Family, Place and Cognitive Development among Children of Immigrants

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Abstract

Studies of immigrant adaptation in the United States emphasize the importance of duration of residence, language use, location of schooling and other factors related to the migration process in determining outcomes for immigrants. Research also points to the variability of socioeconomic mobility among immigrants and their descendants across receiving contexts encountered in the United States. This paper extends this model to young children with immigrant parents and examines the extent to which family migration and community context interact to produce differential developmental outcomes. The analyses rely on data from the Early Childhood Longitudinal Study-Birth Cohort (ECLS-B) and 2000 US Census. Children's cognitive scores vary considerably by mothers' age at arrival in the United States and household linguistic isolation. The results provide more modest evidence that nativity and linguistic isolation have differential effects depending on the community context in which the family resides.

Introduction:

Today in the United States, approximately one in five children have at least one foreign born parent (Hernandez, 2004). Yet, researchers are only beginning to investigate the implications of parental immigration for development in very early childhood. Much of the theory and research on immigrant outcomes has focused on the economic, education or family formation experiences of adult immigrants (White and Glick, 2009). Additional research on the second generation, children of more recent cohorts of immigrants, has largely focused on the ethnic identity and school performance of school aged children and adolescents (Fuligni, 2001; Kao and Tienda, 1995; Nicholas, Stepick and Stepick, 2008; Pong and Hao, 2007; Portes and Fernández-Kelly, 2008). It is only recently that national level data has included sufficient samples of young children of immigrants and researchers are able to turn their attention to this important life stage (Cabrera et al., 2006; Glick, Bates and Yabiku, 2009). These studies are beginning to elaborate the extent to which the familial and community environments surrounding these young children influence their cognitive development, school readiness and subsequent academic success.

Studies of immigrant adaptation in the United States emphasize the importance of age at arrival, language acquisition, location of schooling and other life course events for determining outcomes for immigrants. When examining outcomes for young children of immigrants, it is the timing and context of parental migration that is most likely associated with health, education and general well-being. These factors characterize the familial migration context that plays a role in both adolescent and adult outcomes. But current research on immigrant assimilation also recognizes the importance of the receiving context in shaping outcomes for immigrants. In other words, the migration experiences of parents **and** the new environments in which they raise their children likely interact to influence the developmental outcomes for even young children.

In this paper, we examine the extent to which contextual features of communities moderate the relationship between familial migration context and subsequent developmental outcomes. In particular, we focus on the cognitive development of very young children of immigrant mothers and their peers with

US born mothers. The analyses rely on the first two waves of a nationally representative longitudinal dataset (ECLS-B) which included sufficient numbers of children of immigrant mothers to allow for detailed analyses by mother's age at arrival and the language context of the home (see Glick, Bates and Yabiku, 2009). However, the ECLS-B has limited variables describing the environment in which these families reside. To typify the surrounding community, we use restricted use files containing the zip code in which the families reside at the first wave of the ECLS-B data collection. We then merge 2000 US Census data describing the characteristics of the zip code. The analyses pay particular attention to the economic status, nativity and linguistic isolation of households in the area and the interaction of these community level characteristics with mother's nativity and language use.

Background:

Families are the primary site of early childhood socialization. Family structure, income and health are all important predictors of how young children develop and thrive. But families are not isolated entities. They interact with their communities to access resources and social support. The interaction of family and community then sets the stage for child well-being. Although many scholars and policy makers emphasize the growing population of children with immigrant parents and their contribution to the increasing diversity of the broader society, we have less of an understanding of how the receiving context in the United States influences outcomes among very young children before they encounter formal social institutions like schools. Immigrant parents are often parenting in a context different from that in which they were raised and are learning to navigate a new social environment as they raise their children (Quintana et al., 2006). Our conceptual framework emphasizes the importance of family migration context and community context for children's early cognitive development.

The Importance of Family Migration Context. Immigrants come to the United States from diverse origins. They migrate for different reasons, at different ages and with different levels and types of education (Alba, 2002; Feliciano, 2005). Many immigrant families are at the low ends of the economic

spectrum. The poverty rate among young children of immigrants (age 0-8) was 22% in 2007-08 compared to 17% among children of US born parents (Fortuny, Hernandez & Chaudry, 2010). Family socioeconomic status clearly offers one challenge that faces many children of immigrants (Crosnoe, 2007; Hernandez, 1998; Mistry et al., 2008; Thomas, 2009). Low income and poor resourced communities may make it difficult for young children in immigrant families to acquire the skills necessary for school readiness.

The timing of migration to the United States is also associated with resource acquisition and adaptation in the receiving society. Age at arrival in the United States, for example, helps predict the socioeconomic attainment of immigrants. The educational progress of immigrants who arrive as very young children does not differ significantly from that of their US born peers once family socioeconomic status is taken into account (Glick and Hohmann-Marriott, 2007). For those who arrive at older ages, however, educational attainment tends to be lower. Some immigrant youth do not 'drop in' to school in the United States at all (Oropesa and Landale, 2009; Rumbaut, 2008). These immigrants may arrive in the United States with little or no formal schooling and remain outside the US school systems. Receiving one's highest level of education outside the United States is associated with lower economic status than having attended an educational institution in the United States. This may then extend to the children of immigrants; Children's reading skills are higher if their parents attended school in the United States (Jackson, et al., 2010). So different exposures to US socialization and social institutions on the part of immigrant parents is likely also associated with differential opportunities for their own children born in the United States. Parents' own age at arrival, rather than simple duration of residence in the United States, may be an important determinant of outcomes among the second generation (Glick, Bates and Yabiku, 2009).

Another factor associated with family migration that has implications for children's own development is language use and ability. Children in immigrant families are raised in a variety of linguistic environments and the language environment in the home is associated with child development

(Alba et al, 2002; Cobo-Lewis et al., 2002). Overall, the majority of homes in which a non-English language is spoken include at least one person who speaks English well (Hernandez, 2004). But a substantial minority of immigrant children live in homes in which no one speaks English well. Limited English proficiency may reduce competitiveness in the US labor market among immigrant parents and lead to lower family resources and location in poorer communities. But even though limited English proficiency may be a detriment to subsequent educational progress for some, researchers also suggest that retaining a native language can have positive effects on children's educational attainment (Portes and Rumbaut, 2001; Mouw and Xie, 1999). A bilingual home background may be beneficial for cognitive development (Carlson and Meltzoff, 2008). In this case, the linguistic environment in the home may be a better predictor of cognitive development and school readiness than parental nativity alone. Fortunately, the data used here contain information about parental nativity, age at arrival and language use. Beyond examining the main relationship between these factors and children's developmental outcomes, we need to also look at the interactions of these family characteristics and the community context in which children of immigrants and their peers reside.

The Importance of Community Context. Children's educational and social development are theoretically influenced by the resources and social capital embedded in their communities as well as in their families. Distribution into neighborhoods is not random (see Harding, 2003) but if community contexts are systematically different for these families via racial/ethnic or linguistic segregation, this could help partially explain differential outcomes among children from immigrant and minority backgrounds when compared to their US born non-Hispanic white peers (Farkas, 1996; Entwisle and Alexander, 1993; Pong and Hao, 2007). Children in poor neighborhoods, for example, may be surrounded by peer groups that are less engaged in education or they may attend schools with fewer resources (i.e., staff, textbooks, etc.) that in turn reduce their own educational engagement and attainment (Ainsworth, 2002; Harding, 2003; Sampson, Sharkey & Raudenbush, 2008). Studies of early education point to the importance of stratification for shaping even the very initial academic progress of children in the United States (Entwisle and Alexander, 1993; Lee and Burkam, 2002). Brooks-Gunn et al. (1993) find that

having a greater proportion of higher income neighbors is associated with higher IQ scores in children at 36 months. These associations persist after controlling for family-level characteristics. Several mechanisms have been proposed to explain these differentials, including low access to institutional resources and collective norms or expectations (Leventhal and Brooks-Gunn, 2003).

For immigrants, the context of reception, including the educational opportunities afforded to the children of immigrants, is a key to incorporation in the receiving country (Fernandez-Kelly and Schauffler, 1994; Alba and Nee; 2003: 138; Zhou and Xiong, 2005). Many immigrants first reside in poor urban areas and it is considered a sign of assimilation if they move to suburban or more affluent and mixed ethnic areas (Waldinger, 1989; White and Glick, 2009). Yet research on neighborhood effects and outcomes for immigrants and their children yields mixed results (Jackson & Mare, 2008; Urquia et al., 2009). Certainly much of the literature on economic mobility among the first generation has pointed to the importance of immigrant communities, or enclaves, as sources of social capital and sites of entrepreneurship (Portes, 1996; Zhou, 2004). The research on immigrant enclaves has largely focused on the potential for economic mobility among adults. In this case living in an area with other immigrants from the same national origins provides access to greater social capital and conduits to employment. Immigrant communities and neighborhoods may be typified by non-English speaking households and businesses and services that cater to non-English speakers. Immigrants may be able to access better information and services in a community that has more immigrants than when they become more 'residentially assimilated'. It seems likely then that outcomes for second generation children may also depend on the composition of immigrant communities and other ethnic groups residing nearby.

Other research on the consequences of neighborhood or community characteristics for immigrants has addressed health differentials and also points to positive outcomes for living near other immigrants. The so called 'Latino health paradox' or 'immigrant health paradox' is based on the apparent beneficial association of recent immigration and good physical health and beneficial health behaviors (Antecol & Bedard, 2006; Gordon-Larsen et al., 2003; Hummer et al, 2007). Those with longer duration of residence in the United States, on average, report worse health than those who have been in the United

States for shorter periods of time (Jasso et al., 2004). Theoretically, the apparent paradox is attributable, in part, to better health behaviors and reduced stress associated with living in an immigrant community. But results of studies testing these relationships are mixed. Cagney et al., (2007) note that Latinos living in neighborhoods with more foreign born residents report fewer breathing problems than those with fewer foreign born residents. Osypuk et al., (2010) conclude that residential ethnic segregation is associated with poorer birth outcomes among Mexican American women but not for Mexican born mothers in the United States. It may be that the benefits associated with immigrant communities buffer risks for immigrants and protect health (Frank et al., 2007). But other neighborhood characteristics such as racial/ethnic residential segregation and poverty are detrimental to health for residents regardless of nativity (Frank et al., 2007; Jackson & Mare, 2007; Shulz, et al., 2008).

The Present Study. The extant research provides mixed support for the importance of community characteristics for immigrant youth and adults' health and economic mobility. It is more difficult to hypothesize the role of community context on the second generation from early childhood before children have entered formal schooling and encountered US social institutions outside of their immediate familial context. Although there is evidence that family and community characteristics interact to enhance child well being, we need to examine how these mechanisms might vary by immigration context.

Some mechanisms that are highly effective for predicting positive child outcomes among the native-born population may yield few benefits for immigrants. Children of immigrant families from lower socioeconomic status may face a disadvantage if they become segregated in poorer neighborhoods with fewer resources (Frank et al., 2007; Turney and Kao, 2009). But very young children who are more directly influenced by their parents' experiences than their own encounters in the community could be advantaged by living in immigrant communities or enclaves where their parents' language use and practices are supported. For immigrant parents, language use may facilitate access to these institutional resources and relationship ties outside of the immigrant community (Garcia Coll et al., 2002: 321). Similarly, Turney and Kao (2009) suggest that linguistic assimilation may help families to access social support in US communities. Thus, linguistic isolation may have few detrimental effects if families reside

in areas with other immigrants and others using the same non-English language. However, limited English use may offer less access to resources beyond the immigrant enclave. Other community characteristics, such as high poverty rates, are expected to be associated with poorer cognitive development regardless of parental nativity.

This paper examines the early cognitive development of young children of immigrants from a birth cohort in the United States. Previous analyses confirm significant variation in cognitive scores at 24 months among children of US born mothers, children of mothers who migrated to the United States as children and children of mothers who migrated at older ages (Glick, Bates and Yabiku, 2009). We also hypothesize the linguistic environment in the home will also be important for predicting children's early cognitive development. To this end, we compare analyses that rely on mother's age at arrival to those that combine mother's nativity and a proxy measure for the linguistic isolation of the household.

We then address whether the observed relationships between migration context and cognitive scores are mediated by the community context in which these families reside. Studies vary considerably in terms of the way 'context' is measured. Studies of school age children of immigrants suggest they exhibit different outcomes depending on the characteristics and composition of the schools they encounter (Cosentino de Cohen et al., 2005; Portes and Hao, 2004). For very young children, school context is irrelevant. Census tracts are often used to proxy the 'neighborhoods' of children and adolescents (Frank et al., 2007; Pong and Hao, 2007). Measuring 'neighborhood' socioeconomic status and concentration of foreign born this way has been associated with the social behaviors and educational outcomes of adolescent youth (Frank et al., 2007; Tong, 2010). In this paper, we are limited to a more broad brush to characterize the contextual environment in which the family is located. We rely on zip code level data as measured in the 2000 US Census and linked to data on individual children and families. In some cases, this will typify the community in which the family lives, works and plays. In other cases, the zip code will represent an area much larger than what is often conceptualized as a 'neighborhood'.

We evaluate interactions between family migration variables and community variables to assess whether the importance of community context for early cognitive development also varies by nativity and

linguistic home environment. The association between family language background and cognitive scores at 24 months may depend, in part, on the linguistic environment of the larger community. The directional hypothesis is unclear. Certainly, we might expect some children to be hampered in their own English acquisition by living in a linguistically isolated household but this may not hold for overall cognitive development. In addition, children in non-English homes may actually benefit from living in areas with more foreign born and non-English speakers because their families may be less socially isolated than if they lived in other areas. These families may then be able to access more community resources and parenting support than if they lived in areas with fewer non-English speakers. These analyses can assess these complimentary hypotheses with unique data that merges community variables from US Census data to the individual child data from the Early Childhood Longitudinal Study- Birth Cohort (ECLS-B).

Data and Methods:

The ECLS-B. The Early Childhood Longitudinal Study- Birth Cohort (ECLS-B) is a large, nationally representative sample with approximately 14,000 children born in the United States in calendar year 2001, and makes a special effort to include underrepresented groups (NCES, 2005). This provides a diverse sample with sufficient numbers of children with at least one foreign born parent. The survey interviews caregivers on a variety of topics including children's development, family environment, health and healthcare, childcare, and early education programs. In addition, ECLS-B includes direct observations of children's physical, cognitive, social, and emotional development (NCES, 2005). Our analyses rely on the first two waves of the data; the first wave is collected when children are approximately 9 months old and the second wave occurs when the children are approximately 24 months of age. This is a key advantage of the ECLS-B dataset: the ability to observe developmental outcomes over time. Our primary measures of mother's migration, language use and family resources as well as the outcome measure of cognitive development come from the ECLS-B.

US Census zip code data. Studies of community level effects on child outcomes have used a variety of measures to typify the child's 'neighborhood'. Children may be influenced by features of their

environment that go beyond any of the single measures used to define their context (Crowder & South, 2011). For our analyses, we are limited to identifying the community context based on the zip-code of residence for the children in the ECLS-B cohort at 9 months. With this information, we merge characteristics of the zip code available in the 2000 US Census to the individual child records. These data are used to provide proxy measures of the 'community context' for the families. There are some limitations with this approach. First, zip code boundaries vary in size and population density. While some may well approximate neighborhood contexts, others will represent larger areas that go beyond the child's immediate social and physical environment. To somewhat ameliorate these limitations, we include a variable indicating whether the family is living in an urban, suburban or rural area.

Second, zip code boundaries change over time, particularly in areas of rapid population growth. This means that a minority of children in the ECLS-B resided in zip codes that did not exist in the 2000 Census. To address this limitation, we accessed zip code geographic coordinates for 2001 and 2000. When a child in ECLS-B resides in a zip code in 2001 that did not exist in 2000, and therefore was not listed in the Census, we assign the zip code characteristics of the 2000 zip code from which the 2001 zip code was created. In other cases, we were able to see which 2000 zip codes served as the derivative of the 2001zip codes, through the use of spatial zip codes maps. There were also circumstances in which the zip code provided did not point to a valid zip code based on the State code provided in the ECLS-B. In these circumstances we first reviewed the information regarding the State in which the interview occurred. If the zip code did not match the state, we checked to see if the digits in the State code were inverted in the data and then assigned the correct zip code based on the corrected State code (fewer than 50 cases). Finally, there were a handful of remaining cases in which we could not correct the zip code and those cases were eliminated from (fewer than 10 cases). We then conducted preliminary analyses with and without the 'mismatched' cases. These results reveal no significant differences in our substantive conclusions and we include all cases in the analyses presented here.

The Dependent Variable. The primary dependent variable for the analyses reflects children's cognitive development. This was measured with the shortened form of the Bayley Scales of Infant

Development, Second Edition (BSID-II). The shortened form (BSF-R) was developed for use in the ECLS-B and measures children's cognitive development including memory, exploratory competence, object permanence and communication (Glick, Bates and Yabiku, 2009; Andreassen and Fletcher, 2007; NCES, 2005). The items were adjusted according to expected age developmental patterns so that different items were used for infants versus those at older ages. We use the standardized BSF-R score at wave 2, when children are approximately 24 months old, as the dependent variable.

Independent Variables. Our primary predictor variables come from the second wave of the ECLS-B when the mother reports their country of birth, citizenship, and age when moved to the United States (if not born in the United States). Categories of mother's age at arrival are based on previous research (Glick, Bates and Yabiku, 2009) and supported by previous research on educational and socioeconomic progress among immigrants and their children (Cahan, Davis, and Staub, 2001; Oropesa and Landale, 1997; Portes and Rumbaut, 2001).Children whose mothers are born in the United States are compared to mothers who arrive in the United States in earlier childhood (age 0-7), those who arrived in middle childhood or adolescence (age 8-12 or 13-17) and those who arrived in adulthood (age 18 and above). These four groups were then compared to children whose mothers are born in the United States. A continuous variable for age at arrival is not sufficient because there is significant nonlinearity in many characteristics across these categories. For example, mothers born in the United States, arriving as very young children and arriving in adulthood have higher levels of education than those who arrive in adolescence.

Home language environment is also important for early cognitive development (Cobo-Lewis et al., 2002). Linguistically isolated households, defined in Census data as those in which no one over age 14 in the home speaks English 'well' or 'very well', will provide fewer opportunities for preschool age children to acquire English skills than those in which English is regularly spoken. Thus, we are interested in those households in which children are primarily exposed to a non-English language and those in which adults are limited in their comfort communicating in English. Unfortunately, the ECLS-B does not

identify the English proficiency of all household members. To approximate the definition of a linguistically isolated household with the ECL-B, we combine several items. For our purposes, a child will be identified as residing in a linguistically isolated household if their mothers were interviewed in a non-English language, the mother reported that she does not speak English well and the mother reported that the primary language spoken in the home is a non-English language. All three of these conditions must be present to be identified as living in a linguistically isolated household.

We also note that linguistic isolation and timing of migration are highly correlated. Most mothers who arrived as children or adolescents are living in homes where a non-English language predominates. Of those children whose mothers arrived in the United States as young children, we only identify 11% as living in linguistically isolated homes. This increases to 12% of those who arrived between ages 8-12, 40% among those whose mothers arrived as adolescents (13-17) and nearly 60% of those who arrived over age 18. Only a handful of US-born mothers also report that the child is living in a home where a non-English language is used. Therefore, we also created a variable that combines nativity and linguistic isolation into one. This variable has three categories: Mother is foreign born/linguistically isolated household, Mother is foreign born/ not linguistically isolated and Mother is US born. We present analyses relying on age at arrival and separate analyses with this three category measure of nativity/linguistic isolation.

Other variables representing mother and family characteristics are included as controls in the analyses. Where the data are sufficient, mother's ethnicity is separated into national origin categories (i.e. Mexican origin and Chinese origin). Other groups are collapsed into broader panethnic groups (i.e. other Hispanic, other Asian and Black). Non-Hispanic White serves as the reference group. Mother's age is included as a continuous variable. Mother's education is a categorical measure and those who have less than a high school education serve as the reference group. Previous analyses no significant difference in the cognitive scores for children whose mothers have some college, college degrees, or education beyond a bachelor degree so these groups are combined (Glick, Bates and Yabiku, 2009). We include a single

dummy variable indicating whether the child is living with two parents or in some other family form. The family's economic status is reflected with a dummy variable indicating that the family lived within 185% of the poverty line at the time of the first interview (when children were approximately 9 months of age). Although poverty status can change over time, the majority of children living in families within 185% of poverty remain in the same economic category by the second wave of the data and relatively few children in families above this line at wave one are living within 185% of poverty at wave 2 (<10%).

Other control variables in the models identify child characteristics that may be predisposing to cognitive development. These include the child's gender (male as reference group), age at the wave 2 assessment (continuous measure in months), and birth weight (less than 1,500 grams, 1,500-2,500 grams and the reference for above 2,500 grams). The wave one BSF-R scores are included in the model to adjust for other unobserved traits associated with early cognitive development. In this way, our models assess children's observed cognitive scores at approximately 24 months of age net of their initial cognitive scores when they were approximately 9 months old.

Measures reflecting the community context come from the 2000 US Census data and indicate the socioeconomic and demographic makeup of the zip code in which the children resided at the first wave of the ECLS-B. These variables include the proportion of the zip code residents in several race/ethnic groups (non-Hispanic White, non-Hispanic Black, Hispanic, Asian and other origins). We also looked at the proportion of the zip code population that is foreign born and the proportion that is below the poverty line. The concentration of low income residents is expected to be important so we also dichotomized poverty to reflect those zip codes in which 30% of more of the households were identified as below poverty (see Harding, 2003; Sampson, Sharkey and Raudenbush, 2008).

To estimate the potentially protective effect of living in a community where others are linguistically isolated, the analyses also include a measure of the proportion of households considered to be 'linguistically isolated'. According to the definition used in the Census, a household is considered to be linguistically isolated if no household member age 14 or older reports speaking English 'very well'.

Approximately 4% of US households were considered "linguistically isolated" in 2000 (Sigel, Martin and Bruno, 2001). We then consider whether the zip-codes contain a concentration of linguistically isolated households (30% or more), a moderate concentration (10-30% of households are linguistically isolated) versus those with fewer isolated households (<10% households linguistically isolated).

We can only assess the characteristics of zip codes when the children were 9 months of age. This is temporally appropriate for predicting children's cognitive scores at 24 months of age. Nonetheless, some families may have moved from their origin zip code by the time we are observing the children's scores at 24 months. Unfortunately, we cannot determine the characteristics of the areas to which they move. We include a dichotomous variable indicating whether the family changed residences between the first interview when the children were 9 months old and the second interview when we measure outcomes for children at 24 months of age.

Methods. The analyses rely on data from the child/family level as well as at the zip code level and some children are therefore clustered within the same zip codes. The dependent variable is a continuous standardized measure (mean = 0; sd = 1). We employed multiple imputations to fill in missing data across the individual and zip code level data. The preferred analytic approach with clustered data would be multilevel modeling. However, the national level data from the ECLS-B also includes a stratified sampling structure and analyses with the data are best conducted with adjustments for the stratified and complex sample design (Andreassen and Fletcher, 2007). Because of this and because the cases are not highly clustered within zip codes, we have elected to conduct the multivariate analyses with the adjustments for the initial sampling structure (ie., SVY REGRESS in STATA)[1]. To ensure that this does not greatly alter the results, we conducted a preliminary multilevel model that accounted for two data levels: child and zip code. The substantive conclusions remain the same regardless of which approach we adopt.

[1] There are over 3,650 unique zip codes for children in the ECLS-B. The number of children per zip code ranges from 1 to 23 with an average of approximately 2.4 children per zip code.

Results:

Descriptive Results. Table 1 describes the descriptive characteristics (weighted) of the ECLS-B sample. The majority of the children have a mother born in the United States but there are sufficient numbers of cases to disaggregate the foreign born by age at arrival and by the linguistic isolation of the household (based on our own proxy). We note there is a sizable group for whom English is not the primary language used at home but fewer cases in which the mother also was interviewed in a non-English language. As noted above, there is considerable overlap in the homes we identify as linguistically isolated and the mother's age at arrival. There is also considerable racial and ethnic variation in the sample. The majority of mothers have graduated from high school but fewer have completed college.

[Table 1 about here]

There is considerable variation in the standardized BSF-R scores by mother's nativity and age at arrival in the United States. Overall, children of immigrants have lower scores than children of US born mothers. However, these differences are most pronounced for children whose mothers arrived in the United States in their adolescent years. Figure 1 illustrates the nonlinear association between mother's age at arrival and children's BSF-R scores at wave 2. The scores are lowest among children whose mothers arrived in the United States during adolescence. We also note the considerable variation in scores when we rely on the measure that combines mother's nativity and linguistic isolation. Those children whose mothers are foreign born and whose households we identify as linguistically isolated have the lowest scores of any other group we have identified here. In part, this reflects the lower English use and ability among mothers who arrived in adolescence and adulthood.

[Figure 1 about here]

Children of immigrant mothers also reside in different types of zip codes when compared to children of US born mothers. Table 2 presents selected community variables by mother's age at arrival and again by the nativity/linguistic isolation categories. Not surprisingly because of the large proportion of recent immigrants originating from Latin America and Asia, many of the children of immigrants in the ECLS-B also live in areas with higher concentrations of Latinos or Asians. Children of immigrants are

also more likely to live in areas with more immigrants and more linguistically isolated households than those with US born mothers. However, children whose mothers arrived in adolescence are the most likely to live in areas with other foreign born or linguistically isolated households. Children whose mothers arrived as very young children live in communities where, on average, 8.5% of households are considered linguistically isolated. This increases to 11% among children whose mothers arrived in the United States between the ages of 13-17. This provides some suggestive evidence that the patterns observed in Figure 1 whereby children whose mothers arrive in the United States in adolescence are particularly disadvantaged even when compared to their peers with immigrant mothers. In other words, we are not observing, at least at the descriptive level, a pattern consistent with a linear assimilation model in which outcomes are necessarily better for those with the greatest amount of time in the United States. We also note that children living in linguistically isolated households are particularly disadvantaged in terms of their neighborhood context. They live with the largest percentage of other foreign born (28%) and the highest proportion of households living below the poverty line (17%).

[Table 2 about here]

The next step is to use multivariate models to predict children's cognitive development scores at wave 2 based on mother's nativity/age at arrival, nativity/linguistic isolation, community characteristics and family and child control variables. Previous work demonstrates significant variation in children's scores by mother's nativity and age at arrival in the United States even in the presence of demographic and socioeconomic control variables (see Glick, Bates and Yabiku, 2009). However, those analyses relied solely on the variables available in the ECLS-B restricted data. These analyses include those measures of the community context that are merged onto the dataset from zip code-level Census data. It is expected that some of the association between mother's nativity/age at arrival will be explained by (i.e. mediated) the community context in which families reside. For example, lower cognitive scores observed for children with mothers who arrived in adolescence may be partially accounted for by their presence in communities with lower SES and higher proportions of foreign born residents.

Table 3 displays our first multivariate models relying on the variables measuring mother's age at arrival in the United States and a separate measure for household linguistic isolation. All of the models include the child characteristics (age at assessment, gender, birthweight and previous scores at wave one). Model 1 confirms that all children with non-US born mothers have lower scores than their US born peers except for those whose mothers arrived as young children themselves. The variation by mother's age at arrival persists even with controls for race/ethnicity, education and a simple indicator of family structure. There is a great deal of variation in scores by race/ethnicity as well as mother's nativity. Children with Black, Mexican and other Hispanic mothers have lower cognitive scores than non-Hispanic whites while children of Chinese origin mothers tend to outscore their peers. Although there is no apparent association of household linguistic isolation and children's cognitive scores, preliminary models (not shown) demonstrate significantly lower scores by children in linguistically isolated households before mother's education is entered into the models. Mothers with lower education have children with lower scores than those with higher education. We observe no significant association between household mobility and children's scores.

[Table 3 about here]

Model 2 includes the zip code characteristics for the children in the ECLS-B data. There is little change in the child level variables by adding these measures suggesting there is not much mediation occurring between mother's nativity and community characteristics. Living in a zip code with more linguistically isolated households is negatively associated with scores but this is not statistically significant. Living in a zip code with proportionately more households in poverty is associated with lower BSF-R scores although this too fails to achieve statistical significance. However, living in a zip code with proportionately more Asians is associated with higher BSF-R scores ($p<.10$).

Previously, we noted the considerable correlation between mother's age at arrival in the United States and linguistic isolation. And, the descriptive results suggested considerable disadvantage in terms of observed cognitive scores and community context among children living in linguistically isolated households. Our hypotheses based on the potential protective effect on immigrant communities suggest a

need to examine the interactions between nativity/linguistic isolation at the household level and linguistic isolation in the community. Therefore, we re-estimated the regression models with the simpler nativity/linguistic isolation variable and add interactions for this household level measure of nativity and linguistic isolation with the linguistic isolation of the zip code. Table 4 presents the results from this analysis, repeating with all of the same variables included in Table 3. For simplicity, however, Table 4 presents only the main effects and interaction terms for nativity/linguistic isolation. All other covariates from Table 3 are in the models and operate in a consistent fashion here as they did above.

[Table 4 about here]

The interactions for maternal nativity/household linguistic isolation and linguistic isolation in the community are consistent with the protective effect hypothesized above. In other words, children of immigrant mothers living in households that are linguistically isolated are less disadvantaged than their counterparts in linguistically isolated communities. Although the predicted scores for children with US born mothers are higher than the predicted scores for children of immigrant mothers in areas with low levels of linguistic isolation, the nativity differentials in scores is greatly reduced in communities with higher levels of linguistic isolation overall. We had also questioned whether the association between poverty and children's cognitive development would be differentiated by maternal nativity or linguistic isolation. Interactions of these measures (not shown) failed to achieve statistical significance. This is consistent with the rather mixed results of previous research suggesting that some characteristics of immigrant communities are beneficial for children's well-being but that poverty is detrimental for children's well-being regardless.

Discussion

Children of immigrants are not a monolithic group. Just as immigrant parents arrive at different points in their own life course with different linguistic backgrounds and educations, children of immigrants are raised in very diverse households and diverse community contexts in the United States. Although research has pointed to important neighborhood and school level effects on the educational and

health behaviors of adolescents, it is not clear whether very young children are similarly impacted by the receiving context for their immigrant parents. We followed the model provided by previous research to hypothesize that parental timing of arrival and the home linguistic environment would be associated with children's early cognitive scores. We further hypothesized that the negative association of household linguistic isolation would be somewhat ameliorated for children living in communities with considerable linguistic isolation (i.e. 'protective effect'). Finally, we expected that the effect of community level of poverty would be associated with lower cognitive scores consistently across nativity groups.

To test these hypotheses, the analyses took advantage of nationally representative data on a cohort of very young children in the United States and merged census zip-code level characteristics. Children of mothers who migrated as adolescents are more likely to live in areas with higher concentrations of foreign born residents and with more non-English speakers than children of US born mothers. These children also have lower cognitive development scores around age 2 than their peers with US born mothers. The results of the multivariate analyses demonstrate that mother's nativity and age at arrival continue to be associated with children's cognitive development even in the presence of controls for family characteristics. Further, there did not appear to be much of a direct association between zip code level variables and children's cognitive scores at 24 months.

We then examined interactions between household linguistic isolation and community linguistic isolation. Children of foreign-born mothers who lived in linguistically isolated households have the lowest cognitive scores than any other group; a disadvantage that persisted in multivariate models controlling for mother and child characteristics. However, the interactions of nativity/household linguistic isolation and community level linguistic isolation did provide some support for the hypotheses. But, there were no appreciable differences in the association between family poverty and community poverty or nativity/linguistic isolation and community poverty suggesting the negative association of poverty and children's scores is fairly similar across groups.

The results of the analyses also point to the persistent and large differences in early cognitive development in children across racial/ethnic groups. These differences cannot be 'explained away' by

mother's nativity, education or poverty. The racial/ethnic composition of communities is also marginally associated with variation in children's scores such that children in areas with a larger proportion of Asian residents appear to have higher scores than those in other areas. Unfortunately, we are limited to these broad 'panethnic' categories so it is not clear whether children are living in areas with more 'co-ethnics' specifically or simply more ethnically diverse areas in general.

There are several other limitations here that indicate the need for additional study. First, we are limited to identifying the children's community context with zip-code characteristics. These are highly variable and may not accurately reflect the local resources or constraints for all families. Second, we are restricted to identifying children's community context at one point in time when they were approximately 9 months of age. Previous research suggests there is a fair amount of temporal consistency in neighborhood characteristics for many youth which would justify single point measures (see Crowder & South, 2011 for example). But it seems likely that foreign born families may be more mobile than their native-born counterparts particularly among some minority groups. In this case, we will miss upward mobility on the part of some families and downward economic mobility of others.

Our analyses contribute to the perpetually mixed story regarding contextual effects on children's well-being. Of course, the measures used here can only proxy the potential for greater access to social support and community resources that have been hypothesized to provide protective environments for immigrants and linguistically isolated households. However, we find some support for this idea. Children of immigrants in more linguistically isolated homes appear to be less disadvantaged by living in a community with many linguistically isolated households than their peers in these neighborhoods. Children in areas with more Asian origin residents also fare better. But, we also found that, while household poverty is clearly associated with lower cognitive scores among children, there was no significant difference in scores among children in areas of concentrated poverty. Clearly, further work is needed to help disentangle the role of community resources *and* disadvantages for the health and well-being of all children.

References

Ainsworth, J.W. (2002). Why does it take a village? The mediation of neighborhood effects on educational achievement. *Social Forces,* 81: 117-152.

Alba, R., Logan, R., Lutz, A., & Stults, B. 2002. Only English by the Third Generation? Loss and Preservation of the Mother Tongue among the Grandchildren of Contemporary Immigrants. *Demography*, 39(3):467-484.

Antecol, H. & Bedard, K. (2006). Unhealthy Assimilation: Why do immigrants converge to American health status levels? *Demography*, 43: 337-360.

Cabrera, N., Shannon, J., West, J., & Brooks-Gunn, J. (2006). Parental interactions with Latino infants: Variation by country of origin and English proficiency. *Child Development*, 77, 1190-1207.

Cagney, K.A., Browning, C.R., Wallace, D.M. (2007). The Latino paradox in neighborhood context: The case of asthma and other respiratory conditions. *American Journal of Public Health,* 87: 919-925.

Cahan, S., Davis, D, Staub, R., 2001. Age at immigration and scholastic achievement in school-age children: Is there a vulnerable age? *International Migration Review, 35:* 587-95.

Cobo-Lewis, A., Pearson, B., Eilers, R., & Umbel, V. (2002). Effects of bilingualism and bilingual education on oral and written English skills: A multifactor study of standardized test outcomes. In D. Oller (Ed.), *Child Language and Child Development, 2: Language and Literacy in Bilingual Children* (chapter 4). Multilingual Matters Limited.

Cortes, K. (2006). The effects of age at arrival and enclave schools on the academic performance of immigrant children. *Economics of Education Review*, 25, 121-32.

Consentino de Cohen, C. Deterding, N., & Clewel, B.C. (2005) *Who's left behind? Immigrant children in high and low LEP schools.* Washington, D.C., The Urban Institute.

Crowder, K. South, J.S. (2011). Spatial and temporal dimensions of neighborhood effects on high school graduation. *Social Science Research,* 40: 87-106.

Farkas, G. (1996). *Human Capital or Cultural Capital? Ethnicity and Poverty Groups in an Urban School District.* New York: Aldine De Gruyter.

Feliciano, C. (2005). Does selective migration matter? Explaining ethnic disparities in educational attainment among immigrants' children. *International Migration Review,* 39, 841-871.

Fernandez-Kelly, M. P. & Schauffler, R. (1994). Divided Fates: Immigrant Children in a Restructured U.S. Economy. *International Migration Review* 28:662-689.

Fuligni, A. (2001). A comparative longitudinal approach to acculturation among children from immigrant families. *Harvard Educational Review*, 71, 566-78.

Frank, R., Cerdá, M., & Rendón, M. (2007). Barrios and burbs: Residential context and health-risk behaviors among Angeleno Adolescents. *Journal of Health and Social Behavior,* 48: 283-300.

Glick, J.E.; Bates, L. & Yabiku, S. (2009). "Mother's age at arrival in the United States and children's early cognitive development."*Early Childhood Research Quarterly,* 24: 367-380.

Glick, J.E., & Hohmann-Marriott, B. (2007). Academic performance of young children in immigrant families: The significance of race, ethnicity and national origins. *International Migration Review*, 41, 371-402.

Gordon-Larsen, P. Harris, K.M., Ward, D.S. & Popkin, B.M. (2003). Acculturation and overweight-related behaviors among Hispanic immigrants to the US: The National Longitudinal Study of Adolescent Health. *Social Science & Medicine,* 57: 2023-2034.

Harding, D.J. (2003). Counterfactual models of neighborhood effects: The effect of neighborhood poverty on dropping out and teenage pregnancy. *American Journal of Sociology,* 109: 676-719.

Hernandez, D.J. (2004). Demographic change and the life circumstances of immigrant families. *Future of Children,* 14(2).

Hummer, R., Powers, D.A., Pullum, S.G., Gossman, G.L., & Frisbie, W.P. (2007). Paradox found (again): Infant mortality among the Mexican-origin population in the United States. *Demography,* 44: 441-457.

Jackson, M.I., Pebley, A. & Goldman, N. (2010). Schooling location and economic, occupational and cognitive success among immigrants and their children: The case of Los Angeles. *Social Science Research,* 39: 432-443.

Jackson, M.I. & Mare, R. (2007). Cross-sectional and longitudinal measurements of neighborhood experiences and their effects on children. *Social Science Research,* 36: 590-610.

Kao, G., & Tienda, M. (1995). Optimism and achievement: The educational performance of immigrant youth. *Social Science Quarterly*, 76, 1-19.

Lee, V. E. & Burkam, D.T. (2002). *Inequality at the Starting Gate: Social Background Differences in Achievement as Children Begin School.* Washington DC: Economic Policy Institute.

Leventhal, T., Xue, Y., & Brooks-Gunn, J. (2006). Immigrant differences in school-age children's verbal trajectories: A look at four racial/ethnic groups. *Child Development*, 77, 1359-1374.

Leventhal, T. & Brooks-Gunn, J. (2003).Moving to Opportunity: An Experimental Study of Neighborhood Effects on Mental Health. *American Journal of Public Health*, 93: 1576-1582.

National Center for Education Statistics, US Department of Education. (2006). *ECLS-B Longitudinal 9-Month-2-Year Restricted-Use Data File and Electronic Codebook (CD-ROM).* (NCES 2006-044). Washington DC.

National Center for Education Statistics, US Department of Education. (2005). *Early childhood longitudinal study, birth cohort, 9 month methodology report Volume II: Psychometric report (NCES 2005-100).* Washington DC: US Government Printing Office.

Nicholas, T., Stepick, A., & Dutton Stepick, C. (2008). "Here's your diploma, Mom!" Family obligation and multiple pathways to success. *The Annals of the American Academy of Political and Social Science*, 620, 237-252.

Osypuk, T.L., Bates, L.M. & Acevedo-Garcia, D. (2010) Another Mexican birthweight paradox? The role of residential enclaves and neighborhood poverty in the birthweight of Mexican –origin infants. *Social Science & Medicine,* 70: 550-560.

Paul Sigel, Elizabeth Martin, and Rosalind Bruno. 2001. "Language Use and Linguistic Isolation: Historical Data and Methodological Issues." Pp. 167-190 in *Statistical Policy Working Paper 32:2000 Seminar on Integrating Federal Statistical Information and Processes.* Washington DC: Federal Committee on Statistical Methodology, Office of Management and Budget. April 2001.

Pong, S. & Hao, L. (2007). Neighborhood and school factors in the school performance of immigrants' children. *International Migration Review,* 41: 206-241.

Portes, A. & Hao, L. 2004. "The Schooling of Children of Immigrants: Contextual Effects on the Educational Attainment of the Second Generation." Proceeding of National Academy of Science 101:11920-27.

Portes, A., & Rumbaut, R. (2001). *Legacies: The Story of the Immigrant Second Generation.* Berkeley: University of California Press.

Portes, A. (1996.) Self-employment and the earnings of immigrants. *American Sociological Review*, 61: 219-234.

Quintana, S; Aboud, F. Chao, R., Conteras-Grau, J., Cross W., Hudley, C. Hughes, D., Liben, L., Nelson-Le Gall, S., Vietze, D. (2006). Race, Ethnicity and Culture in Child Development: Contemporary Research and Future Directions. *Child Development*, 77: 1129-1141.

Sampson, R. (2008). Moving to Inequality: Neighborhood effects and experiments meet social structure. *American Journal of Sociology*, 114: 189-231.

Sampson, R., Sharkey, P. & Raudenbush, S.W. (2008). Durable effects of concentrated disadvantage on verbal ability among African American children. *Proceedings of the National Academy of Sciences of the United States of America,* 105: 845-852.

Schulz, A.J., Zenk, S.N., Israel, B.A., Mentz, G., Stokes, C. & Galea, S. (2008). Do neighborhood economic characteristics, racial composition, and residential stability predict perceptions of stress associated with the physical and social environment? Findings from a multilevel analysis in Detroit. *Journal of Urban Health,* 85: 642- 661.

Thomas, K.J. (2009). Parental characteristics and the schooling progress of the children of immigrant and US born Blacks. *Demography,* 46: 513-534.

Tong, Y.Y. (2010). Foreign-born concentration and acculturation to volunteering among immigrant youth. *Social Forces,* 89: 117-143.

Turney, K. & Kao, G. (2009). Assessing the private safety net: Social support among minority immigrant parents. *The Sociological Quarterly,* 50: 666-682.

Urquia, M., Frank, J., Glazier, R. Moineddin, R., Matheson, F. & Gagnon, A. 2009. Neighborhood context and infant birthweight among recent immigrant mothers: A multilevel analysis. *American Journal of Public Health,* 99: 285-293.

Waldinger, R. D. (1989). Immigration and urban change. *Annual Review of Sociology,* 15: 221-32.

White, M.J. & Glick, J.E. (2009). *Achieving Anew: How new immigrants do in American schools, jobs and neighborhoods*. New York: Russell Sage Foundation.

Zhou, M. (2004). Revisiting ethnic entrepreneurship: Convergencies, controversies and conceptual advancements. *International Migration Review,* 38: 1040-1070.

Zhou, M. & Xiong, Y.S. (2005). The Multifaceted American Experience of Asian Immigrants: Lessons for Segmented Assimilation. *Ethnic and Racial Studies* 28(6): 1119-1152.

TABLE 1. Descriptive Statistics, ECLS-B Waves 1 and 2

Variable	Percentage or Mean
Mother and Household Characteristics	
Nativity/Age at arrival	
US born	79.4
Arrived age 0-7	2.9
Arrived age 8-12	1.6
Arrived age 13-17	3.5
Arrived age 18 or older	12.7
Household is Linguistically Isolated	9.5
Mother's Nativity/Linguistic Isolation	
Foreign born & Linguistically Isolated HH	9.2
Foreign born & Not Linguistically Isolated HH	11.3
Household within 185% of poverty	47.9
Household Location	
Urban Center	73.6
Urban/Outlying area	12.2
Rural area	14.2
Household Mobility (% moved between waves)	27.9
Mother Race/Ethnicity (%)	
White	52.0
Black	14.4
Mexican	15.1
Other Hispanic	6.7
Chinese	0.0
Other Asian	3.1
Other	0.0
Mother Education (%)	
Less than High School	19.3
High School Graduate	29.0
Some College or more	51.8
Mother's Age	28.2
Children's Characteristics	
Sex (%)	
Male	51.2
Female	48.8
Age (in months at wave one)	10.5
Birthweight (%)	
Very Low	1.5
Low	6.2
Normal	92.3
Standardized Cognitive Score at wave one	0.183

TABLE 2. Zip Code Characteristics by Mother's nativity and age at arrival in the United States, ECLS-B and 2000 Census.

		Mother is foreign born				Mother is foreign born	
	Mother is US born	*Mother arrived age 0-7*	*Mother arrived age 8-12*	*Mother arrived age 13-17*	*Mother arrived age 18 and above*	*Linguistically Isolated Household*	*Not Linguistically Isolated Household*
Race/ethnic composition							
Percent non-Hispanic White	68.4	54.9	51.4	47	53	60.0	64.0
Percent non-Hispanic Black	13.7	10.9	10.7	11.7	9.9	10.7	12.0
Percent Asian origin	3.2	7.2	9.2	9.9	10.2	5.0	7.0
Percent Hispanic origin	10.4	23.4	25.3	27.8	23.6	26.1	13.6
Percent other or mixed origin	4.3	3.6	3.4	3.6	3.3	3.2	3.4
Avg. Percent Foreign born	8.8	20.6	23.0	25.8	23.8	28.0	23.7
Avg. Percent Linguistically Isolated	3.5	8.5	9.4	11.0	9.9	13.8	9.7
Avg. Percent of households living below poverty	13.1	13.1	12.8	14.0	12.5	17.0	13.0

Source: Early Childhood Longitudinal Study – Birth Cohort, waves 1 and 2 (n ~ 8,900) and US Census 2000.

TABLE 3. Regression models predicting BSF-R scores, ECLS-B and 2000 Census.

Variable	**Model 1**		**Model 2**	
Mothers' Chracteristics				
Nativity/Age at arrival (vs. US born)				
Arrived age 0-7	-0.13		-0.10	
Arrived age 8-12	-0.36	***	-0.36	***
Arrived age 13-17	-0.19	***	-0.20	***
Arrived age 18 or older	-0.19	***	-0.20	***
Household Linguistically Isolated	-0.06		-0.04	
Household within 185% poverty	-0.20	***	-0.19	***
Race/Ethnicity (vs. White)				
Black	-0.26	***	-0.24	***
Mexican	-0.26	***	-0.21	***
Other Hispanic	-0.25	***	-0.22	***
Chinese	0.34	***	0.28	***
Other Asian	-0.14	**	-0.17	***
Other	-0.08		-0.09	
Education (vs. some college or more)				
Less than High School	-0.20	***	-0.20	***
High School Graduate	-0.17	***	-0.17	***
Not living in a two parent family	-0.03		-0.03	
Household Location (vs.Urban Center)				
Urban/Outlying area	0.05		0.04	
Rural area	0.08	a	0.07	
Household mobility	0.01		0.01	
Zip Code Characteristics				
Amount of Linguistic Isolation (vs. < 10%)				
High Linguistic Isolation			-0.05	
Moderate Linguistic Isolation			-0.02	
High Concentration of Poverty (> 30%)			-0.05	
Proportion Hispanic			-0.11	
Proportion non-Hispanic Black			-0.06	
Proportion Asian			0.42	a

Source: Early Childhood Longitudinal Survey, Birth Cohort, waves 1 and 2 (n~8,900)
Note: All models include controls for mother's age, child's age at assessment, child gender, birth weight and cognitive scores at wave 1.

TABLE 4. Regression Models Predicting BSF-R score, Interactions of Nativity/Linguistic Isolation, ECLS-B wave two.

Mothers' Chracteristics		
Nativity/Linguistic Isolation		
Mother foreign born/linguistically isolated	-0.23	***
Mother foreign born/not linguistically isolated	-0.19	***
Zip Code Characteristics		
Amount of Linguistic Isolation (vs. < 10%)		
High Linguistic Isolation	-0.36	a
Moderate Linguistic Isolation	-0.12	
Interactions		
Mother foreign born/linguistically isolated*High linguistic isolation	0.49	***
Mother foreign born/linguistically isolated*Medium linguistic isolation	0.24	**
Mother foreign born/NOT linguistically isolated*High linguistic isolation	-0.15	
Mother foreign born/NOT linguistically isolated*Medium linguistic isolation	-0.11	

Source: Early Childhood Longitudinal Survey, Birth Cohort, waves 1 and 2 (n~8,900)
Note: All models include controls for mother's age, child's age at assessment, child gender, birthweight and cognitive scores at wave 1.

Figure 1. Standardized Congitive Development Scores by Mother's age at arrival in the US and Nativity/Household Linguistic Isolation, ECLS-B wave two