easyCBM (letter sounds and

letter names). For early literacy: letter names, non-ELLs (adjusted $M=24.59$) performed higher than Spanish-speaking ELLs (adjusted $M=15.78$) and in early literacy: letter sounds, non-ELLs (adjusted $M=7.67$) performed higher than Spanish-speaking ELLs (adjusted $M=5.00$).

Currently, the State of Oregon is working to require all districts to measure both English and Spanish early literacy for ELLs so future research should continue to examine these relations to see if they hold. Although not statistically significant, for self-regulation we found that after adjusting for gender and ethnicity, non-ELLs (adjusted $M=3.93$; observed $M=3.32$) were rated somewhat higher on self-regulation by their teachers than Spanish-speaking ELLs (adjusted $M=3.88$; observed $M=3.35$).

The self-regulation skills that children bring to kindergarten can provide the foundation for future academic trajectories. Understanding the gaps in achievement and self-regulation skills of low-income Spanish-speaking ELLs when compared to low-income non-ELLs can inform the academic and linguistic supports that might be needed by Spanish-speaking ELLs as they enter kindergarten (Boals, et al., 2015; Linqanti, Cook, Bailey, & MacDonald, 2016). Moreover, providing children with the necessary supports at the beginning of kindergarten can help address the achievement gap previously documented between non-ELLs and Spanish-speaking ELLs early in children's academic trajectories (Espinoza, 2010; Genesse, Lindholm-Leary, Saunder, 2006). This is important given the increase in the number of Spanish-speaking ELLs in schools and the need to not only address their academic needs, but also to support their linguistic development so that children can take full advantage of learning opportunities.

The present study also documents the importance of assessing ELLs' academic skills in their native language, in addition to English, to obtain a comprehensive picture of their academic skills (Genesse, Lindholm-Leary, Saunders & Christina, 2005). For example, in the present

study, the biggest gap in skills was observed in early literacy, which was only assessed in English. The smallest differences in the means of assessments were observed in measures that were not language-dependent, such as self-regulation skills, which were rated by teachers and in early math, which was assessed with a bilingual assessment. Although the English easyCBM Letter sounds & letter names provides information on Spanish-speaking ELLs' English early literacy, it does not provide information on Spanish-speaking ELLs' Spanish literacy, which is key information to support Spanish-speaking ELLs' literacy development. Thus, assessing children in English and Spanish can provide a more complete picture of children's literacy skills, and inform the academic and linguistics supports needed for Spanish-speaking ELLs in the classroom.

English Language Proficiency and Self-regulation and Achievement

In the current study, we found that English language proficiency had a positive relation to self-regulation and academic achievement for low-income Spanish-speaking ELLs. Specifically, children with higher English language proficiency scores, as measured by ELPA, had significantly higher scores in early math, early literacy and self-regulation skills than children with lower English language proficiency scores at the beginning of kindergarten. Although fewer studies have documented the relationship between English language proficiency, self-regulation, and academic achievement, our results match previous research supporting the importance of English language proficiency for academic achievement (Hakuta et al., 2000) and the relations between self-regulation and academic achievement for Spanish-speaking ELLs (Schmitt, McClelland, Tominey, & Acock, 2015; Wanless et al., 2011).

The current study highlights the importance of gaining a better understanding of the connections between English language proficiency, self-regulation, and academic achievement to

support the academic trajectories of low-income Spanish-speaking ELLs (Espinosa 2010; Wanless, McClelland, Tominey, & Acock, 2011). To effectively support low-income Spanish-speaking ELLs, a greater understanding of the components that influence their academic achievement is needed. Recent efforts to support Spanish-speaking ELLs' academic achievement have primarily focused on improving literacy skills (Chang et al., 2007). Yet, research shows that supporting other components, such as self-regulation and English language proficiency can set the foundation and improve the academic achievement of low-income Spanish-speaking ELLs (Schmitt, McClelland, Tominey & Acock, 2015; Genesse, Lindholm-Leary, Saunders & Christina, 2005). Additionally, exploring the role of parents' access to resources to support English language development such as access to high quality preschools and access to reading materials that can help to further elucidate the relations between English language proficiency and academic achievement for low-income Spanish-speaking ELLs. Understanding the connections between English language proficiency and academic achievement can inform programs and policies aimed at supporting the academic and linguistic needs of low-income Spanish-speaking ELLs in Kindergarten to ensure a successful transition into school.

Limitations and Future Directions

This study contributes important information to understanding the achievement gap between low-income Spanish-speaking ELLs and low-income non-ELLs, and exploring the links between English language proficiency, self-regulation, and academic achievement. The study, however, also had a number of limitations. For example, the present study focused only on low-income Spanish-speaking ELLs. There are other languages spoken by ELLs in the state of Oregon, but none of those languages made up more than 1% of the data or no subgroup was more than 260 children and Spanish-Speaking ELLs make up the largest number of ELLs in the

State of Oregon. Although the smaller sample sizes would make it more difficult to test meaningful differences in performance on the Kindergarten Assessments for ELLs of different languages, it is critical to highlight the importance of understanding the academic needs of ELLs who are not Spanish-speaking. Future research should focus on continuing to explore the academic and linguistic needs of non Spanish-speaking ELLs.

When data for the present study were collected, Spanish early literacy was not a required assessment as part of the Kindergarten Assessments; therefore, the present study only assessed English early literacy of Spanish-speaking ELLs, whereas math achievement was assessed in English for non-ELLs and Spanish for Spanish-speaking ELLs. Although assessing English early literacy provides important information about the English literacy skills of Spanish-speaking ELLs, including measures of early literacy skills in Spanish can provide comprehensive information on the literacy skills of Spanish-speaking ELLs. Future research, as well as standardized assessments, should include measures of Spanish early literacy skills when assessing differences between achievement among Spanish-speaking ELLs and non-ELLs. Additionally, it is important to continue to explore and control for other factors such as immigration, parental education, and years in the U.S that could help more precisely isolate the relations between English language proficiency and academic achievement for low-income Spanish-speaking ELLs.

Practical Implications

The findings of the present study have implications for programs, policies and standardized assessments aimed at addressing the academic and linguistic needs of low-income Spanish-speaking ELLs. Standardized assessments need to include measures in both English and ELLs' native language to have a more complete picture of ELLs' academic skills. Having a

comprehensive understanding of ELLs skills can help teachers gain a better understanding of the skills ELLs have as they transition to kindergarten. Additionally, having feasible methods for teachers to access ELLs' scores on the Kindergarten Assessments can help inform teacher instruction and secure additional academic and linguistic support.

The results of this study can also inform the need for officially identifying ELLs during preschool. As results of the present study indicated, English language proficiency has a positive influence on low-income Spanish-speaking ELLs' achievement and self-regulation. Officially identifying ELLs during preschool and providing linguistic supports in both children's native language and English that can help ELLs enter kindergarten with higher English language proficiency, higher self-regulation skills, and higher academic achievement. As documented by previous research, children with higher initial English language proficiency have higher academic achievement (Chesterfield et al., 1983; Espinosa, 2013). Understanding the academic development and supporting low-income Spanish-speaking ELLs can help address the current achievement gap between ELLs and non-ELLs.

Conclusion

The current study contributes to existing literature by using standardized assessment data from the statewide Oregon Kindergarten Assessment to explore potential differences in achievement and self-regulation skills between low-income Spanish-Speaking ELLs and low-income non-ELLs. Additionally, this study explored the influence of English language proficiency in academic achievement and self-regulation for low-income Spanish-speaking ELLs. In a time when schools, districts, and states are increasing efforts to support the academic achievement of ELLs, it is critical to have a more holistic understanding of ELLs' academics and self-regulation skills, as well as their English language proficiency, as they enter kindergarten.

Having the information needed to provide ELLs adequate academic and linguistic supports can help ensure ELLs' educational equity to address the existing achievement gap.

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Table 2.1: *Descriptive Statistics for Major Study Variables* (n= 21,623)

Variable	ELLs (n=5225)			Non-ELLs (n=16,398)		
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range
Early Math	6.18	2.84	0-16	7.53	3.05	0-16
Letter Sounds	1.32	3.55	0-41	4.87	7.90	0-83
Letter Names	5.27	9.14	0-69	16.08	15.18	0-97
Self-regulation	3.35	.92	0-5	3.33	.96	0-5
English Proficiency	486.49	8.03	455-520	–	–	–

Note. English proficiency was only administered to ELLs.

Table 2.2. *Correlations Between all Study Variables for ELLs (n=5225)*

Variables	1	2	3	4	5	6	7
1. Early Math	–						
2. Letter Sounds	.29***	–					
3. Letter Names	.30***	.61***	–				
4. Self-regulation	.23***	.13***	.17***	–			
5. English Proficiency	.32***	.30***	.37***	.24***	–		
6. Gender	.01	-.02	-.02	-.20***	-.07***	–	
7. Ethnicity	-.00	.01	.01	-.03**	.01	-.00	–

** $p < .01$, *** $p < .001$

Table 2.3. *Correlations Between all Study Variables for non-ELLs (n=16,398)*

Variables	1	2	3	4	5	6
1. Early Math	–					
2. Letter Sounds	.42***	–				
3. Letter Names	.50***	.71***	–			
4. Self-regulation	.30***	.23***	.30***	–		
5. Gender	-.03	-.05***	-.07***	-.23***	–	
6. Ethnicity	-.05	.02**	.01*	-.04***	.02*	–

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

Table 2.4: *Analysis of Covariance Summary for non-ELLs and ELLs Performance on the Kindergarten Assessments (n=21,623)*

Source	df	F	sig	Non-ELLs		ELLs	
				Adj <i>M</i>	Observed <i>M</i>	Adj <i>M</i>	Observed <i>M</i>
Early Math	1	200.43	.001	8.88	7.53	7.90	6.18
Letter Names	1	725.13	.001	24.59	16.09	15.78	5.27
Letter Sounds	1	252.76	.001	7.67	4.87	5.00	1.32
Self-regulation	1	3.50	.06	3.93	3.33	3.89	3.35

Note. All models controlled for gender and ethnicity

*** $p < 0.001$

Table 2.5: *Final Regression Models for the relations between English Language Proficiency and Kindergarten Assessments Scores for ELLs (n=5225)*

Variable	<i>B</i>	<i>SE</i>	β
Early Math	.03	.00	.32***
Letter Sounds	.43	.01	.30***
Letter Names	.13	.02	.37***
Self-regulation	.11	.00	.23***

Note. Individual regression models controlled for gender and ethnicity.

 $p < .01$.

CONCLUSION

Low-income children who are also English language learners (ELLs) begin preschool and kindergarten with a wide range of individual skills, such as English language proficiency, math skills, literacy skills, and self-regulation. These children also come with diverse family experiences that influence their success in kindergarten. As a result of academic disparities and the increase in the number of ELLs entering the school system, national and state efforts are focused on improving and supporting the school readiness and academic outcomes of ELLs in the US. Unfortunately, factors associated with lower academic achievement are often also characteristics associated with being an ELL. For example, 60% of ELLs live in poverty and have parents with lower educational attainment (Garcia-Coll, Meyer & Brillon, 1995; Grantmakers for Education, 2013; Gandara & Contreras, 2009; Hakuta, 2000, Pew Hispanic Center 2011; U.S. Census, 2011). Previous research has documented the links between these factors and poor achievement outcomes. For example, children living in poverty are more likely to have lower academic achievement and are less prepared to enter kindergarten (Dearing et al, 2006; Evans & Rosenbaum, 2008). Additionally family demographic factors play a key role in children's academic success. Low-income ELLs are more likely to experience risk factors that are detrimental to their school success. For example, ELLs are more likely to be low-income, have parents who have lower educational attainment, and more likely to be unemployed (Augustine, 2014; Garcia-Coll, Meyer & Brillon, 1995; Grantmakers for Education, 2013; Gandara & Contreras, 2009). Although previous research has documented that low-income ELLs lag behind in achievement when compared to non-ELLs, less research has explored how relations between family demographic factors and school readiness vary as a function of being a low-income Spanish-speaking ELL. Additionally, less research has used statewide datasets to

compare the academic achievement of ELLs and non-ELLs and to explore the relations between English language proficiency, achievement, and self-regulation at the start of kindergarten. This dissertation attempts to address these gaps with two studies.

Using data from the Kindergarten Readiness Study, a measurement study in the Northwest of the US, study 1 investigated the relations between family demographic factors- parent education, residential mobility, and mother's employment- and low-income children's school readiness (early math, early literacy, and inhibitory control) in the fall of preschool. Additionally, study 1 explored if these relations varied as function of ELL status.

Study 2 used data from the statewide Oregon Kindergarten Assessments to compare performance on the Kindergarten Assessments (early math, early literacy: letter sound & letter names, and self-regulation) between low-income Spanish-speaking ELLs and low-income non-ELLs. It also explored the relations between English language proficiency and performance on the Kindergarten Assessments for low-income Spanish-speaking ELLs. Together, findings from these studies inform the need to explore the family demographic factors that are related to children's school readiness and further examine how these can differently influence low-income ELLs. Additionally, it highlights the need to support ELLs' academic achievement, self-regulation, and English language proficiency as a mechanism to address the achievement gap between low-income ELLs and non-ELLs.

Overview of Study Findings

Results from the first study, *The influence of family demographic factors on school readiness: Variation by Spanish-Speaking English Language Learners Status*, indicated that, after controlling for age, gender, study location, ELL status, and ethnicity, parent education had a significant and positive relation to early math and early literacy but not to inhibitory control.

Children whose parents had higher education scored higher in early math and early literacy than children with lower education. There was not a statistically significant relation between mother's employment, residential mobility and school readiness (early math, early literacy, and inhibitory control). Additionally, the relation between residential mobility and early math varied as a function of ELL status. Specifically, children who were ELLs scored significantly lower on early math for each additional residential move. Although, Spanish-speaking ELLs had fewer moves ($M=1.09$) than non-ELLs ($M=2.43$), residential moves were more detrimental for low-income Spanish-speaking ELLs than low-income non-ELLs. However, the relations between residential mobility and early literacy and inhibitory control did not vary as a function of ELL status nor did the relation between parent education and mother's employment and school readiness.

Result from study two, *Links between English language proficiency, achievement and self-regulation: A focus on low-income Spanish-speaking English language learners in kindergarten*, indicated that, after controlling for ethnicity and gender, non-ELLs performed significantly higher in early math (administered in English for non-ELLs and Spanish for Spanish-Speaking ELLs) and early literacy (letter names & letter sounds; administered in English in both non-ELLs and Spanish-Speaking ELLs) than Spanish-Speaking ELLs. Differences in teacher ratings of self-regulation were not statistically significant between Spanish-Speaking ELLs and non-ELLs. Furthermore, English language proficiency had a positive influence on low-income Spanish-speaking ELLs' scores on the Kindergarten Assessments. Specifically, children with higher English language proficiency scored higher on measures of early literacy (letter sounds & letter names; administered in English for both Spanish-speaking ELLs and non-ELLs), early math (administered in English for non-ELLs and

in Spanish for Spanish-speaking ELLs), and self-regulation (teacher rated) assessed at kindergarten entry. Together, findings from these two studies suggest the importance of exploring children's family demographic factors such as, parent education, and individual factors such as, English language proficiency, to better comprehend the academic achievement of low-income Spanish-speaking ELLs in preschool and kindergarten. Three themes emerged from the two studies: 1) Family demographic and individual factors influencing school readiness; 2) Challenges exist when assessing the academic achievement and school readiness skills of low-income Spanish-speaking ELLs; and 3) The need for further research focused on ELLs to inform policy and practice.

Family Demographic and Individual Factors Influencing School Readiness

Both of these studies highlight the importance of exploring demographic factors and children's individual skills to gain a better understanding of low-income Spanish-speaking ELLs' school readiness skills. In study 1, findings were consistent with past research indicating the important role of parent education for children's achievement (Brooks-Gunn, Berlin, & Fuligni, 2000; Christian, Morrison & Bryan, 1998; Davis-Kean, 2005; Magnuson, 2007). Additionally, results emphasize the importance of exploring how the relations between family demographic factors and school readiness vary as a function of ELL status. For example, results indicated that relation between residential mobility and early math varied as a function of ELL status, meaning that children who were low-income Spanish-speaking ELLs scored lower in early math for each additional residential move. But the relations between parent education and mother's employment and measures of school readiness did not vary as a function of ELL status. These results indicate that residential mobility may be more detrimental for low-income Spanish-speaking ELLs than for non-ELLs. Overall, the results highlight the need to continue to explore

the influence of these demographic factors on low-income ELLs' school readiness in larger datasets or in datasets that include only ELLs. Access to larger datasets can provide researchers the ability to create comparable samples between ELLs and non-ELLs to further elucidate how these relations might differ for ELLs and non-ELLs. Additionally, datasets with ELLs only can guide future research to explore additional factors that are unique to the experiences of low-income Spanish-speaking ELLs school readiness such as length of residency in the US, discrimination, and immigration status (Hill & Torres, 2010).

Study 2 documented the role of English language proficiency (an individual factor) in children's achievement. Consistent with previous research, we found that children's English language proficiency was related to academic achievement and self-regulation skills (Butler & Bailey, 2007; Linquanti, Cook, Bailey, & MacDonald, 2016; Wanless, McClelland, Tominey & Acock, 2011). Low-income Spanish-speaking ELLs who had higher English language proficiency also scored higher on measures of early math, early literacy (letter sounds & letter names), and self-regulation skills than children with lower English language proficiency. These results provide preliminary evidence of the potential of supporting both English language proficiency and self-regulation as a strategy to support the academic achievement of low-income ELLs. Previous research has documented a relation between English language proficiency and academic achievement (Espinosa, 2013; Chesterfield et al., 1983), as well as relations between self-regulation and academic achievement (Lengua, 2002; McClelland, Acock, & Morrison, 2006). Additionally, self-regulation and English language proficiency can both be improved through interventions and support (Schmitt, McClelland, Tominey & Acock, 2015; Tominey & McClelland, 2011). Future research should continue to explore the relation between English language proficiency and self-regulation as a potential mechanism to support the academic

achievement and school readiness of low-income Spanish-speaking ELLs as they enter kindergarten. Taken together, these results highlight the importance of understanding the influence of both demographic factors and children's individual abilities to improve the academic achievement of low-income Spanish-speaking ELLs as they enter kindergarten.

Challenges with assessing the academic achievement and school readiness skills of low-income Spanish-speaking ELLs.

Both of these studies are consistent with previous research documenting that ELLs lag behind in academic achievement (Fuligni & Howes, 2011; Good, Masewicz & Vogel, 2010; Genesee, Lindholm-Leary, Saunders, 2006; Wanless, McClelland, Tominey & Acock, 2011). Results indicated that low-income Spanish-speaking ELLs lagged behind in measures of early math (administered in English for non-ELLs and Spanish for Spanish-speaking ELLs) and early literacy (letter sound & letter names; administered in English for both non-ELLs and Spanish-speaking ELLs). When comparing the school readiness scores between Spanish-speaking ELLs and non-ELLs in study 1, Spanish-speaking ELLs scored significantly lower in early math. Additionally, these results provide evidence for focusing on skills such as self-regulation as a potential mechanism for improving academic achievement in low-income Spanish-speaking ELLs. For example, in study 2 results indicated that low-income Spanish-speaking ELLs did not score significantly differently than low-income non-ELLs on self-regulation indicating that Spanish-speaking ELLs are being rated by teachers as having similar self-regulations skills as non-ELLs. Results highlight that despite efforts by policy makers and school officials, ELLs continue to lag behind in academic areas when compared to non-ELLs, but self-regulation skills can serve as a point of intervention for improving the academic achievement of low-income Spanish-speaking ELLs.

Additionally, results highlight the need to develop a formal definition of ELL for children who are attending preschool and the challenges of assessing ELLs with standardized assessments. Currently, there is no formal definition of ELL for children in preschool. To further understand the academic development of ELLs in preschool it is important to develop a clear and consistent definition of ELL status. Developing a formal definition of ELL can provide guidance on academic expectations and language development of ELLs in preschool. Additionally, it can have implications for supports and services offered for children and their families. In study 2, data from the statewide Oregon Kindergarten Assessments only required early literacy (letter names & letter sounds) to be assessed in English. Assessing ELLs in English can be problematic as it only provides their skill level in one language. To have a complete understanding of ELLs' academic skills, researchers and school administrators need to assess children in English and their native language. Having an understanding of children's academic abilities in their native language can serve as a base to support English academic abilities. Future policy efforts should advocate for assessing ELLs in both their native language and English. In addition, future research should explore the links between English language proficiency and standardized assessments to improve our understanding of ELLs academic achievement as they enter kindergarten.

Need for further research focused on ELLs to inform policy and practice

Both of these studies emphasized the need for further research focused on ELLs to inform policy and practice. Previous research has concluded the need to continue to explore the factors that influence that academic achievement of ELLs to provide teaching strategies that support both English language development and learning academic content (Bailey, 2007; Garcia & Frede, 2010). Additionally, the research is needed to develop valid and reliable measures to assess the

academic skills of ELLs in their native language and in English in kindergarten (Stevens, Butler and Castellon-Wellington, 2000). For example, in study 2, it is difficult to determine if the significant differences in performance in early literacy between low-income Spanish-speaking ELLs and non-ELLs were because early literacy was assessed only in English or because low-income Spanish-speaking ELLs were lagging behind in literacy skills as they enter kindergarten.

Previous research documenting the family demographic factors associated with low-income ELLs are often descriptive (Child Trends, 2013; Herbers et al., 2012; Pew Hispanic Center, 2008). Further research is needed to elucidate the relations between family demographic factors such as parent education and low-income ELLs' academic achievement. Also family demographic factors that are unique to ELLs such as immigration status need further exploration (Hill & Torres, 2010). Additionally, access to larger datasets is needed to explore how relations between family demographic factors and school readiness vary as a function of ELL status. Study 1 found that the relation between residential mobility and early math varied as function of ELL status, but the relations between parent education and mother's employment did not. Future research should attempt to replicate these results in larger datasets to create comparable samples of ELLs and non-ELLs. Finally, further research is needed to explore both family demographic factors and individual skills in ELLs that are not Spanish-speaking ELLs. Both studies of this dissertation only focused on Spanish-speaking ELLs, although, Spanish-speaking ELLs make up over 75% of ELLs it is still critical to understand the academic development of non Spanish-speaking ELLs to address their academic needs. Continuing to explore the factors that influence the academic achievement of ELLs is critical to inform policy and practice focused on reducing the achievement gap and supporting the academic development of ELLs.

Limitations

Although findings from both studies provided insight into the factors influencing the academic achievement of ELLs and the research still needed to understand, measure and support the academic needs of ELLs, both studies had limitations. First, both studies were limited to a sample of low-income Spanish-speaking ELLs. The results of the present studies only provide insight on these relations influence Spanish-speaking ELLs. Although, Spanish-speaking ELLs make up about 75% of ELLs in the US and in Oregon, it is critical to highlight the importance of understanding the academic needs of ELLs who are not Spanish speaking. Future research should focus on continuing to explore the influence of family demographics and individual factors on samples of non-Spanish speaking ELLs.

Another limitation of the studies is the limited measures for ELL identification, mobility and employment for study 1 and a limited early literacy measure for study 2. Children's teachers determined ELL status. Future research should include direct measures to assess English language proficiency and determine ELL status in preschool children. The measures of mother's employment and residential mobility were limited to one question on a demographic survey. Future research should explore more comprehensive measures of employment and residential mobility. For example, exploring the different types of employment and exploring the influence of father's employment on ELLs' school readiness. Additionally, further exploring the types of moves and reasons for moving could provide information to understand the influence of residential mobility on children's school experiences. Study 2 assessed only English early literacy of Spanish-speaking ELLs whereas math achievement was assessed in English for non-ELLs and in Spanish for Spanish-speaking ELLs. Assessing English early literacy provides important information about the English literacy skills of Spanish-speaking ELLs, but including measures of early literacy skills in Spanish can provide comprehensive information on the

literacy skills ELLs have as they enter kindergarten. Future research, as well as statewide standardized assessments, should include measures of Spanish early literacy skills to elucidate the potential achievement differences between achievement among Spanish-speaking ELLs and non-ELLs.

Conclusion

The studies in this dissertation explored the relations between family demographic factors and school readiness and how these relations varied as a function of ELL status. Additionally, they compared performance on the Kindergarten Assessments between low-income Spanish-speaking ELLs and low-income non-ELLs, and explored the role of English language proficiency for academic achievement and self-regulation. Future work should explore the influence of family demographic factors on school readiness for low-income ELLs and the role of English language proficiency on academic achievement for ELLs as they enter kindergarten. The results of these studies highlight the consistent need to conduct research to understand the academic achievement of ELLs and to develop effective teaching strategies to support ELLs to in preschool and kindergarten. Finally, an understanding of the influence of family demographic factors and individual factors on low-income Spanish-speaking ELLs' school readiness can promote policies and programs at the school, district, and state level to support children's individual skills as well as the needs of the families to potential reduce the achievement gap among low-income ELLs.

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APPENDICES

Appendix A: Information on Key Variables for Study 1 & Study 2

Study 1: The influence of family demographic factors on school readiness: Variation by Spanish-speaking English Language Learners status

Study 1		
Predictors	Administration	Language of Administration
Parent education	Self-reported in demographic survey	Survey in Spanish
Residential mobility	Self-reported in demographic survey	Survey in Spanish
Mother's employment	Self-reported in demographic survey	Survey in Spanish
ELL status	Teacher reported	Survey in Spanish
Outcomes		
Early literacy	Direct assessment	Spanish for ELLs English for non-ELLs
Early math	Direct assessment	Spanish for ELLs English for non-ELLs
Inhibitory control	Direct assessment	Spanish for ELLs English for non-ELLs

Study 2: Links between English language proficiency, achievement and self-regulation: A focus on low-income Spanish-speaking English language learners in kindergarten.

Study 2		
Variables	Administration	Language of Administration
Early math	Direct assessment	Spanish for ELLs English for non-ELLs
Early literacy: letter sounds & letter names	Direct assessment	English for both ELLs and non-ELLs
Self-regulation	Teacher rated	N/A-teacher rated
English language proficiency (ELLs only)	Direct assessment	English (ELLs only)
ELL status	Determined by school & district	English (ELLs only)

Appendix B: Propensity Score Matching

For study 1, I attempted to conduct a propensity score matching to obtain a comparable sample of ELLs and non-ELLs to conduct a model for each of our research questions. A propensity score provides the predicted probability of being an ELL.

A probability score is estimated based on indicators related to the treatment, which in the present paper is ELL status. The indicators used to estimate the propensity score included:

- Parent Education
- Ethnicity
- Mother's employment
- Mobility
- Family structure
- Qualifying for public assistance
- Study Location

The propensity score was estimated using the `pscore` command and replicated using the `logit` command.

First attempt for propensity score matching only predicted propensity scores for half of the sample because of missing data patters. To address missing data issues variables were recoded to include a "decline to answer" option for binary variables. For example, mother's employment was coded as yes, no or decline to answer. After recoding variables the propensity score was recalculated.

Further analysis indicated that the two variables (parent education and ethnicity) did not balance. These two variables are key indicators of ELL status and the two strongest indicators available in the dataset. If I remove them the balancing property is satisfied, but then I am left with indicators that have not been extensively documented as indicators of ELL status, but are rather associated with being Latino.

Stata Output for Propensity Score

```
. pscore ell dem3 momemp2 dem7 parented dem22R data, ///
> logit pscore(mypscore) blockid(myblock) comsup
```

```
*****
Algorithm to estimate the propensity score
*****
```

```
The treatment is ell
```

```
Child test |
language(fr |
           om |
Tracker):0= |
spanish,1=e |
```


Use option detail if you want more detailed output

The final number of blocks is 5

This number of blocks ensures that the mean propensity score is not different for treated and controls in each blocks

 Step 2: Test of balancing property of the propensity score
 Use option detail if you want more detailed output

Variable parented is not balanced in block 1

Variable dem3 is not balanced in block 3

Variable parented is not balanced in block 3

The balancing property is not satisfied

Try a different specification of the propensity score

of pscore	Child test language(from Tracker):0=spanish,1= english		Total
	0. non-el	1. ell	
0	134	9	143
.2	81	38	119
.4	27	30	57
.6	6	16	22
.8	2	27	29
Total	250	120	370

Note: the common support option has been selected

 End of the algorithm to estimate the pscore

After conducting multiple models and estimators to estimate the score it was not possible to estimate a reliable score to create a comparable sample of ELLs. Suggestions for obtaining a balancing property is removing indicators or reducing the number of indicators. Removing ethnicity and parent education balances the property, but after removing these two indicators, the rest of the indicators not correlated to ELL status. I lose the two strongest indicators previously documented to be indicators of ELL status. Additionally correlations indicate that only parent education had a moderate correlation to ELL status in the sample.

Stata output removing ethnicity and parent education, the property balances, but it removes the two strongest indicators.

```
. pscore ell momemp2 dem7 dem22R data, ///
> logit pscore(mypscore2) blockid(myblock2) comsup
```

```
*****
Algorithm to estimate the propensity score
*****
```

The treatment is ell

	Freq.	Percent	Cum.
Child test			
language(fr			
om			
Tracker):0=			
spanish,1=e			
nglish			
-----+-----			
0. non-ell	356	69.94	69.94
1. ell	153	30.06	100.00
-----+-----			
Total	509	100.00	

Estimation of the propensity score

```
Iteration 0: log likelihood = -311.1837
Iteration 1: log likelihood = -308.19165
Iteration 2: log likelihood = -308.18484
```

```
Logistic regression                               Number of obs =          509
LR chi2(4) =          6.00
Prob > chi2 =          0.1993
Pseudo R2 =          0.0096

Log likelihood = -308.18484
```

	ell	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
-----+-----						
momemp2		.2178352	.1911596	1.14	0.254	-.1568307 .592501
dem7		-.1814965	.1188918	-1.53	0.127	-.4145201 .0515271
dem22R		-.0794006	.295017	-0.27	0.788	-.6576233 .4988221
data		.3130545	.1977093	1.58	0.113	-.0744485 .7005576
_cons		-.8015442	.2768527	-2.90	0.004	-1.344166 -.2589229
-----+-----						

Note: the common support option has been selected
The region of common support is [.21519745, .43274641]

Description of the estimated propensity score
in region of common support

Estimated propensity score		
Percentiles	Smallest	
1%	.2225857	.2151974
5%	.2225857	.2225857
10%	.2237513	.2225857
		Obs
		507

25%	.2638404	.2225857	Sum of Wgt.	507
50%	.292982		Mean	.3009993
		Largest	Std. Dev.	.0495727
75%	.3289257	.4222078		
90%	.3701551	.4327464	Variance	.0024574
95%	.3942563	.4327464	Skewness	.4168707
99%	.4222078	.4327464	Kurtosis	2.780376

```
*****
Step 1: Identification of the optimal number of blocks
Use option detail if you want more detailed output
*****
```

The final number of blocks is 3

This number of blocks ensures that the mean propensity score is not different for treated and controls in each blocks

```
*****
Step 2: Test of balancing property of the propensity score
Use option detail if you want more detailed output
*****
```

The balancing property is satisfied

This table shows the inferior bound, the number of treated and the number of controls for each block

Inferior of block of pscore	Child test language(from Tracker):0=spanish,1= english		Total
	0. non-ell	1. ell	
.2	338	144	482
.4	16	9	25
Total	354	153	507

Note: the common support option has been selected

```
*****
End of the algorithm to estimate the pscore
*****
```

Correlations between ELL status and indicators

```
. pwcorr ell dem3 momemp2 dem7 parented dem22R, sig
```

	ell	dem3	momemp2	dem7	parented	dem22R
ell	1.0000					

dem3		0.0133	1.0000				
		0.7647					
momemp2		-0.0162	0.6683	1.0000			
		0.7146	0.0000				
dem7		-0.0647	0.7365	0.7615	1.0000		
		0.1449	0.0000	0.0000			
parented		-0.4444	-0.0967	0.0580	-0.0681	1.0000	
		0.0000	0.0631	0.2658	0.1912		
dem22R		-0.0464	0.6994	0.6919	0.7649	0.0228	1.0000
		0.2961	0.0000	0.0000	0.0000	0.6620	

Potential next steps could be to use multiple imputations to calculate a propensity score for the sample.

Additional Analyzes with Latino Sample Only

Identifying as Latino is a key indicator of ELL status documented by the previous research. Additional regression models were conducted with a subsample of 153 Latinos. In the subsample of Latinos 113 were identified as ELLs and 43 non-ELLs. Sample size is small for non-ELLs, but analysis was conducted to explore patterns of results in ELLs. Results with only the Latino sample indicated that the pattern of results remains consistent with results reported in paper 1.