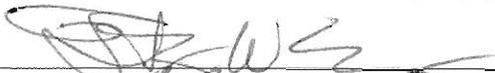
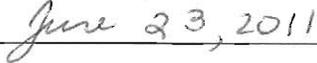


SCHOOL READINESS, EARLY ACHIEVEMENT, AND THE ROLE
OF ENGLISH LANGUAGE PROFICIENCY FOR CHILDREN IN
LOW-INCOME IMMIGRANT FAMILIES

by

Jessica J. De Feyter
A Dissertation
Submitted to the
Graduate Faculty
of
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in Partial Fulfillment of
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of
Doctor of Philosophy
Psychology

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Children in Low-Income Immigrant Families

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Master of Arts
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DEDICATION

This is dedicated to my daughter, Alexandra Skye.

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I would like to thank my family for being endlessly supportive throughout this journey. My husband, Miles, for always encouraging me to strive for the best and serving as my partner in the sacrifices needed to pursue this endeavor. My parents, who spent countless hours entertaining their granddaughter, and without whom I would not have completed this dissertation. My advisor, Dr. Adam Winsler, whose dedication to mentoring his students is unlike any other, and who poured over draft after draft of these manuscripts, ensuring they were of the highest quality before reaching the committee. I would also like to express my sincere appreciation to Dr. Timothy Curby, whose statistical consultation was critical to the data analyses and allowed me to turn this third paper into a true learning experience. Finally, I would like to thank the members of Winslab for constructive comments and feedback on each of the three papers along the way.

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ABSTRACT

SCHOOL READINESS, EARLY ACHIEVEMENT, AND THE ROLE OF ENGLISH LANGUAGE PROFICIENCY FOR CHILDREN IN LOW-INCOME IMMIGRANT FAMILIES

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George Mason University, 2011

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Children in immigrant families, 88% of whom are U.S. citizens, will play a key role in the future economy as they replace today's aging population of wage earners.

Understanding their achievement patterns has therefore become a new challenge confronting educators, researchers, and policy makers. A solid body of research has documented that children's skills and abilities upon entering kindergarten, or school readiness, can help predict long-term achievement. However, the extent to which this research applies to culturally-diverse immigrant children remains an open question, and the unique role of English language acquisition warrants further exploration. Using a structural equation modeling (SEM) framework, this manuscript examined relations between school readiness and later academic achievement for a sub-sample of low-income children from the Miami School Readiness Project (MSRP; N = 2,657).

Specifically, it investigated whether these relations were moderated by children's nativity

status (immigrant vs. non-immigrant family) and whether there were any indirect influences of school readiness on later achievement via the timing of children's English proficiency. As part of the MSRP, cognitive and linguistic school readiness were assessed at age four with the Learning Accomplishments Profile – Diagnostic (LAPD), while social-emotional and behavioral school readiness were assessed with the Devereaux Early Childhood Assessment (DECA). Third grade academic outcomes were retrieved from the Miami-Dade County Public Schools and included end-of-year grades and math and reading scores from the Florida Comprehensive Achievement Test (F-CAT). Results indicated that the age-four school readiness measures predicted third grade outcomes similarly across children in immigrant and non-immigrant families. After accounting for a number of family background and demographic factors, greater behavior concerns at age four predicted lower end-of-year grades and lower reading scores in 3rd grade, while greater age-four pre-academic skills were associated with higher grades and higher standardized math and reading scores in 3rd grade. Additionally, early pre-academic skills exerted an indirect influence on immigrant children's 3rd grade achievement by reducing the amount of time it took them to become proficient in English. This finding persisted across children in Hispanic/Latino- and Black/African-descent immigrant families. Though previous research has found mean-level group differences in educational outcomes between children in immigrant and non-immigrant families, findings herein suggest linkages between outcomes across the early years may be quite similar between the two groups. Discussion highlights the importance of behavioral and academic school

readiness, as well as early English proficiency, for the long-term achievement of children in immigrant families.

1. INTRODUCTION

Children in immigrant families are a sizeable and growing proportion of the U.S. population, accounting for nearly one in four children under age 18 (Hernandez, Denton, & McCartney, 2008). The vast majority of these children (88%) are U.S. citizens (Ruggles et al., 2008) and will therefore play a key role in the ability of the United States to remain competitive in the future global economy. The challenge for educators and policy-makers then, is to accurately understand this population and respond with practices and legislation that are best suited to foster their development and long-term educational success. Currently, there is research consensus that we can understand children's long-term educational trajectories in part by understanding their early experiences and school readiness prior to entering kindergarten. For instance, a child's standing on a developmental assessment at three years old can help predict how they will perform years later on a standardized achievement test (Duncan et al., 2007; La Paro & Pianta, 2000). Likewise, increasing a child's social and cognitive skills in preschool through early education has been shown to positively impact academic outcomes in elementary school and beyond (Campbell, Pungello, Miller-Johnson, Burchinal, & Ramey, 2001; NICHD Early Child Care Research Network, 2002; Schweinhart, 2005). Though numerous studies make such associations between early skills and later achievement clear for the general child population, similar research with young children

in immigrant families is still in its infancy.

Recent studies on the school readiness skills of children in immigrant families suggest that they enter kindergarten with a somewhat different set of early competencies than their peers in non-immigrant families (Crosnoe, 2006, De Feyter & Winsler, 2009; Hair et al., 2006). Specifically, children with immigrant parents tend to lag behind children with American-born parents on assessments of cognitive and language skills, but they are often rated higher by teachers in social-emotional functioning and behavior. Additionally, recent studies of immigrant children's educational achievement in elementary school reveal that, despite what might be predicted by their challenges in cognitive and linguistic areas prior to kindergarten, they tend to perform relatively well academically in the early years of school. They have even been found to demonstrate faster academic growth than their non-immigrant peers, enabling them to close any educational gaps with which they began, and in some cases, outperform their peers by 3rd grade (De Feyter, Winsler, Curby, Kim, & Hutchison, 2010; Halle et al., in review; Han, 2008; Palacios et al., 2008).

Immigrant children are extremely diverse but as a group, they present a unique challenge to schools because they are more likely to speak a foreign language at home and enter kindergarten with varying degrees of English language proficiency (Hernandez et al., 2008). Although not all English Language Learners (ELLs) are immigrants and visa versa, it is notable that the number of school-age children speaking a language other than English at home has increased dramatically in recent decades, from 3.8 million (9%) in 1979 to 10.9 million (21%) in 2008 (National Center for Education Statistics, 2010),

making ELLs a somewhat new but sizeable group with unique educational needs. Using a structural equation modeling framework and data from the Miami School Readiness Project (MSRP; Winsler et al., 2008), this study investigates the early educational outcomes of children in immigrant families, with particular attention to school readiness, the transition to kindergarten, and achievement in the early years of grade school. Specifically, it will examine whether school readiness skills at age four predict 3rd grade achievement similarly for children in immigrant and non-immigrant families. Additionally, it will examine ways in which immigrant children's developing English language proficiency may serve as an intermediary link between school readiness and later achievement and make up for early challenges in cognitive and general language skills. Together, the findings will provide a more nuanced picture of how immigrant children's early skills are related to their English acquisition and later achievement, providing insight into how their overall development can be fostered in the early years of childhood.

School Readiness and Early Academic Achievement

Numerous studies have documented the importance of school readiness for later academic achievement (Barnett, 1995; Currie & Thomas, 1995; Downer & Pianta, 2006; Duncan et al., 2007; Magnuson, Meyers, Ruhm, & Waldfogel, 2004), especially for children who are considered at-risk for long-term academic difficulties due to individual, familial, or contextual risk factors (e.g., poverty, low-parental education, special education needs, limited English proficiency) (Brooks-Gunn, 2003; Brooks-Gunn & Duncan, 1997). School readiness has been defined in many ways, but is most often

described in terms of a set of child skills or characteristics prior to, or upon entering, kindergarten (Boethel, 2004; La Paro & Pianta, 2000). For instance, at a convening of the National Educational Goals panel in 1993, the Goal One Technical Planning Group defined early development and learning as consisting of five dimensions: physical and motor development, social and emotional development, approaches toward learning, language and cognition, and general knowledge (Ramey & Campbell, 1994). These domains have become widely accepted today as important for children's success as long-term learners.

A large body of research has now been developed examining relations between children's school readiness and later academic achievement. Two groups of researchers recently published syntheses of these findings and, using meta-analysis techniques, calculated overall effect size estimates for relations between various domains of school readiness and academic achievement in elementary or middle school (Duncan et al., 2007, La Paro and Pianta, 2000). While La Paro and Pianta (2000) used more traditional meta-analysis techniques, Duncan and colleagues (2007) combined and analyzed six longitudinal educational datasets. Both groups of researchers reached similar conclusions – that academic/cognitive skills appear to be the greatest predictors of academic outcomes in elementary school, accounting for a small to moderate proportion of variance, while social/behavioral skills are only weakly associated with later outcomes, either in the academic or social domains.

Another natural outgrowth of this enhanced focus on school readiness has been an increase in the development, implementation, and evaluation of preschool programs that

have the goal of getting children “ready” for kindergarten. Overall, studies of program effectiveness conclude that participation in moderate- to high-quality preschool programming enhances children’s social and cognitive development and leads to higher academic achievement in grade school (Liaw, Meisels, & Brooks-Gunn, 1995; Magnuson et al., 2004; Magnuson, Ruhm, & Waldfogel, 2007; NICHD Early Child Care Research Network, 2002). Together these studies highlight the importance of closing educational gaps early, before formal schooling is underway. Further, this new knowledge base has greatly impacted contemporary education practice and policy by making early education and preschool a priority. While great strides have been made in this respect, questions still remain regarding the generalizability of these findings to underrepresented subgroups of children, such as those who are ethnic or language minorities, and children from immigrant families.

Nativity-Based Differences in School Readiness and Early Achievement

Developmental researchers have questioned the extent to which longitudinal study samples have included children from economically or culturally underrepresented groups. For instance, La Paro and Pianta (2000) noted the lack of economic and ethnic diversity in the 70 studies included for their meta-analysis, and as a whole, studies on early childhood education programs and later achievement are lacking in the extent to which they report subgroup findings or moderators of effect sizes (Garcia Coll & Marks, 2009). Cross-sectional studies with children from immigrant families, however, have begun to emerge, and generally find that immigrant and non-immigrant children’s school readiness strengths and weaknesses, as well as their later achievement, often differ.

The general pattern that has emerged in the school readiness literature is that children with native-born parents tend to enter kindergarten more cognitively and linguistically advanced than children of with immigrant parents, while children with immigrant parents enter with greater social, emotional, and behavioral competence (Crosnoe, 2006; Gormley, Gayer, Phillips, & Dawson, 2005; Hair, Halle, Terry-Humen, Lavelle, & Calkins, 2006; Magnuson et al., 2006). This pattern was duplicated in our low-income sample of children in Miami, Florida (De Feyter & Winsler, 2009), for whom we model educational patterns herein. Specifically, first- and second-generation immigrant children scored lower than non-immigrant children on cognitive and linguistic school readiness assessments. Teachers, however, rated immigrant children higher in self-control, initiative, and closeness with adults and reported that they had fewer behavior concerns than non-immigrant children. The social and emotional strengths of children in immigrant families were evident regardless of ethnicity, language, or country of origin.

A number of researchers have also investigated the elementary school achievement of immigrant and English language learner (ELL) children. Overall, these studies suggest an interesting pattern of academic growth for these important subgroups across the early years of elementary school, such that they enter kindergarten behind in reading and math when compared peers in native-born, White families, but demonstrate faster academic growth and perform equally or better in these same areas in 3rd grade (Halle et al., in press; Han, 2008; Palacios, Guttmannova, & Chase-Lansdale, 2008). The pattern applies particularly well to children of Hispanic descent, and has been found for

both English proficient and ELL children. These recent reports of educational success among children in immigrant families seem to conflict with much of the adolescent research, which shows immigrants, and especially Latino and ELL immigrants, lagging behind non-Hispanic White and Asian students on standardized test scores, high school completion, and college enrollment and completion (Kao & Thompson, 2003; Fry, 2004; Suárez-Orozco & Suárez-Orozco, 1995). Additional longitudinal research is needed in order to determine whether these discrepancies involve cohort effects, influences of earlier versus later age of immigration, or an even more unsettling pattern whereby children's educational outcomes actually decline with increasing time in the country (known as the *immigrant paradox*).

Our own investigation of MSRP children's elementary school achievement found similarly positive academic outcomes for young immigrant children, including lower kindergarten retention, better school attendance, higher end-of-year GPA, and higher math and reading scores (De Feyter et al., (2011). Though it is yet unclear why some immigrant children in these studies demonstrate faster academic growth despite higher levels of socio-economic disadvantage (Palacios et al., 2008), one potential explanation involves their developing facility with the host language. Level of English proficiency at the start of kindergarten has emerged as a strong predictor of both educational and behavioral outcomes and has been found to explain heterogeneity in achievement among ELL children in elementary school (Halle, et al., Kieffer, 2008; Kim et al., 2010).

Overall, these studies suggest an interesting pattern: that 1) prior to kindergarten, children in immigrant families demonstrate limitations in pre-academic (cognitive,

language) areas and strengths in social-emotional/behavioral areas as defined by traditional school readiness assessments, 2) in kindergarten, children in immigrant families, especially those who are Latino, lag behind their native-born peers in reading in math, and 3) by 3rd grade, many children of immigrants have grown faster academically, and in some cases, outperform their native-born peers. A primary goal of this study is to use a single cohort of children from diverse immigrant and non-immigrant backgrounds to predict 3rd grade achievement from preschool school readiness. Due to the lack of existing research in this area, we really do not know whether school readiness assessments measure in the same way for immigrant and non-immigrant children, or whether the skills they capture predict later achievement in the same way. Given well-documented cultural and linguistic differences between the two groups (Fuligni, 1997; Portes, 1999; Perreira, Chapman, & Stein, 2006; Suarez-Orozco & Suarez-Orozco, 2001), this is an area worthy of study and long overdue.

It is now well understood that culture influences development, cognition, and behavior through socially constructing ways of knowing and understanding the world (Rogoff, 2003; Shweder, et al. 2006). As such, measures of developmental skills and abilities should be sensitive to differences in culture. If, however, performance on an assessment is dependent on skills and abilities that are not common across cultures, then test bias, or systematic group differences in item responses or test scores, could result (Guion, 1998). This could happen, for instance, when measures are implemented with populations that differ culturally or linguistically from the norming sample (Guion, 1998; Solano-Flores & Nelson Barber, 2001). Culturally-based test bias could then lead to an

over- or under-prediction of later achievement for individual groups, such as children in immigrant families, and inaccuracies in placement decisions can have a high cost for children, parents, and school districts.

In addition to test-based differences, there could also be true group differences in relations between school readiness and later achievement stemming from cultural differences in societal values, child rearing beliefs, and exposure to Western schooling. For example, the skills and abilities emphasized and reinforced by foreign-born parents often differ from those of Western, U.S.-born parents (Crosnoe, 2010; Garcia Coll et al., 1996; Rogoff, 2003). These socialization differences may then lead to 1) mean differences in school readiness skills upon kindergarten entry, 2) a different pattern of relations between early skills and later achievement, or 3) both. In either case, it is important to better understand the way in which school readiness assessments, especially those used most frequently to make educational placement decisions for individual children, function and predict later achievement for these culturally unique populations. The first main analysis of this paper will therefore investigate whether nativity status moderates relations between school readiness and later achievement for low-income children in Miami.

English Acquisition and Children in Immigrant Families

As noted in the opening, a central goal of this paper is to provide a more nuanced picture of immigrant children's school readiness and later achievement and to investigate the developmental processes that are key to their academic achievement. Migrating to a new country involves a number of changes and adjustments, often not the least of which

is the need for parents and children to learn the language of the host country. As will be discussed in more detail, research has demonstrated that children's success with second language learning is both influenced by their competence in other areas (like cognition and social skill) and is a key factor contributing to their academic achievement, making it a key potential mediator in understanding linkages between school readiness and later achievement for children in immigrant families.

Though the United States has no official language, English is the primary language used to communicate in most social and economic sectors. Teachers use it to convey academic content in school, and children use it to forge peer relationships. The percentage of English language learners (ELLs) in pre-kindergarten through fifth grade rose from 4.7 to 7.4 percent between 1980 and 2000 (U.S. Census Bureau, 2005), however some individual states and communities have experienced much larger increases (Capps et al., 2005). As of 2005, there were approximately 5.1 million ELL students in U.S. schools, amounting to 10.5 percent of the U.S. population (National Clearinghouse for English-Language Acquisition and Language Instruction Educational Programs, 2006).

While most 5-8 year old children in immigrant families (97%) speak some English, up to one-third are not yet English proficient (do not speak English "very well") (Hernandez, Takanishi, & Morotz, 2009). The families of immigrant children are diverse in terms of languages spoken in the home, with approximately 42% of immigrant children living with English-fluent parents, 42% living with ELL parents, and 17% living with mixed-fluency parents (one ELL and one English-fluent parent) (Hernandez et al.,

2009). Additionally, approximately 27% of children in immigrant families live in linguistically isolated households, where no one over the age of 14 speaks English very well (Hernandez et al., 2009). While these children may have greater opportunity to one day become bilingual, they experience special challenges in their early years of schooling. ELL children are more likely than native English speakers to attend low-achieving schools (Fry, 2008), and along with low-income children, children with disabilities, and children with behavior problems, they are identified by the federal government as one of four major groups of U.S. children at risk for academic failure (King, 2006). According to the 2005 National Assessment of Educational Progress (NAEP; U.S. DOE, 2005), 73% of 4th grade ELL students scored below the most basic level in reading, and 46% scored below the most basic level in math (as compared to 33% and 17% of non-ELL students).

It can take anywhere from three to seven years for an ELL child to become proficient enough in English to fully participate in an academic context (Hakuta, Goto Butler, & Witt, 2000; Thomas & Collier, 1997). Further, the timing of English-language acquisition may be critical to children's long-term development, such that ELL children who are proficient by the time they enter kindergarten perform similarly to their non-ELL peers on academic outcomes by 5th grade but those who do not enter proficient still lag behind (Halle et al., in press; Kieffer, 2008; Kim et al., 2010). Therefore, it is critical for educators and policymakers to understand not only what areas English-proficiency impacts most in terms of academic and social outcomes, but also which child, family, and school support factors predict early and successful English language acquisition for

immigrant and ELL children.

Academic/Social Benefits of English Proficiency

If ELL children in immigrant families can attain proficiency in English, and attain it early (Stevens, 1999), they are able to perform similarly to native English-speaking peers on academic measures of achievement in elementary school (Halle et al., in press; Hernandez et al., 2008; Kim et al., 2010) which can translate to more positive long-term educational outcomes. Additionally, there is evidence to suggest that bilingualism, or becoming fluent in more than one language, promotes development in several other domains such as information processing skills and metalinguistic awareness (Cummins, 1999), cognitive control and flexibility (Bialystok, 2001; Bialystok & Martin, 2004), problem solving (Ben-Zeev, 1977), and theory of mind (Bialystok & Senman, 2004).

English proficiency is also important for young immigrant children's social outcomes. During the early grade school years, peers and friendships become more central to children's lives, and ELL children are often navigating a new socio-cultural environment for the first time. As such, a child's English language proficiency can impact the extent to which he or she is able to successfully form friendships and feel a sense of belonging in the school context. If children are unable to communicate effectively with teachers and peers, they may receive negative feedback and even experience rejection, which can negatively impact academic achievement, school dropout, and even delinquency into adolescence (Han, 2010; Raver, 2002).

Predictors of English Proficiency

There is great variation among ELL children in terms of timing, speed, and ultimate proficiency level in their second language, as well as in the level of first language retention, or extent of bilingualism (Collier, 1989; Winsler, Diaz, Espinosa, & Rodriguez, 1999). In order for educators and policy-makers to most efficiently target English proficiency as a goal for young students, it is crucial to understand the child, family, and school factors that predict English fluency in young immigrant and ELL children. One factor that consistently predicts second language acquisition is first language competence. There appear to be aspects of general language ability, such as phonological memory (Service & Kohonen, 1995) and pragmatic vocabulary (Ordonez, Carlo, & McLaughlin, 2002), that are associated with acquiring the foundational skills of a first language and applying those skills to learning a second language (Collier, 1995; Sparks & Ganschow, 1991). Such research suggests there are likely benefits to providing ELL children opportunities to become proficient (or maintain proficiency) in their first language (Collier, 1989; Cummins, 1986; Hernandez et al., 2008) in addition to promoting competence in the second language.

Individual differences in cognitive ability can also partially explain individual differences in second language learning. For instance, specific cognitive skills such as the ability to think analytically, the ability to function rationally and calmly in an ambiguous situation, and the ability to perform various cognitive tasks such as matching and counting objects have all been linked to better second language learning (Chappelle & Roberts, 1986; Kim et al., 2010). There is also some evidence to suggest that a child's social competencies and experiences contribute to second language learning. For

instance, Garner and Lambert (1972) found that positive attitudes toward the group whose language was being learned predicted second language proficiency in children and adults. Additionally, a child's own social skills, such as the ability to initiate interactions, a willingness to take risks, and a readiness to depend on English-fluent friends are all factors that make it more likely that an ELL child will be included in conversations and activities, and that other children will continue efforts to communicate (Garcia, 2005; Kim et al., 2010; Wong Fillmore, 1976; Wong Fillmore & Valadez, 1986). Other psychosocial variables found to predict second-language acquisition include motivation (Dörnyei, 2005; Gardner, 1985), self-confidence (Clément, 1980), and language anxiety (Horowitz, Horowitz, & Cope, 1986).

Finally, it is noteworthy that there is likely a bi-directional relationship between cognitive/social competencies and second language learning, such that children with advanced cognitive and social skills are more adept at learning English as a second language, and in turn, enhanced English competence provides further opportunities for learning and cognitive development, as well as engagement and relationship forging with peers and teachers (Peal & Lambert, 1962). As the research described above demonstrates, any investigation into the developmental pathways of immigrant children must take English language acquisition into account. Because English proficiency is both influenced by school readiness and predicts later academic achievement, it has the potential to be a key factor in explaining relations between school readiness and later achievement for children in immigrant families.

2. RESEARCH QUESTIONS

The following research questions were examined, guided by the following hypotheses:

1) To what extent do age-four school readiness skills (pre-academic, social-emotional, behavior) predict 3rd grade academic achievement (GPA, math/reading scores) for low-income children? For the overall sample, it is hypothesized that, a) higher pre-academic (cognitive, language, and fine motor) school readiness at age four will lead to higher academic achievement in 3rd grade, b) higher social-emotional (initiative, self-control, attachment) school readiness at age four will lead to higher academic achievement in 3rd grade, and fewer behavior concerns at age four will be associated with higher academic achievement in 3rd grade. Further, and in concert with the literature, pre-academic skills will be more strongly related to 3rd grade achievement than socio-emotional skills or behavior.

2) Does nativity status moderate relations between school readiness and later achievement? The literature does not provide overwhelming guidance here, however, due to demonstrated cultural differences and differential academic growth between the two groups, it is hypothesized that nativity status will moderate relations between school readiness and later achievement. One possibility, for example, is that social-emotional skills, strengths for immigrant children, are more important for their later achievement

than for non-immigrant children, for whom the association is weak (Duncan et al., 2007; La Paro & Pianta, 2000).

3) For immigrant children, to what extent do pre-academic and social-emotional school readiness predict timing of English language proficiency? It is hypothesized that greater pre-academic school readiness, greater social-emotional school readiness, and fewer behavior concerns will each predict earlier English proficiency for immigrant children.

4) For immigrant children, to what extent does the timing of English language proficiency predict academic achievement in 3rd grade? It is hypothesized that earlier English proficiency will predict higher 3rd grade academic achievement.

5) For immigrant children, does timing of English language proficiency mediate relations between school readiness and 3rd grade achievement? It is hypothesized that timing of English language proficiency will partially mediate relations between school readiness and later achievement, in that greater pre-academic and social-emotional school readiness will lead to earlier English language acquisition, which will, in turn, lead to higher 3rd grade achievement. In other words, school readiness will exert a direct influence on 3rd grade achievement (Research Question 1), but also an indirect influence, by reducing the amount of time it takes for a child to become English proficient.

All research questions were investigated using a structural equation modeling (SEM) framework. Research questions 1 and 2 were addressed with Model A (Figure 1) and questions 3, 4, and 5 were addressed with Model B (Figure 2).

3. METHOD

Participants

Participants consisted of 2,657 children (51% male) whose parents consented to their participation in the Miami School Readiness Project (MSRP; Winsler et al., 2008), a large-scale, longitudinal, university-community partnership study that assessed the school readiness of all children receiving state subsidies to attend child care in Miami-Dade county, Florida between Fall 2002 and Spring 2007. The sub-sample was selected based on the criteria that children a) had sufficient child and parent country of birth data to determine nativity status and b) were in a subsidized child care arrangement (center-based child care, public school pre-k, or family day care) at age four, and c) had data for at least one school readiness assessment at age four. Children were predominately Hispanic/Latino (61%) and African-American/Black/Caribbean (37%), with 2% White/Other/Mixed. They attended kindergarten in the Miami-Dade County Public School (MDCPS) system during the 2004-05 school year and average age at the start of kindergarten was 5.5 years ($SD = .30$).

During their pre-kindergarten year, 86% of these children attended a community-based child care center, 12% attended a public school pre-k, and 2% attended a family child care facility. The vast majority of the children were born in the U.S. (94%), and approximately half the sample (50%) was composed of children in immigrant families

with at least one immigrant parent. More than half the sample (57%) reported there was a language other than English spoken in the home, and for 87% of these children, that language was Spanish. In kindergarten, nearly all children (92%) qualified for free or reduced lunch, defined by having a family income less than 185% of the federal poverty line. Just 9% of parents were married (the remaining 91% were single, divorced, separated, or widowed), with average income of \$16,155 and average education 11.6 years (see Table 1 for full demographic information). The nature of the child ID system and matching procedure used enabled us to receive kindergarten through 3rd grade public school data on each child in the original sample as long as they did not leave the MDCPS system, even if they changed schools within MDCPS.

Demographic differences by nativity group. Before describing details of demographic differences between children in immigrant and non-immigrant families, recall that all children in the sample received state subsidies to attend child care at age four and all were low-income and experiencing a number of risk factors associated with living in poverty. We will see, however, that even within this low-income sample, nativity status differences emerged for a number of family background factors that could, in turn, relate to educational outcomes. First, while both immigrant and non-immigrant parents reported similar levels of education (11.5 and 11.6 years, respectively), $t(2,654) = 1.07, p > .05$, immigrant parents earned greater annual income (\$16,744) than non-immigrant parents (\$15,566), $t(2,655) = 3.90, p < .001, d = .15$. Overall marriage rates were quite low among these at-risk families (9%), however immigrant parents were considerably more likely to be married (14%) than native-born parents (3%), $\chi^2(4, N =$

2,657) = 251.83, $p < .001$.

The majority of children in immigrant families were of Latino race/ethnicity (82%) while a majority of children in non-immigrant families were Black (57%), $\chi^2 (2, N = 2,650) = 502.33, p < .001$. The groups also differed in terms of language spoken in the home, with Spanish primarily spoken in the home for 78% of children in immigrant families and English in the homes of 75% of children in non-immigrant families, $\chi^2 (12, N = 2,009) = 859.64, p < .001$. Finally, children differed somewhat in terms of the type of care they experienced at age four. Both groups were composed of more children who attended community-based child care than public school pre-k, but the proportion of children in community-based care was greater for children in immigrant families (90%) than for those in non-immigrant families (81%), $\chi^2 (2, N = 2,655) = 49.80, p < .001$. The picture painted here is that, overall, no one group appears to be significantly more advantaged than the other. Immigrant parents have slightly greater income and are more likely to be married, but children of non-immigrant parents are more likely to have English spoken in the home and to have attended public school pre-k, which tends to be of higher quality than child care based in the community (Goodson & Moss, 1992; Winsler et al., 2008). Each group has some relative advantages and disadvantages, and since nativity status is not subject to random assignment, we will attempt to account for some background and demographic differences by including them as covariates in the main analyses.

Procedure

When children were four years old, parents consented for participation in the Miami School Readiness Project; a county-wide evaluation of the development and school readiness of children who received subsidies to attend early child care in the county (see Winsler et al., 2008). Child and family demographic information was collected from parents at time of consent, and children's school readiness was assessed in the Fall and Spring of the four-year-old preschool year (De Feyter & Winsler, 2009). Once children entered kindergarten, and through 3rd grade, we received demographic and academic outcome data via MDCPS public school records (described in more detail below). With the assistance of MDCPS, children's unique identification numbers were linked with their unique public school IDs so that preschool and elementary school data could be merged into a single data set with one case per row. Additionally, through a series of file merges and database development techniques, children's grade school trajectories were preserved, so that, for instance, data for a child who repeated kindergarten included academic outcomes from both their first and second time in kindergarten. For the purposes of this study, and to reduce additional sources of variability associated with retention, only on-time trajectory children were included so that by 3rd grade, all children were of similar ages and started kindergarten at the same time four years earlier.

Measures

Demographics. Upon enrollment into the county child care subsidy program when children were four years old, Miami-Dade county staff members collected a variety of demographic information from parents. This information included child gender,

ethnicity, language, and country of birth, as well as parental income, education, language, country of birth, marital status, and family size.

Nativity status. Children were divided into two groups based upon parent report of the parent's and child's country of birth. If either the child, or the parent, or both were born outside the United States, the child was classified as residing in an immigrant family. Therefore, this group was composed of both first-and second-generation immigrants. If both the child and the parent were born in the United States, the child was classified as residing in a non-immigrant family. See De Feyter and Winsler (2009) for more detail on generational status and region information for this sample, however for the purposes of this paper, only a two-group dichotomy of children in immigrant and non-immigrant families was used in analyses.

Age-four pre-academic skills. The Learning Accomplishment Profile-Diagnostic (LAP-D; Nehring, Nehring, Bruni, & Randolph, 1992) was administered individually to children in a separate room of the child's school, both around the beginning (September–October) and end (April–May) of the age four academic year. LAP-Ds were administered by educated, (M.A. or B.A.) bilingual (English–Spanish) assessors who determined the appropriate language of assessment by speaking with the child's teacher or the child him/herself. LAP-D raw scale scores for the cognitive (matching and counting subscales combined), language (comprehension and naming subscales combined), and fine motor (writing and manipulation subscales combined) subscales were used for this study. Most children had assessment scores at both time points for the cognitive ($n = 2,086$) and language ($n = 2,087$) scales and in such cases the two scores were averaged. However,

there were a number of cases where a child had only a pre or post cognitive ($n = 475$) or language ($n = 473$) assessment but not both. In these cases the available time point was used so that all available data were utilized. Internal consistency reliabilities for the LAP-D within the Miami sample were .93 for cognitive and .95 for language. Please see Winsler and colleagues (2008) or De Feyter and Winsler (2009) for additional details about the LAP-D.

Age-four social-emotional skills and behavior. Children's social-emotional strengths and behavior problems were measured by teacher report in the fall and spring of the child's four-year-old preschool year using the Devereux Early Childhood Assessment (DECA; LeBuffe & Naglieri, 1999). The DECA creates a profile of children's social-emotional strengths or "protective factors" within a resilience framework (Werner & Smith, 1992) and was also available in both Spanish and English. When using the DECA, teachers report on the frequency of children's behaviors by rating them on items comprising four subscales: initiative, self-control, attachment/closeness with adults, and behavioral concerns. The first three subscales are combined to create an overall social-emotional total protective factors score (larger numbers indicating greater strengths) and the behavior concerns scale is scored such that larger numbers indicate greater problems with behavior. As with the LAP-D, we computed the average of the raw score for fall and spring for children who had both time points ($n = 1,501$), and used a single time point for children who had only a single time point ($n = 937$). Internal consistency reliability within this diverse sample was .94 for total protective factors and .81 for behavior concerns (Winsler et al., 2008), and reliability did not vary as a function of language of

form (Spanish, English; Crane, Mincic, & Winsler, 2011). Please see Winsler and colleagues (2008) or De Feyter and Winsler (2009) for additional detail about the DECA.

Third grade end-of-year GPA. At the end of the 3rd grade year, children in the MDCPS system received marks from their teachers in nine subject areas including language development, reading, writing, mathematics, science, social studies, art, music, and physical education. Grades were reported on the standard A, B, C, D, and F scale and then children's original marks were converted into numerical values using a five-point coding system: A = 5, B = 4, C = 3, D = 2, F = 1. After converting the marks to numerical form, scores were averaged across the nine subjects to create a single, continuous grade-point-average (GPA) score with a range of 1 – 5 for each child (M = 3.95; SD = 0.60).

Third grade math and reading scores. Beginning in 3rd grade, students in Florida take the Florida Comprehensive Achievement Test (F-CAT; Human Resources Research Organization & Harcourt Assessment, 2007), an assessment mandated by the Florida Department of Education. Certain items were incorporated for Florida public schools specifically, were based on the Florida Department of Education's Sunshine State Standards (SSS), and were standardized on Florida students only, while the remaining items were standardized nationally. The F-CAT was comprised of both a reading and math scale and yielded a continuous score for each scale ranging from 0 to 300.

Timing of English language proficiency. Upon entrance to kindergarten, and for each grade thereafter, children in Miami-Dade County received the Oral Language Proficiency Scale-Revised (OLPS-R; Oral Language Proficiency Scale, ESOL Placement

Interview Guidelines – Revised, 1978) when parents reported speaking a language other than English at home. OLPR-R is a Florida state-wide English oral proficiency test given by an ESOL (English for Speakers of Other Languages) teacher at the school. This test places children into five levels, with level one indicating beginner status and resulting in placement into an ESOL program, and level five indicating full proficiency resulting in the student being placed only in a regular curriculum with native-English speaking students. Once children have reached level five, they are no longer assessed and are considered proficient enough in oral English to no longer participate in ESOL programming.

The OLPS-R is a grade-norm referenced oral proficiency test so that testing criteria change as children age, with similar criteria for kindergarten through second grade, third through fifth grade, and sixth through twelfth grade. We received ESOL data for children for each year and were therefore able to determine children's initial ESOL status upon kindergarten entry (whether or not they were assessed) as well as the grade at which they became proficient. Because some children had a reported home language of English yet were still tested and scored below a level 5, and other children had a non-English home language but were never tested, we used home language in conjunction with ESOL level to determine English Language Learner (ELL) status. If a child was living in a home where a language other than English was spoken (according to data collected by the public schools) OR they received an ESOL test they were considered an ELL child. A child who had a home language other than English but was not tested in ESOL was given a "5" for "fully proficient" Children whose home language was English

(and were therefore not given the ESOL test) were given a “6” for “native English speaker.” The existing ESOL variable was then recoded for each grade level (kindergarten through grade four) with 1 = beginner level 1; 2 = beginner level 2; 3 = intermediate level 1; 4 = intermediate level 2; 5 = fully proficient; and 6 = native English speaker. Table 2 depicts the distribution of the original English proficiency variable for children in immigrant families at each grade level.

Next, a dichotomous (yes/no) variable was created for each grade to represent whether a given child was proficient in that particular grade, including native English speakers (coded as proficient). Approximately 46% of the sample was proficient by kindergarten, 63% by first grade, 84% by second grade, and 92% of children in immigrant families were proficient in English by 3rd grade. Finally, using the variable for each grade level, a single variable was created indicating the grade at which the child was considered fully proficient with 0 = proficient (level 5 or 6) by kindergarten; 1 = proficient by 1st grade; 2 = proficient by 2nd grade; 3 = proficient by 3rd grade; 4 = still not proficient by 3rd grade. This is the variable used in analyses and referred to as “timing of English proficiency.” The mutually exclusive categories include approximately 47% of children in immigrant families who were proficient by kindergarten, 18% who were proficient by first grade, 18% by second grade, 9% by third grade, and 8% were still not quite proficient by 3rd grade.

Control variables. It is well-documented that a number of child, family, and contextual factors such as poverty, parental education, and child care setting differ between children in immigrant and non-immigrant families (Brandon, 2002; Capps, et al.,

2004; Hernandez et al., 2008; Leventhal, Xue, & Brooks-Gunn, 2006), and that these factors are also related to children's school readiness and educational outcomes (McLoyd, 1998). To account for these additional sources of demographic variability, all analyses will control for parental income, education, and marital status; child gender, ethnicity, child care type in preschool, and free/reduced lunch status in 3rd grade; and family size.

4. ANALYTIC APPROACH

Since the research questions addressed in this study examine the various pathways by which immigrant children's early school readiness predicts 3rd grade achievement, and because there were multiple observed variables, or indicators, for two of the main constructs (age four social-emotional skills, age four pre-academic skills), a structural equation modeling framework (SEM; Jöreskog, 1973) was utilized to address the main research questions of the study. SEM is designed to assess hypothesized relationships, or covariance structures, between constructs (structural model) and between measured variables and those constructs (measurement model) (Shumacker & Lomax, 2004). There are multiple advantages of SEM including, 1) Researchers can utilize a number of measured variables to understand a single construct. 2) Models can explicitly account for measurement error within the analysis. 3) Complex models that correspond to complex modern theories can easily be tested, accommodating multiple paths and utilizing multi-group models for questions involving moderation. 4) SEM software has become increasingly user-friendly in recent years (Shumacker & Lomax, 2004).

AMOS, the data analysis software used, is known for being particularly user-friendly, but another distinct advantage is its approach to handling missing data. Though missing data are often ignored, doing so can lead to biased estimates, reduced power, and invalid inferences (Acock, 2005; Widaman, 2006). AMOS utilizes the full-information

maximum likelihood (FIML) approach, which has been shown to result in less biased estimates than other common missing data handling procedures (Shumaker & Lomax, 2004). Finally, because data for this study were collected as part of a community-wide program evaluation and random assignment was not employed, it is helpful that AMOS can accommodate a number of continuous and categorical covariates. Models were tested with a two-step approach (Anderson & Gerbing, 1988), whereby the fit of the measurement model was assessed, followed by the fit of the structural models.

Evaluation of the Models

The measurement models are evaluated by the overall fit or chi-square test, accompanied by the degrees of freedom, sample size, and p value. Since the chi-square is overly influenced by sample size and rewards lack of parsimony (Gerbing & Anderson, 1992; Schumacker & Lomax, 1996), a number of additional fit indices were utilized to assess model fit. For both the measurement and the structural models, the chi-square statistic is presented along with the standardized Root Mean Square Error of Approximation (RMSEA), Normed Fit Index (NFI), and Comparative Fit Index (CFI). To indicate good model fit, RMSEA should be .08 or smaller although because it is sensitive to the size of the model, more weight will be given to the NFI and CFI values. It is common to see a recommended cut-off value of .90 or higher NFI, and CFI (Mulaik, 1989), however more recently, values closer to .95 are considered ideal (Hu & Bentler, 1998). For the structural models, parameter estimates were examined in addition to model fit to determine which paths are statistically significant and to evaluate the strength of the associations.

Moderation Analyses

Both Model A (Figure 1) and Model B (Figure 2) were evaluated for model invariance (Vandenberg & Lance, 2000), or model equivalence, across groups via a multigroup analysis in AMOS. The first multigroup analysis determined whether Model A, examining relations between school readiness and later achievement, was equivalent, or invariant, across children in immigrant and non-immigrant families. The second multigroup analysis determined whether Model B, examining the role of English language proficiency, was equivalent for immigrant children of Hispanic/Latino and Black/African descent. Once the model fit and parameter estimates were determined for the overall sample, the multigroup analysis involved the evaluation of a series of nested models with different sets of constraints for each model. First, we compared an unconstrained model (all parameters free to vary) with a measurement-constrained model (measurement weights, or factor loadings, constrained equal across groups). Evidence for measurement non-equivalence exists if the measurement-constrained model fits significantly worse than the unconstrained model according to a chi-square difference test and other relevant fit statistics (Vandenberg & Lance, 2000). Though there are no widely accepted cutoff values for the adjusted fit indices as there are for the chi-square difference test, we used Cheung and Rensvold's (1999) Monte Carlo simulation study recommendation that the model invariance hypothesis should be rejected when CFI differences reach between .01 (suspected differences) and .02 (definite differences). After comparing the measurement-constrained and unconstrained models, we compared a structure-constrained model (where both the measurement weights and the structural

weights were constrained across groups) with the measurement-constrained model.

Evidence for structural non-invariance exists if the structure-constrained model fits significantly worse than the measurement-constrained model. Such results would indicate that the hypothesized paths between constructs differ across groups.

Mediation Analyses

We were particularly interested in the extent to which timing of English language proficiency plays an intermediary role in relations between school readiness and later achievement for children in immigrant families. It is possible, for instance, that children's attainment of certain skills upon entering kindergarten helps them learn English faster and sooner, thereby enabling them to perform better academically by 3rd grade. To examine this hypothesis, the overall fit of the model was first assessed, followed by an examination of the path coefficients for the direct paths from Model A to determine the extent to which school readiness exerted a direct influence on 3rd grade achievement when the mediator, timing of English proficiency, was included. Finally, the indirect effects of school readiness on later achievement via timing of English proficiency were computed using the products of the coefficients for the direct paths. To assess the reliability of indirect effects, we used the Monte Carlo method for assessing mediation (MCMAM; MacKinnon, Lockwood, & Williams, 2004; Selig & Preacher, 2008), which provides confidence intervals around the estimates and has been shown to perform better than the more commonly used Sobel test (MacKinnon et al., 2004; Sobel, 1982).

Nesting

Another issue considered, one that is common with educational data, is the potential for nesting to bias the results of the study. Nesting occurs when there is a hierarchical structure to the data whereby information collected for participants is situated at multiple “levels” such as children within classrooms within schools (Bryk & Raudenbush, 1987). Traditional statistical techniques assume that data observations, or their errors, are independent and when this assumption is violated the potential for Type I Error is increased (Cohen, Cohen, West, & Aiken, 2003; Hox, 2002). To address this issue, we computed intra-class correlations for each of the outcome indicator variables to determine the proportion of variance in each attributed to the school children attended. The intra-class correlations for 3rd grade GPA, FCAT Math, and FCAT reading were 14%, 7% and 10%, respectively. Recent recommendations regarding the necessity for multi-level models (de Leeuw & Kreft, 1995) suggest that when groups are large, intra-class correlations are small, or researchers are only interested in the fixed regression coefficients, multi-level models may not be necessary. Given these considerations, that the sample size would need to be greatly reduced to meet the recommended participants per group for HLM (Little, Schnabel, & Baumert, 2000), and that the variance in the outcome variables attributed to schools is relatively small, we analyzed our models without a hierarchical structure (de Leeuw & Kreft, 1995).

Missing Data

As with any study utilizing longitudinal data, there was a measurable amount of attrition across the years of the study, between preschool and 3rd grade. The child ID system utilized made it possible to link a child with his or her public school data as long as they

remained in the MDCPS system, so children missing from the present study in a given year either a) left or moved out of the MDCPS system, or b) were retained in grade at some point and were therefore no longer on a normal trajectory for their age. By 3rd grade, approximately 44% of the sample was missing at least one of the 3rd grade criterion measures. Missing data analyses revealed that children who were missing from the study by 3rd grade were at slightly higher academic-risk at school entry than those who remained, both in terms of family/child demographics and in terms of developmental competencies. Additionally, children with native-born parents were more likely than those with immigrant parents to disappear from the study. To minimize biases due to missing data, we implemented Full Information Maximum Likelihood (FIML) estimation in AMOS, as it has been shown to result in less biased estimates when compared to mean substitution, listwise deletion, and pairwise deletion (Schumacker & Lomax, 2004).

5. RESULTS

Bivariate Associations Among Key Variables

Prior to the main analyses, basic descriptive analyses were conducted to examine the data upon which the SEM models were based. Table 3 provides the matrix to be analyzed in the form of a correlation matrix of the key variables. Though SEM estimation is based on covariances, correlations are easier to interpret, and by including the standard deviations of the variables, an interested reader can recover the covariance matrix, if desired (Hoyle & Panter, 1995). As can be seen from the correlation table, both pre-academic and socio-emotional areas of school readiness bear small to moderate bivariate relations to 3rd grade achievement. Additionally, both nativity status (our moderator) and timing of English language proficiency (our mediator) bear small to moderate bivariate relations to multiple areas of school readiness as well as measures of 3rd grade achievement, providing the underpinnings for the conceptual models presented herein.

Distributions and Multivariate Normality

Because excessive kurtosis and significant departure from multivariate normality can affect the validity of the estimates under the SEM framework, it was also important to examine the distribution of the variables in the models to be estimated (Hoyle & Panter, 1995; McDonald & Ho, 2002). None of the variables were characterized by excessive skewness or kurtosis, as the highest value for skewness was 0.86 for the timing

of English proficiency variable and the highest value for kurtosis it was 1.20 for the FCAT reading scale. Additionally, scatterplots revealed bivariate normality and no evidence of multivariate outliers.

Measurement Models

Two measurement models were tested via confirmatory factor analyses for two predictors: age-four pre-academic skill and age-four social-emotional skills. The latent construct for age-four pre-academic skills was represented by three observed indicator variables: age-four cognitive skills, language skills, and fine motor skills. Because all three indicators were measured on the same scale, we constrained the error variances to be equal and this resulted in a model that fit the data well [$\chi^2(2, N = 2657) = 182.16, p = .000, NFI = .96, CFI = .96$]. All standardized factor loadings were significant and greater than .84.

The latent construct for age-four social-emotional skills was also represented by three observed indicator variables: self-control, attachment, and initiative. Again, because all three indicators were measured on the same scale, their error variances were constrained equal. This modification allowed the model to be estimated but resulted in inadequate fit [$\chi^2(3, N = 2657) = 663.73, p = .000, NFI = .80, CFI = .80$]. Examination of the parameter estimates revealed that the attachment variable had a lower factor loading than the other indicators and that the model might benefit from the error variance for that variable being freed. Allowing the error variance of the attachment variable to be free then resulted in a model that fit the data well [$\chi^2(1, N = 2657) = 56.98, p = .000, NFI =$

.98, *CFI* = .98]. All standardized factor loading were significant and ranged from .65 to .93.

Structural Models

Structural Model A. The purpose of structural Model A (Figure 1) was to examine relations between school readiness and later achievement among this diverse, low-income sample of children. We first computed model fit for the overall sample (pooled across groups) to obtain a baseline chi-square value. The model demonstrated adequate fit for the overall sample [$\chi^2(146, N = 2657) = 3086.85, p = .000, RMSEA = .06, NFI = .94, CFI = .94$].

Not shown in the figure is that the model included eight dummy-coded covariates representing five categorical variables [gender (male 1/0), ethnicity (Black 1/0, Latino 1/0, with ‘White’ as the reference group), free or reduced lunch (yes 1/0), marital status (single 1/0, separated/divorced/widowed 1/0, with ‘married’ as the reference group), and child care type at age four (public school pre-k 1/0, family child care 1/0, with ‘center care’ as the reference group) and three continuous covariates (parent income, maternal education, and family size). For both groups, being male was associated with lower GPA in 3rd grade ($\beta = -.11, p < .001$), and higher reading scores ($\beta = .09, p < .001$), but gender was unrelated to math scores. Additionally, having a mother who was separated/divorced/widowed (as compared to married) when the child was in preschool was related to lower end-of-year GPA ($\beta = -.10, p < .05$) and being the child of a single (never married) mother was associated with lower 3rd grade math scores ($\beta = -.06, p < .05$). Finally, greater maternal education was associated with higher GPA in 3rd grade (β

= .04, $p < .01$) but not with reading or math scores, while living in a smaller family was related to higher GPA ($\beta = -.13, p < .001$), as well as higher reading ($\beta = -.06, p < .01$) and math scores ($\beta = -.14, p < .001$).

The three predictors of interest for Model A (Table 4) were age four social-emotional skills (a latent construct), age four behavior concerns (an observed variable), and age four pre-academic skills (a latent construct). For the overall sample, social-emotional skills at age four were not uniquely related to any of the three academic outcomes in 3rd grade after controlling for the other predictors and covariates. Greater behavior concerns at age four were associated with worse end-of-year GPA ($\beta = -.13, p < .001$) and lower reading scores ($\beta = -.08, p < .01$) in 3rd grade. Finally, greater pre-academic skills at age four predicted better performance on all three academic outcomes in 3rd grade: better GPA ($\beta = .31, p < .001$), higher reading scores ($\beta = .43, p < .001$), and higher math scores ($\beta = .42, p < .001$), and contributed to substantially more variance in 3rd grade achievement than did behavior concerns.

The next step involved conducting the multigroup analysis and comparing the nested models (unconstrained, measurement-constrained, and structural-constrained) to determine whether the above parameter estimates differed significantly across immigrant and non-immigrant children. Recall there is evidence for model non-equivalence if constraining either the measurement weights or structural weights to be equal across groups results in a model with worse fit than the base model. The unconstrained model fit the data well [$\chi^2(146, N = 2657) = 1450.39, p = .000, RMSEA = .06, NFI = .94, CFI = .95$], as did the measurement-constrained model [$\chi^2(152, N = 2657) = 1492.68, p = .000,$

$RMSEA = .06$, $NFI = .94$, $CFI = .95$]. A significant chi-square difference test indicated that the measurement-constrained model fit worse than the unconstrained model [$\Delta\chi^2(6, N = 2657) = 42.29, p = .000$]. However, because χ^2 is overly influenced by large sample size, it was important to compare the other fit statistics as well (Cheung & Rensvold, 1999; Vandenberg & Lance, 2000). Doing so revealed that the NFI and IFI of the two models differed by only .002, not a large enough difference to constitute worse fit in any meaningful way, and smaller than the recommended change cutoff of .01 (Cheung & Rensvold, 1999). Based upon these first analyses, we can conclude we have evidence for model invariance, or model equivalence, across groups in terms of the behavior of the measurement models. The structural-constrained model also fit the data well [$\chi^2(161, N = 2657) = 1502.10, p = .000, RMSEA = .06, NFI = .94, CFI = .95$], and a non-significant chi-square test indicated the fit was no worse than the fit of the measurement-constrained model, [$\Delta\chi^2(9, N = 2657) = 9.42, p = .399$]. We can therefore conclude that there is also structural invariance, or structural equivalence, across groups with regard to the paths of interest. It appears that these school readiness assessments not only function in a similar manner for children in immigrant and non-immigrant families, but that the school readiness skills measured by the assessments predict later achievement to a similar degree as well.

We also evaluated the path coefficients from the covariates to the criterion measures. There were two instances, in the cases of ethnicity and free/reduced lunch receipt, where the relative importance of a demographic predictor depended on a child's nativity status. Ethnicity was not related to 3rd grade achievement outcomes for children

with immigrant parents, but for children with native-born parents, being Hispanic/Latino (as compared to White) was associated with lower GPA ($\beta = -.15, p < .05$), and being Black/African-American was associated with lower GPA ($\beta = -.35, p < .001$), reading ($\beta = -.34, p < .001$), and math scores ($\beta = -.17, p < .01$) in 3rd grade. Additionally, whether a child received free or reduced lunch in 3rd grade was related to each of the 3rd grade achievement outcomes for children in immigrant families (β GPA = $-.09, p < .01$; β reading = $-.09, p < .01$; β math = $-.08, p < .05$) but was unrelated for those in native-born families.

Structural Model B. Structural Model B aimed to examine the timing of children's English proficiency as a mediator in the relation between school readiness and later achievement. Model B fit the data well for the overall sample of immigrant children [$\chi^2(88, N = 1328) = 788.33, p = .000, RMSEA = .08, NFI = .94, CFI = .94$]. Social-emotional skills at age four did not exert a direct influence on any of the 3rd grade achievement outcomes after controlling for the host of child and family covariates. There was a direct effect of age-four behavior concerns on 3rd grade GPA, with greater concerns leading to lower GPA ($\beta = -.12, p < .01$), but behavior concerns were not associated with either reading or math scores. Pre-academic skills at age four exerted a direct influence on each of the three 3rd grade achievement outcomes and greater skills were associated with higher end-of-year GPA ($\beta = .31, p < .001$), higher reading scores ($\beta = .42, p < .001$), and higher math scores ($\beta = .39, p < .001$). Additionally, while greater pre-academic skills at age four predicted earlier timing of English proficiency in elementary school ($\beta = -.24, p < .001$), social-emotional skills and behavior concerns at age four

were not uniquely related to timing of English proficiency when controlling for the other predictors and covariates. Finally, earlier timing of English proficiency was related to all three achievement outcomes in 3rd grade: better GPA ($\beta = -.10, p < .01$), higher reading ($\beta = -.11, p < .001$), and higher math scores ($\beta = -.17, p < .001$).

In addition to direct effects, we were particularly interested in any indirect effects of school readiness skills on later achievement via influence on children's timing of English proficiency. Significant indirect effects were found for age-four pre-academic skills but not the other two school readiness domains. Specifically, pre-academic skills exerted an indirect influence on end-of-year GPA ($\beta = .02, b = .003, 95\% CI [.001, .005]$), 3rd grade reading scores ($\beta = .03, b = .32, 95\% CI [.13, .54]$), and 3rd grade math scores ($\beta = .04, b = .42, 95\% CI [.24, .63]$) by reducing the amount of time it took for children to become English proficient. Therefore, the total standardized effects that pre-academic skills exerted on each outcome (derived from adding the direct and indirect effects) were $\beta = .33$ (GPA), $\beta = .45$ (reading,) and $\beta = .43$ (math).

After determining model fit and parameter estimates for the overall sample of children in immigrant families, we ran another multigroup analysis with nested models, constraining first the measurement weights and then the structural weights, to determine whether any of the hypothesized paths differed between children in Black/African-American and Hispanic/Latino immigrant families. The unconstrained model, where all paths were free to vary across groups, fit the data well [$\chi^2(146, N = 1328) = 764.34, p = .000, RMSEA = .06, NFI = .91, CFI = .92$]. Examination of the parameter estimates revealed some interesting differences between the Black and Latino children in

immigrant families. For instance, for Black children in immigrant families, increased age four behavior concerns had a significant direct effect on each of the four criterion measures. They were associated with later timing of English proficiency ($\beta = .16, p = .05$), worse end-of-year GPA ($\beta = -.20, p < .05$), lower reading scores ($\beta = -.26, p < .01$), and lower math scores ($\beta = -.22, p < .05$). This was not the case, however, for Latino children, for whom early behavior concerns were unrelated to the criterion measures, with the exception of end-of-year GPA ($\beta = -.11, p < .01$). In addition, while pre-academic skills exerted a direct influence on all three 3rd grade achievement outcomes, the coefficients were notably greater for Black children in every case (+.12 GPA, +.17 reading, +.21 math). Finally, greater pre-academic skills were associated with earlier timing of English proficiency for Latino children in immigrant families ($\beta = -.27, p < .001$) but were unrelated for Black children in immigrant families ($\beta = -.08, p > .05$).

Given the above differences in parameter estimates between the two groups, we proceeded with nested model comparisons, constraining first the measurement weights, and then the structural weights. The fit of the measurement-constrained model was similar to that of the unconstrained model [$\chi^2(151, N = 1328) = 772.10, p = .000$, RMSEA = .06, NFI = .91, CFI = .92] and a non-significant chi-square difference test confirmed the models were not significantly different, [$\Delta\chi^2(5, N = 1328) = 7.77, p = .17$]. The fit of the structural-constrained model was adequate as well [$\chi^2(166, N = 1328) = 798.51, p = .000$, RMSEA = .06, NFI = .90, CFI = .92], and comparison of this model with the measurement-constrained model resulted in a significant chi-square difference test [$\Delta\chi^2(15, N = 1328) = 26.40, p = .034$]. Again, because of the large sample size and

its influence on chi-square, we examined the other relevant fit statistics and found little if any difference in the adjusted fit of the models ($\Delta NFI = .003$; $\Delta IFI = .003$). Because the model was still acceptable (according to fit statistics) when all parameters were constrained equal, and reduction in overall fit with the constraints was nominal, it was concluded that Model B was equivalent across groups. In interpreting these findings, it is worth noting that evaluation of model equivalence using SEM is an evolving practice, and standards for the field are still being developed (Vandenberg & Lance, 2000). It is at the discretion of the researcher to evaluate the evidence and draw an ultimate conclusion, including deciding upon which decision criteria to use. In this case, using the more rigid criteria for model equivalence (Cheung & Rensvold, 1999) resulted in us concluding that the above group differences in parameter estimates did not result in group differences in the overall model, while a more lenient criteria based solely on the chi-square difference test would have instead led to a conclusion of model non-equivalence.

6. DISCUSSION

Children in immigrant families represent an important and growing population, one that is vital to the future social and economic well-being of the United States. As such, understanding their patterns of academic achievement and relevant educational processes has become a new challenge confronting educators, researchers, and policy makers. We used a structural equation modeling (SEM) framework to examine relations between school readiness and early academic achievement for children in immigrant and non-immigrant families. We also explored the extent to which timing of children's English language proficiency played an intermediary role in these relations. Greater behavior concerns at age four were associated with worse end-of-year GPA and lower reading scores in 3rd grade, while greater age-four pre-academic skills were associated with better GPA and higher reading and math scores. The school readiness measures utilized in this study, the Learning Accomplishments Profile-Diagnostic (LAP-D; Nehring et al., 1992) and the Devereaux Early Childhood Assessment (DECA; LeBuffe & Naglieri, 1999), behaved similarly across children in immigrant and non-immigrant families, and school readiness predicted later achievement similarly as well. Finally, for both Hispanic/Latino and Black children of immigrants, pre-academic skills, but not the other two school readiness domains, impacted later GPA, reading, and math scores

indirectly by reducing the amount of time it took for children to become English proficient.

The present study contributes to a growing body of research on the skills and competencies that prepare children for success in school and life-long attainment (Currie & Thomas, 1995; Downer & Pianta, 2006; Duncan et al., 2007) and responds to the call for added diversity in studies that examine school readiness and later achievement (Garcia Coll & Marks, 2009; La Paro & Pianta, 2000). To date, there have not been sufficient investigations into the cultural validity of school readiness assessments that are used daily to make educational placement decisions for millions of children. Therefore, it is an open question whether these measures may or may not be appropriate for groups with different racial, ethnic, or historical backgrounds (Oakland, 1978; Reynolds, 1980), such as children in immigrant families. This study demonstrated that the scales of two school readiness assessments, the LAP-D (cognitive, language, and fine motor skills) and DECA (self-control, initiative, and attachment), represented the constructs of pre-academic and social-emotional school readiness in a similar way for low-income children in immigrant and non-immigrant families. Inaccuracies in placement decisions based on such assessments can have a high cost for children, parents, and school districts, and given increased emphasis on school readiness and early intervention, there are both social and economic benefits to ensuring that assessments are appropriate for use with immigrant children. The findings of this study suggest that we can be more confident in results garnered from school readiness assessments and the decisions based upon them,

although future research should continue to investigate other similar measures when used with diverse populations.

It was also hypothesized that because children in immigrant and non-immigrant families have been found to differ in terms of mean levels of school readiness (Crosnoe, 2006; De Feyter & Winsler, 2009; Hair et al., 2006; Magnuson et al., 2006), academic outcomes in elementary school (De Feyter et al., 2010), and academic growth (Han, 2008; Palacios, et al., 2008), differences may also exist with respect to relations between school readiness and later achievement. We did not, however, find evidence to support this hypothesis. For both groups, behavioral and pre-academic school readiness predicted 3rd grade achievement, and pre-academic school readiness was a stronger predictor of achievement five years later than were behavior concerns. This finding is promising, because it means that early education curricula and intervention strategies that are currently being used successfully to enhance the school readiness and later achievement of low-income children in general are likely to demonstrate similar effectiveness with low-income immigrant populations.

Another interesting finding was that behavior problems in preschool emerged as a much greater predictor of later achievement than the more positively valenced construct of social-emotional skills. Behavior concerns at age four were not only related to school GPA five years later, as may be expected because GPA includes the elements of teacher subjectivity and child behavior in class, they were also related to reading scores on a standardized, high-stakes test that is used to determine whether children are promoted to the fourth grade. Certainly, there is ample evidence in the literature that social-emotional

skills are important for academic achievement (Payton et al., 2008; Raver, 2002) and that social and cognitive processes are bi-directionally influential (Crick & Dodge, 1994), which begs the question of why social-emotional skills did not emerge as a significant predictor of later achievement in the present study. One possibility is that other studies do not always distinguish between pro-social skills and absence of bad behavior, and thus to some extent, behavior drives the construct of social-emotional skills as it is operationally defined. Further, the DECA focuses on protective factors that predict a child's adaptation to life's stresses, and perhaps this specific definition of social-emotional skills differs from other social-emotional assessments. There was also notable overlap between children's behavior and their social-emotional skills, with correlations between behavior concerns and the social-emotional scales ranging between $-.35$ and $-.68$. Either way, it is clear that early behavior problems are quite disruptive to children's ability to achieve academically, either by taking them off task, damaging their relationship with teachers, or being exposed to punishment, which may negatively impact their general attitudes toward school.

It is notable that while many teachers report that behavior problems have been increasing in recent years, especially among low-income children (Qi & Kaiser, 2003), they often regard children in immigrant families as among the best behaved students in the classroom (Crosnoe, 2007; De Feyter & Winsler, 2009; Suarez-Orozco, 2007). Now, whether this is because immigrant children are genuinely well behaved in all contexts, or it has something to do with taciturnity brought on by cultural and language barriers is yet unclear, but it is an important point for early education practice. Knowing that bad

behavior is not generally an issue for immigrant children means that early education teachers can increase focus on activities that develop their general language ability, cognitive skills, and fine motor coordination – all skills that will contribute to their later academic achievement. This recommendation comes, however, with an important caveat. There has been recent public concern that schools, including preschools, are beginning to emphasize rote academic learning at the expense of young children’s socialization and opportunities for play (Spiegel, 2008). It should be noted that for young children, play and social interaction indeed constitute the most effective methods for learning a host of important cognitive and academic skills (Singer, Golinkoff, & Hirsh-Pasek, 2009). Rather than focusing on acquiring information by using worksheets or flash cards, teachers and children can play verbal games like 20 questions, organize interactive activities like charades or Simon says, challenge each other to board games like dominoes or tic-tac-toe, have fun with sensory/motor items like sand, rice, or play-doh, and, of course, enjoy developmentally-appropriate and engaging books together. Such activities not only promote school readiness and academic achievement, but are a means by which children in immigrant families, particularly those who are learning English, can forge relationships with teachers and peers while simultaneously closing early gaps in cognitive and linguistic areas.

A key difference between children in immigrant families and their native family peers is the challenge of learning English and using it in an academic setting. A central finding of this study is that greater pre-academic skills in early childhood positively impact later achievement for children in immigrant families in part by helping them to

learn English more quickly, and attain full proficiency earlier in elementary school. One implication of this finding is that school readiness, and, in turn, access to quality early education programs, is evermore crucial for the large numbers of immigrant children who don't speak English well upon entering kindergarten. It is estimated that 42% of immigrant parents are still learning English themselves, and 27% of children in immigrant families reside in linguistically-isolated households where no one over the age of 14 speaks English well (Hernandez et al., 2009). Further, children in immigrant families are less likely to attend early education programs that would serve to enhance their school readiness - not because they have a cultural preference for maternal or relative care as is often assumed, but often because financial barriers to accessing child care disproportionately affect immigrant families (Brandon, 2004; Takanishi, 2004).

This finding corroborates other recent research demonstrating that the earlier ELL children attain English proficiency, the better they will achieve academically (Kieffer, 2008; Stevens, 1999). Further, it is not just that children need to become English proficient *at some point* in elementary school. Children who are not proficient by the time they enter kindergarten consistently underperform academically compared with those who enter proficient, even in later grades when both groups have achieved full proficiency (Halle et al., in press; Kim et al., 2010). Earlier English proficiency for children means that they can participate more fully in interactions with teachers and classmates, engage more fully in academic content in school, and increase their chances of closing any educational gaps with which they began. It is therefore not only imperative that immigrant and ELL children have access to quality, affordable child care where they

can be exposed to the English language, but that developmentally appropriate ESOL instruction is developed and implemented earlier in preschool, rather than waiting until a child is in 1st or 2nd grade.

Certainly, any efforts to promote English proficiency among preschool children cannot underestimate the importance of a strong foundation in the native language. Early childhood is a sensitive time for language development, and research has demonstrated that allowing children to develop foundational skills in their native language only aids the acquisition of a second language (Collier, 1995; Sparks & Ganschow, 1991). Further, in a world that is more globally connected than ever, we cannot forget the many cognitive and social benefits of bilingualism (Bialystok, 2005), which can only be achieved if second language acquisition is additive, rather than subtractive. Though bilingual education programs have not historically received widespread favor in the United States, they provide a promising solution to the calls for improving the educational and occupational success of immigrant and ELL children (Collier, 1989).

Limitations

As with any study, findings should be interpreted with certain limitations in mind. First, the sample includes only the lowest income immigrants in Miami who participated in the state subsidy program. It does not include immigrants who qualified for, but for whatever reason, did not receive subsidies, and it does not include more well-to-do immigrants who are prominent in Miami such as middle and upper income South Americans or Cubans. While low-income children are an important population to study, and on which intervention efforts should be focused, it is unknown whether these

findings generalize to children from higher SES families. The sample also does not include immigrants from Europe, Africa, or Asia, for whom findings could be quite different from the groups included here. Additionally, because the Latino culture and Spanish language are so prominent in Miami, Latino immigrant children may benefit from aspects of community social capital (such as services or social support) that are not typical for other, non-Latino groups of immigrant children in Miami or Latino children in parts of the country with a smaller Latino population.

Second, the data collected by the community and public schools did not include a measure of children's native language proficiency. This means we cannot say how much variance in timing of children's English proficiency was due to a strong foundation in their native language or to what extent children's English acquisition was additive (in concert with the native language) or subtractive (at the expense of the native language), which could have important implications for practice. Third, and finally, we had no access to social or behavioral measures in 3rd grade, so while age-four social-emotional skills were not associated with 3rd grade academic outcomes, it is still possible they were related to other behavioral outcomes that were not measured here but are nonetheless important for positive development overall.

Conclusion

Young children in U.S. immigrant families represent an important and growing population. Thus, understanding their educational patterns has become a new challenge confronting educators, researchers, and policy-makers. This is especially true given recent evidence of an *immigrant paradox*, whereby immigrant children's educational

outcomes actually decline over time and generation (Suarez-Orozco, C. & Suarez-Orozco, M., 1995, 2001), and in an environment of high-profile legislative proposals like the DREAM Act (Development, Education, and Relief for Alien Minors Act; Senate Bill S.3992, 2010), which place intense scrutiny on the academic performance of children in immigrant families. The present study found that school readiness measures predict later achievement similarly for children in low-income immigrant and non-immigrant families. This suggests that, though previous research has found mean-level group differences in early educational outcomes between children in immigrant and non-immigrant families, actual educational patterns may be quite similar between the two groups. One implication of these findings is that we can be more confident in utilizing the vast school readiness literature to promote the long-term achievement of this of at-risk, culturally diverse group. Because immigrant children tend to enter kindergarten with strengths in social-emotional areas and few behavior problems, bolstering their pre-academic skills and English language proficiency in preschool may provide the largest return on investment for early educators and policy-makers. Pre-academic skills not only impacted immigrant children's later achievement directly, but they enhanced achievement indirectly by reducing the amount of time it took children to become English proficient. Directions for future work could include investigating additional school readiness measures and their relations with later achievement for cultural equivalence; developing, implementing, and evaluating developmentally appropriate preschool curricula that will enhance the first and second language skills of immigrant children, and conducting experimental studies to investigate causal relations between immigrant children's school readiness, English

language acquisition, and later academic achievement.

APPENDIX

Table 1
Demographic Data by Immigrant Group

	Immigrant Family (n = 1,328)	Non-Immigrant Family (n = 1,329)	Overall (n = 2,657)
Child			
Age in mo. at Sept. 1 of K			
M	66.4	66.1	66.3
SD	3.6	3.5	3.5
% Male	51.4	51.0	51.2
Ethnicity*			
% Latino	81.8	39.2	60.5
% Black	17.5	57.3	37.4
% White	0.8	3.5	2.1
Type of care*			
% Child Care	90.3	81.1	85.7
% Pre-K	7.5	16.3	11.9
Family			
Parent income*			
<i>M</i>	\$16,744	\$15,566	\$16,155
<i>SD</i>	\$7,650	\$7,908	\$7,260
Family size*			
<i>M</i>	3.2	3.6	3.4
<i>SD</i>	1.1	1.3	1.2
Maternal education (yrs)			
	11.5	11.6	11.6
% Parents married*			
	13.9	3.0	8.7
Home language*			
% English	8.1	57.2	32.6
% Spanish	58.5	16.1	37.3
% Creole	7.6	2.5	5.0

Table 2

Distribution of English Proficiency among Immigrant Children at Each Grade Level

Proficiency Level	Grade			
	Kindergarten	1 st grade	2 nd grade	3 rd grade
Beginner 1	4.4%	.3%	.1%	.3%
Beginner 2	11.5%	5.4%	.4%	.1%
Intermediate 1	15.6%	9.2%	2.5%	.3%
Intermediate 2	23.1%	21.7%	13.1%	6.6%
Fully Proficient	18.9%	36.5%	55.7%	63.5%
Native English	26.6%	27%	28.2%	27.9%

Table 3
Bivariate Associations Among Key Variables

	Nativity	Initiative	S. Control	Attachment	Behavior	F. Motor	Cognitive	Language	Eng. Prof.	GPA	Math	Reading
Nativity												
Initiative	-.01											
Self Control	.15**	.52**										
Attachment	.05*	.74**	.65**									
Behavior	-.12**	-.35**	-.68**	-.43**								
Fine Motor	.09**	.38**	.27**	.24**	-.27**							
Cognitive	-.05*	.38**	.21**	.22**	-.23**	.74**						
Language	-.11**	.36**	.19**	.23**	-.22**	.67**	.77**					
English Prof	n/a	-.14**	-.06	-.09**	.07*	-.14**	-.24**	-.22**				
GPA	.14**	.18**	.23**	.16**	-.23**	.30**	.27**	.24**	-.19**			
Math	.13**	.16**	.14**	.13**	-.13**	.31**	.31**	.33**	-.27**	.62**		
F-CAT Read	.16**	.17**	.18**	.13**	-.17**	.36**	.34**	.31**	-.22**	.60**	.69**	
<i>M</i>	.50	28.39	21.30	23.35	10.63	45.30	36.32	34.18	1.13	3.95	304.60	329.85
<i>SD</i>	.50	7.18	5.14	4.40	5.45	6.95	6.65	7.36	1.32	0.60	52.36	60.09

Table 4

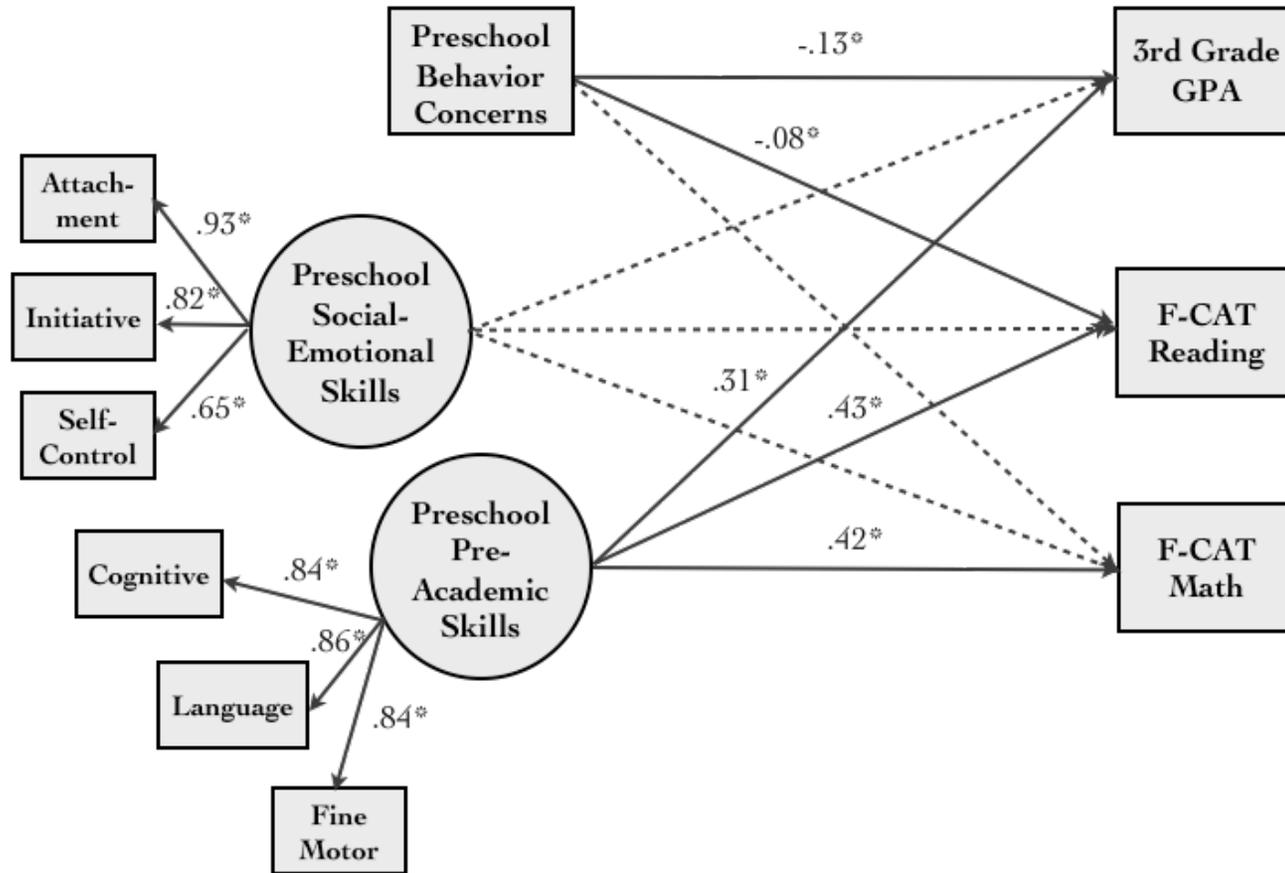
Parameter Estimates: Model A

Age-Four Predictors	<u>3rd Grade Outcomes</u>		
	<u>GPA(β)</u>	<u>Reading (β)</u>	<u>Math (β)</u>
Social-Emotional	.002	-.012	-.003
Behavior	-.13 ***	-.08 **	-.03
Pre-academic	.31 ***	.43 ***	.42 ***

** Coefficient is significant at the 0.01 level (2-tailed).

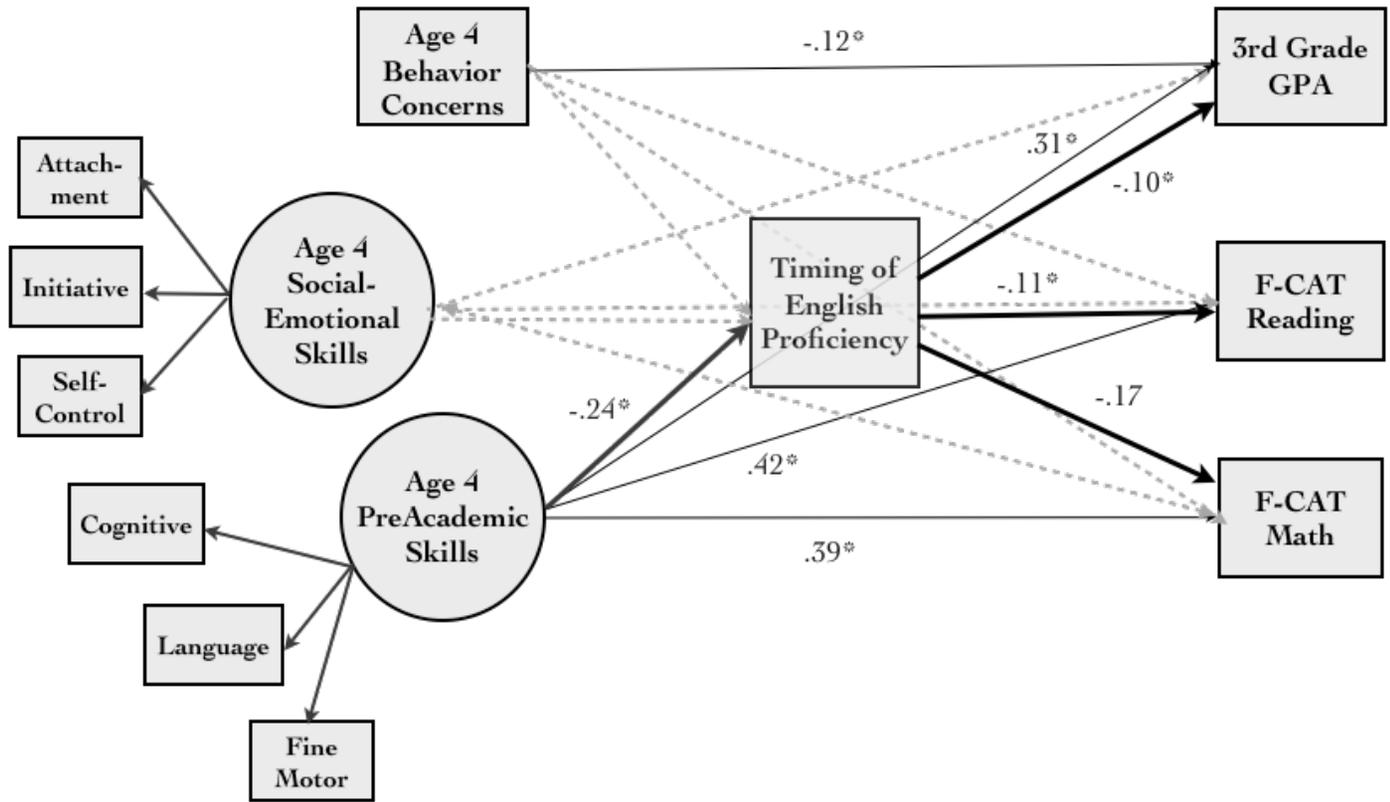
*** Coefficient is significant at the 0.001 level (2-tailed).

Figure 1: Model A



Standardized path coefficients for structural Model A predicting 3rd grade achievement from age-four school readiness. Measurement models for social-emotional and pre-academic skills are shown at left. Solid lines represent significant paths and dashed lines represent non-significant paths. Model A was equivalent for children in immigrant and non-immigrant families.

Figure 2: Model B



Final Model B with pre-academic skills exerting an indirect influence on 3rd grade GPA, Reading, and Math scores through Timing of English Proficiency. Bold lines represent indirect effects while solid (non-bold) lines represent direct effects and dashed lines represent non-significant paths. Model B was equivalent for children in Hispanic/Latino and Black immigrant families.

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CURRICULUM VITAE

Jessica Johnson De Feyter was born in Fairfax, Virginia to an American father and Brazilian immigrant mother. She became interested in culture and its intersection with psychology and education during her undergraduate studies at the University of California Santa Cruz. This experience, along with a long-time interest in early childhood development, motivated Ms. De Feyter's investigation into early educational outcomes for young immigrant children. She received her Masters degree in Applied Developmental Psychology from George Mason University in 2008.