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Examining the Complex Relationships of Early Intervention on Language and Psychosocial Development in Families Facing Multiple Risks with a Focus on Children of Hispanic Immigrants

A Dissertation

Presented to

the Faculty of Arts, Humanities, and Social Sciences

University of Denver

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

by

Marina M. Mendoza

August 2015

Advisor: Sarah Watamura Enos, Ph.D.

Author: Marina M. Mendoza

Title: Examining the Complex Relationships of Early Intervention on Language and Psychosocial Development in Families Facing Multiple Risks with a Focus on Children of Hispanic Immigrants

Advisor: Sarah W. Enos

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ABSTRACT

Abundant research has shown that poverty has negative influences on young child academic and psychosocial development, and unfortunately, disparities in school readiness between low and high income children can be seen as early the first year of life. The largest federal early care and education intervention for these vulnerable children is Early Head Start (EHS). To diminish these disparate child outcomes, EHS seeks to provide community based flexible programming for infants and toddlers and their families. Given how relatively recent these programs have been offered, little is known about the nuances of how EHS impacts infant and toddler language and psychosocial development. Using a framework of Community Based Participatory Research (CBPR) this paper had 5 goals: 1) to characterize the associations between domain specific and cumulative risk and child outcomes 2) to validate and explore these risk-outcome associations separately for Children of Hispanic immigrants (COHIs), 3) to explore relationships among family characteristics, multiple environmental factors, and dosage patterns in different EHS program types, 4) to examine the relationship between EHS dosage and child outcomes, and 5) to examine how EHS compliance impacts child internalizing and externalizing behaviors and emerging language abilities.

Results of the current study showed that risks were differentially related to child outcomes. Poor maternal mental health was related to child internalizing and externaliz-

ing behaviors, but not related to emerging child language skills. Although child language skills were not related to maternal mental health, they were related to economic hardship. Additionally, parent level Spanish use and heritage orientation were associated with positive child outcomes. Results also showed that these relationships differed when COHIs and children with native-born parents were examined separately. Further, unique patterns emerged for EHS program use, for example families who participated in home-based care were less likely to comply with EHS attendance requirements. These findings provide tangible suggestions for EHS stakeholders: namely, the need to develop effective programming that targets engagement for diverse families enrolled in EHS programs.

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CHAPTER ONE: INTRODUCTION

Young children living in adverse conditions, particularly those associated with poverty, are at increased risk for a broad range of negative outcomes (Blair & Raver, 2012; Bradley & Corwyn, 2002; Brooks-Gunn & Duncan, 1997; McLoyd, 1990). School readiness, or academic preparedness prior to formal schooling, is one of many outcomes impacted by early adversity. Specifically, children experiencing early adversity are more likely to have language deficits and delays (Fernald, Marchman, & Weisleder, 2013) and lower social competence (Linver, Brooks-Gunn, & Kohen, 2002). Disparities in these school readiness skills as a function of socio-economic status are present as early as the preschool period (Hart & Risley, 1995). To reduce disparities and alter negative trajectories for children experiencing early adversity, the national leadership has taken initiatives to fund early educational programs such as Head Start and Early Head Start (EHS). These programs are modeled on previously successful early intervention demonstration projects, such as the Perry Preschool (Schweinhart, Barnes, & Weikhart, 2005) and Abecedarian Projects (Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002). Further, work by economists provides evidence that there are substantial returns on investment for early supportive education environments (Heckman, 2006). Ultimately, the hope is that providing early intervention for vulnerable children will support positive development and improve overall life trajectories despite the early adverse conditions they experience early in life (Brooks-Dunn et al., 2013; Ramey & Ramey, 1998).

Research Approach

To understand how early interventions improve the lives of vulnerable children it takes a collective effort by policy makers, economists, researchers, and practitioners. However, challenges arise as these separate entities employ differing theories, practices, and methodologies (Minkler, 2005). For example, differences in terminology across disciplines can hinder crosstalk and promotion of collaboration among the entities. To address these challenges and to maximize efforts across these diverse stakeholders an effective approach called community based participatory research (CBPR; Israel, Schultz, & Parker, 2005) is often employed.

Community based participatory research (CBPR) is designed to create bridges between researchers and communities, with the ultimate goal of improving community outcomes through a mutually beneficial partnership (U.S. Department of Health and Human Services, nd; Wallerstein & Duran, 2006). CBPR also aims to increase the quality, quantity, and usability of data collected by increasing both community trust and researcher understanding of community needs (Viswanathan, 2004). Furthermore, CBPR helps facilitate the transition from research into practice (U.S. Department of Health and Human Services, nd). This approach has been highlighted as beneficial and important when conducting research with ethnic minority, low-income, and other at-risk communities (McAllister, Green, Terry, Herman, & Mulvey, 2003). One of the most important elements to CBPR is that the research questions themselves are compelling and important to the target community (McAllister et al., 2003).

The studies presented in this paper are a small piece of an ongoing collaborative effort of several EHS community partnerships with academic researchers that ultimately aim to mitigate the effects of “toxic stress” in EHS families. CBPR is an approach from which to design and conduct research but there are no specific theories about the processes at play. To ground my research questions in theory and complement a CBPR approach, I rely on the ecological theory of development (Bronfenbrenner, 1979) and cumulative risk perspectives (Rutter, 1979; Sameroff, 2000).

Ecological theory is based on the premise that immediate and distal settings as well as the interactions within and between those settings influence the developing child (Bronfenbrenner & Morris, 1998). The cumulative risk hypothesis posits that concurrent risk leads to more detrimental effects on the developing child than the single impact of one risk (Rutter 1979; Sameroff, 1998). Cumulative risk incorporates multiple risks found within ecological systems (Burchinal, Roberts, Hooper, & Zeisel, 2000), and the ecological systems perspective highlights how those contextual factors interact to have an effect on developmental outcomes (Bronfenbrenner, 1979). These two perspectives are complementary, and together they suggest that efforts to intervene when children face multiple risks may be successful, particularly when they effectively bridge across ecological systems (for example, targeting the child, the family, and the early care and education setting).

Consistent with the CBPR approach, the research aims were specifically designed with and for community EHS stakeholders. The ultimate goal of this two-study paper is to understand the effects of EHS exposure on child outcomes in children that face multi-

ple risks in support of improved and tailored EHS services for families. There are five auxiliary aims to this goal: 1) to characterize the associations between domain specific and cumulative risk and child outcomes within an EHS population 2) to validate and explore these risk-outcome associations separately for Children of Hispanic immigrants (COHIs) and their peers with native-born parents, 3) to explore relationships among family characteristics (i.e. nativity, income), multiple risk factors, and attendance patterns in different EHS program types 4) to examine the relationship between EHS dosage and child outcomes, 5) and to examine how compliance to EHS programs impact early psychosocial symptoms and language abilities.

Early Head Start Programs

Early Head Start was initially authorized in 1994 as a national effort to extend child care services provided by Head Start to disadvantaged pregnant women and children from birth through age three. The families they serve are indeed vulnerable, particularly to the negative consequences of living in poverty (Duncan & Brooks-Gunn, 2000; Child Trend Databank, 2015). At least 90% of the families that EHS programs serve must fall at or below the federal poverty guidelines and the remaining 10% must target families who have children with disabilities. A primary goal of EHS is to provide enrichment programs that promote positive development and prepare children for academic success. Furthermore, EHS was designed to be flexible and dynamic to the needs of the communities they serve and provide comprehensive two-generation programs that target the needs of parents and children simultaneously. To that end, EHS provides a range of program options such as center-based care, extended hours, home visitation programs or a combina-

tion of these options. It also provides high quality educational curriculum and avenues to connect families with excellent community services to attend to the needs that are beyond the scope of EHS programs. For example, this may include directing families with no health insurance to Medicaid offices, or enrolling a family experiencing food insecurity into in a food assistance program.

Because the aim of EHS is to provide early intervention to improve long-term academic success and well-being for the most vulnerable children, examining child outcomes that are likely to be key levers for future academic success are most pressing.

Targeted Child Outcomes

The targeted early outcomes selected share the common characteristics of being modifiable, relevant to families with infants and toddlers, and predictive of long-term success and well-being. Further, as EHS programs primarily target families living in poverty, these three outcomes are particularly relevant because they are also impacted by socio-economic conditions (Hartas, 2011; Reiss, 2013; Leijten, de Castro, Matthys, 2013). Since this project is CBPR, I carefully selected these three outcomes in collaboration with our EHS partners to ensure they were compelling and of importance to the target community.

Language Skills

Language skills in infants and toddlers living in poverty are severely compromised (Campbell et al., 2003; Hart & Risely, 1995, Vandell & Ramanan, 2008). For infants, language acquisition heavily relies on high levels of daily exposure to spoken language and cognitive stimulation by adults in their environment (Clark, 2009). Compared

to families at higher income levels, families living in poverty are less likely to provide these critical learning opportunities to their young infants and toddlers (Duncan & Brooks-Gunn, 2000). Unfortunately, estimates show that by the age of three, the cumulative effect of more impoverished language environments results in poor children having heard 30 million fewer words (Hart & Risely, 1995). Not surprisingly, these environmental differences in language opportunities result in low and/or delayed language acquisition (Hammer, Farkas, & Maczuga, 2009; Pungello, Iruka, Dotterer, Mills-Koonce, & Reznick, 2009). Language abilities are core academic skills and there is strong evidence that they are very important for later academic achievement (Dickinson, Golinkoff, & Hirsh-Pasek, 2010; Duncan et al., 2007; NICHD Early Care Research Network, 2005). Taken together, children living in poverty are at risk for poorer academic achievement and thus understanding early predictors and supports for academic achievement, specifically early predictors of language acquisition, is severely needed.

Internalizing and Externalizing Behaviors

Though not as often recognized for their independent contributions to academic success as language abilities, psychosocial strengths and lack of impairments are both related to academic achievement in young children (Arnold, Kupersmidt, Voegler-Lee, & Marshall, 2012; Duncan et al., 2007). Early maladaptive psychosocial behaviors are also indicative of later psychosocial problems in middle childhood (Mesman et al., 2001). Furthermore, psychosocial symptoms (internalizing and externalizing behaviors) are prevalent among low-income four-six year old children (Gross, Sambrook, Fogg, 1999; Holtz, Fox, & Meurer, 2015; Kaiser, Hancock, Cai, Foster & Hester, 2000). Though not

as often studied in infants and toddlers, infants as young as one can exhibit these symptoms (Briggs-Gowan, Carter, Bosson-Heenan, Guyer & Horwitz, 2006). What is further compelling is that while academic gains resulting from early intervention are seen for language abilities, these gains tend to fade by first grade (Lee, Brooks-Gunn, Schuner, & Liaw, 2008) while problem behaviors persist and even predict later behaviors at age 15 (Belsky et al., 2007).

Multiple Risk Environments for EHS Families

Despite the provisions available through EHS, it appears that a subgroup classified as “high risk” (indexed by socio-demographic risk), show smaller EHS intervention gains (ACF, 2002). This is worrisome because these families are precisely those who are most in need of the benefits of EHS programming (Wagner & Clayton, 1999). Further, it is likely that families facing similar or more risk are also not maximizing the benefits of EHS; for example, these families are less likely to engage with early intervention programs and consequently receive fewer services (Phillips & Shonkoff, 2000). Thus, for optimal uptake of EHS it would be useful to understand how utilization (using program options) is a function of family level risks and demographics. The purpose of identifying specific risk in families is to ultimately adjust EHS programs (services and child care options) so that early intervention is distributed well and benefits are enjoyed by all who enroll.

Cumulative Risk

To test a range of risk factors on child development, a cumulative risk approach is an appropriate strategy because it is statistically and conceptually parsimonious. A num-

ber of studies have decisively shown that cumulative risk models do indeed predict worse child outcomes than a single indicator of risk (Evans & Kim, 2007; Mistry et al., 2010; Wells & Evans, 2010). Cumulative risk strategies have also been utilized in many EHS studies (Ayoub, O'Connor, Rappolt-Schlichtmann, Vallotton, & Chazan-Cohen, 2009; Mistry et al., 2010). These studies find that for infants and toddlers, cumulative risk scores are associated with poor language abilities (Hooper, Burchinal, Robers, Zeisel, & Neebe, 1998; Stanton-Chapman, Chapman, Kaisers & Hancock, 2004) and more maladaptive psychosocial behaviors (Trentacosta et al., 2008; Kerr, Black & Krishnakumar, 2000). While the utility in cumulative risk models are clear, there is also the need to understand the possible individual effects of the risks that are being consolidated into these cumulative risks scores, and whether different risk factors relate to different child behavioral outcomes and/or EHS program enrollment options. Therefore, both effects of cumulative risk and domain specific risks are examined.

Domain Specific Risk

ACF-demographic Risk

Already in use by ACF to identify children and families at “high-risk”, these factors are socio-demographic in nature and are parent centered. Specifically they include mothers who are receiving government assistance (TANF/welfare), have less than a high school education, are a single parent, and/or are unemployed (Raikes, Vogel, & Love, 2013). Each individual effect has established links to detrimental effects on child outcomes. For instance, infants and toddlers of adolescent mothers are more likely to have delays in language than are children of adult mothers (Rafferty, Griffin, & Lodise, 2011).

Language delays are also more prevalent among children with mothers who have lower educational attainment (at or below high school; Horwitz et al., 2003). Children in single parent household are also at increased risk for poor psychological well-being even after adjusting for socio-economic factors (Scharte & Bolte, 2012). Additionally, being in a single-parent household contributes to children's poorer academic achievement (Patterson, Kupersmidt, & Vaden, 1990).

Maternal Mental Health

The effects of poor maternal mental health have long been established (for a review see Goodman, 2007). As it relates to very young children, exposure to maternal depression in infancy predicts poor executive function (a key component of school readiness) at age four (Huges, Roman, Hart, & Ensor, 2013). Early exposure to poor maternal mental health is also associated with more behavioral problems (Duncan et al., 2007).

Economic Hardship

There are many risks associated with living in poverty. Commonly, low income (or income-to-needs ratio) is used to index poverty; however, measures of economic hardship are also useful in establishing the difficulties associated with having low income. While income is useful in indexing poverty, measures of economic hardship are better equipped to capture low resources as a result of factors including income as well as unstable work, debts to assets, support available from other family and friends (resource sharing), and skills at managing (potentially low and unstable) resources (Conger et al., 1994). Further, these risks have also been shown to negatively affect both language abili-

ties (Burchinal, Roberts, Hooper, & Zeisel, 2000) and maladaptive psychosocial behaviors in infants and toddlers (Scaramella, Sohr-Preston, Callahan, & Mirabile, 2008).

Housing Conditions

Though not exclusively associated with poverty, those in poverty disproportionately experience poor housing conditions. Conditions such as overcrowding or having hazardous materials in their living environments are associated with poorer language abilities (Evans, Maxwell, & Hart, 1999) and more behavioral problems (Maxwell, 2003; Solari & Mare, 2012; Evans et al., 1999) in children. Children that have transient households, indexed by moves and entering and exiting household members, are also more likely to have behavioral problems and less academic success than are children with more stable households (Cavanagh & Huston, 2006).

Language Preference and Heritage Orientation

Although there have been extensive efforts to understand the relationships among child outcomes and indices of poverty and maternal mental health there has been very little focus on other diverse factors within the ecological systems. Given that more diverse families are now accessing EHS (Child Trends, 2015), the need to include these additional factors is clear. Thus, the current study incorporates parent-level measures of language use and heritage culture orientation as other potential factors that are relevant to the current study's immigrant family population. The use of these parent-level measures provides an indirect look at the child's home environment, specifically exposure to mainstream language and culture. Parent language is often addressed as English proficiency (or lack thereof); however, it is unclear whether or not supporting a parent's native lan-

guage as compared to only supporting English during program delivery is beneficial. Given work with child English language learners, it indeed may be helpful to support parental native language use during English language acquisition. This is particularly important because many EHS curricula are focused on increasing English proficiency in children, given that English-language skills in the preschool years, particularly for children of immigrant families, is an important element for children's future success in school and labor markets (Hernandez 2004). To examine the role of parental language use in this process, I include a measure of parental language use habits.

Another factor that warrants further investigation is the role of heritage orientation in immigrant families. There is some evidence to suggest that heritage orientation may inform the type of care that immigrant families select for their children (Brandon, 2004). Specifically, less mainstream families choose family, friend and neighbor networks for early child care (Takanishi, 2004). However, less is known about whether heritage orientation is an index of risk or rather is a protective factor for negative outcomes in diverse families. There is some evidence that heritage orientation (Sood, Mendez, & Kendall, 2005) is not a risk but rather is a protective factor for negative outcomes in diverse families. Thus, for this last domain, given the limited body of work and the complexity of culture, it remains unclear whether these indices will be risk or protective factors for the current study population, for child language and psychosocial outcomes.

Together, I hypothesize that the current study's chosen variables will capture a range of factors to accurately reflect the diverse experiences in EHS families. Separate research projects have shown that all of these factors have an effect on child language

skills, psychosocial symptoms and/or problem behavior. However, it is likely that these selected factors are often co-occurring (Evans, 2004; Evans & English, 2002), and thus, the current study will also contribute to an understanding of domain specific and cumulative risk effects among EHS children and families. In line with a CBPR approach, I have also been mindful to include risk factors that are either routinely collected by EHS programs or that would be easily collected. The intention was that these results could help identify the most vulnerable families enrolled in EHS programs and subsequently maximize the benefits of early intervention.

Environmental Factors in Sub Groups

Over the past decade the number of Hispanic children has steadily grown and currently approximately one in four children in the U.S. are Hispanic (Murphey, Guzman, & Torres, 2014). Hispanics are also the largest and fastest growing group (Fry & Passel, 2009), and subsequently, this ratio is projected to increase over the next couple of decades. Specifically, by 2030 Hispanic children are expected to be the largest minority group and may even surpass the current Caucasian majority by 2050 (Murdock, Zey, Cline, & Klineberg, 2010). Currently, nearly half of all Hispanic children in the U.S. are children of Hispanic immigrants (COHIs). This is important because as a whole, immigrant families are less likely than non-immigrant families to utilize early childhood programs (Brandon 2004). Instead, these families more often rely on friends, family and neighborhood networks for early child care (Lui & Anderson, 2012; Ha & Ybarra, 2014; Brandon, 2004). Further, there are differences across cultures in child care preferences based on demographic and nativity characteristics (Huston, Chang, & Gennetian, 2002);

specifically immigrants tend to prefer home-based programs. For the current study, I am responding to an identified need within EHS to examine subgroup populations in EHS programs in order to appropriately inform relevant policy to increase services to high-need groups currently underutilizing center-based care (Love, Chazan-Cohen, Raikes, Brooks-Gunn, & 2013). Given that COHIs are the largest immigrant group and little is known about how they fare in EHS programs, they are a particularly good candidate population.

COHIs are more likely to live in poverty (Capps, 2001; Chaudry & Fortuny, 2010) and are disproportionately represented among those living in poverty (Lopez & Velasco, 2011). In addition to the challenges associated with poverty, immigrants themselves have also identified aspects of life post migration (known as acculturative stress, Berry, 2006) that they find stressful including: economic/occupational stress, parenting and marital stress, language barriers, legal stress surrounding immigration, discrimination, and culture and family conflicts (Cervantes, Padilla, & Salgado de Snyder, 1991; Gil, Vega, & Dimas, 1994). Those who report greater acculturative stress also report worse physical (Farley, Galves, Dickinson, & Perez, 2005) and psychological health (Ornelas & Perreira, 2011). Sparse information is available on whether or not young COHIs under the age of three already show effects on their development as a result of this type of stress exposure. However, given the documented importance of early life stress on health outcomes (Essex et al., 2011), these stressors are likely to have detrimental effects on young children. Additionally, from a segmented assimilation perspective (Portes & Zhou, 1993; Portes, 2007) the context (including but not limited to the socio-political

climate and other salient risk factors) that a family is exposed to during its initial generation of arrival has profound effects throughout the lives of their children and subsequent generations.

Despite COHI's significant presence, large gaps remain in understanding the unique experiences of COHIs (Perreira & Ornelas, 2011). While there is an increasing awareness of the need to accommodate immigrant families in early childhood education programs, relatively few initiatives have been developed. Further, when these efforts are made, they can be met with challenges and lead to tensions between program providers and families, especially in regards to curriculum surrounding cognitive and socio-emotional development (Crosnoe, 2013). These tensions are often hard to categorize because families often leave the program with no other description than the program did not fit the needs of the family (Roggman, Cook, Peterson, & Raikes, 2008). To that end, understanding how COHI families utilize EHS programs and their dosage patterns is warranted and could be used to help families and EHS programs. Understanding how COHIs utilize EHS options and their dosage patterns may also help maximize the benefits of EHS as an intervention for these families.

Impact of EHS in the Context of Multiple Risks

Before reviewing current evidence of early intervention dosage effects for vulnerable infants and toddlers, I consider definitions of the term "dosage". In the broader early childhood education literature, the definitions of dosage generally fall along two dimensions: current and cumulative participation (Zaslow, Tout, Halle, Whittaker, & Lavelle, 2010). Measures of current participation tend to include a single and static time point var-

iable of attendance hours per day or days per week. Cumulative participation on the other hand includes the total number of days or hours of participation over certain enrollment periods and/or from the first age of entry. In this paper, the term dosage reflects the cumulative participation dimension (see Zaslow et al., 2010 for full review of dosage indicators along the current participation dimension).

Overall, EHS programs are modestly effective in reducing the negative effects of poverty on child outcomes, and children show improvements in school readiness, physical health, and socio-emotional development as compared to low-income children that do not enroll in early childhood intervention programs (Love et al., 2011). Further, in comparison to control children, EHS participants show reduced or eliminated negative consequences of risk factors on child outcomes (Ayoub et al., 2009; Barnett, Roost, & McEachran, 2012; Chapin & Altenhofen, 2010). Finally, compared to control groups, EHS participation reduces achievement disparities by the start of kindergarten (Harden, Sandstorm, & Chazan-Cohen, 2012).

Results are still emerging surrounding how EHS dosage affects child outcomes for children under the age of three; however, evidence from Head Start children suggests that early intervention effects reflect a dose-response pattern; specifically, more exposure to intervention leads to a greater response in child academic and behavioral outcomes. However, the dose-response appears inconsistent, as it at times also relates to increases in child psychosocial symptoms (Loeb, Bridges, Bassok, Fuller, & Rumberger, 2007). Importantly, research with non-intervention samples has shown that exposure to early child care generally increases language abilities (Logan, Piasta, Justice, Schatschneider, & Pe-

trill, 2011), but also increases teacher reported child externalizing behaviors (Belsky, 2001; McCartney et al., 2010). In sum, this evidence points to a complex picture of how dosage is related to child outcomes.

An important consideration in EHS samples when examining EHS exposure, particularly when indexed by attendance, is the type of child care in which children are enrolled. Embedded in the transition of EHS programs from federal policy standards to local programming, is the capacity to adapt to the needs of the communities they serve. Therefore, there is no single child care option for EHS programs, but instead, EHS programs provide an array of options for families. Three broad types of programs are most often offered to families: center-based care, home-visitation programs and combination care. Center-based children often attend classrooms four to five days a week and usually, though not always, are in full-day programming. Home-visitation programs, on the other hand, are delivered in-home and are usually only conducted once a week to two times a month. Combination programs include some blend of classroom time and home-visitation. Given that program options vary and thus the opportunity to attend EHS also varies, it is important to recognize and explore dosage as a function of program type. There are a number of reasons families choose specific program options, and these reasons may not be independent of outcome (for example, employed parents may be more likely to choose center-based care and may also have more economic resources to support their children's development).

In addition to the scarcity of knowledge in understanding dosage effects among infants and toddlers in EHS, little is known about the interactive effects of dosage and

cumulative risk factors on child outcomes. When examining the moderating role of early childhood education for preschoolers on the relationship between cumulative risk and child outcomes, a compensatory model unfolds such that intervention programs counterbalance the negative effects of adverse conditions (Bradly, Burchinal, & Casey, 2001). For example, Hubbs-Tait and colleagues (2002) found that Head Start attendance compensates for the effects of cumulative family risk on child language outcomes. Specifically for children with high cumulative risk, increased Head Start attendance was associated with higher vocabulary scores; however, for children with low cumulative risk, attendance was not related to vocabulary scores.

Current Study

In the subsequent chapters, I will contribute to promoting a CBPR research approach by examining timely and community relevant research questions. I also add to the body of literature that focuses on understanding cumulative risk and child outcomes. Because families are likely to face a number of adverse experiences simultaneously, it is worthwhile to understand both whether these risk factors have individual effects in the face of multiple risks and whether cumulative risk exposure predicts child outcomes. Though the literature is decisive in that more risk is associated with poorer outcomes, it has largely left out the experiences of very young children and subgroups such as Hispanic immigrant families.

Frist I 1) characterize how multiple risk exposure contributes to early internalizing and externalizing behaviors and emerging language abilities, 2) validate the relationship between cumulative risk and early psychosocial symptoms and language, and 3) ex-

plore how these family-level factors contribute to child outcomes for COHI and children with native-born parents separately. Second, I will 1) examine the relationship among family-level characteristics and EHS program types, 2) examine how EHS dosage contributes to child symptoms and language, and finally, 3) explore how EHS compliance to program requirements impacts early psychosocial symptoms and language.

CHAPTER TWO: GENERAL METHOD AND DESIGN

The sample drawn for these studies is part of The Buffering Toxic Stress Consortium (BTSC) which is a set of pilot research and intervention projects at six sites across the country. Questions, methods and measures were informed by the collective consortium effort and expertise; however, each site has a unique study design. This study was approved by the Institutional Review Board (IRB) at the University of Denver.

Procedure

To be eligible for the BTSC study, families had children between the ages of six and thirty-six months that were enrolled in an EHS program in the Denver metro area at the time of recruitment. To recruit eligible families, a bilingual and bicultural research team attended classroom drop-off and pick up times, presented the study to parents, and collected contact information from families. For those families who were in home visitation programs, the child-family educators (CFEs) who met with parents weekly initially presented the study to parents and collected contact information. The project manager then contacted the primary parent of interested families to schedule a two-hour in-home screening visit.

The Denver BTSC study has five phases: screening, pre-assessment, intervention, post-assessment, and a three-month follow-up. The data examined for this study were

collected during the screening visit, before families were assigned to an intervention condition. All visits were conducted in the home of the family. A research team of at least two data collectors attended the home visits; one to conduct the interview with the parent (parent interviewer) and the other to conduct the child developmental assessments (child assessor). Parents consented at the screening visits and the parent interviewer reviewed consent at the beginning of each subsequent research visit (excluding intervention visits).

To reduce the heavy reading requirements for parents, especially those with low literacy skills, the questionnaire portion of the visits were conducted as interviews. Parents were given the option to conduct the visits in English or Spanish. Parent interviews were collected via a secure computerized system. Additionally, child assessments were conducted in Spanish or English according to the child's language preference. Data were routinely downloaded and reviewed for quality assurance. Procedures for the visit from which this sample was drawn is described below.

Screening Visit Protocol

During the screening visit, parent interviewers collected information about the target child's health and behavior including psychosocial symptoms, the family background and structure, the stresses and strains the family had experienced, the parent's relationship with his or her child, and the parent's mental and physical health. While the parent completed the interviews, the child assessor used standardized child assessments to evaluate the child's current cognitive, language, and physical development. Additionally, the child assessor weighed and measured the target child. Participants were given \$50 for their participation in the screening portion of the study. If a family did not com-

plete the entire protocol during the screening visit, the remaining portions were completed at the next visit or over the phone.

Measures

Translation and Measurement Invariance

Standardized Spanish translations of measures were prioritized over translating measures for the study. If a translation for a measure was not available then a back translation method was used. Measures were first translated into Spanish then back-translated into English. The back-translated document was compared to the English version. Disagreements between the documents were resolved by consensus of the translation team. The translation team consisted of two native Spanish-speakers (Mexican and Dominican dialects), two Spanish language learners, and two monolingual English-speakers (to check back translated documents). This is an ongoing project; however, once data collection is complete, measures will undergo rigorous measurement invariance procedures (Schout, Lugtig, & Hox, 2012) for English and Spanish measures.

CHAPTER THREE: LINKS BETWEEN ENVIRONMENTAL FACTORS AND CHILD OUTCOMES

Aims and Hypotheses

- 1) Characterize the relationships among domain specific risks (i.e. ACF- demographics, maternal mental health, family economic hardship, poor housing conditions, and parent language and heritage orientation) and early child internalizing and externalizing behaviors and emerging language abilities.
 - a) I hypothesize replication of previous associations between domains of risk, such that there will be a positive linear relationship between the specified domain risk and internalizing and externalizing symptoms and a negative linear relationship between the specified domain risk and emerging language abilities.
- 2) Validate the relationship between cumulative risk and early child internalizing and externalizing symptoms and emerging language abilities.
 - a) I hypothesize that the cumulative effect of risk will have a positive linear relationship between cumulative risk and internalizing and externalizing behaviors and a negative linear relationship between cumulative risk and emerging language abilities.
- 3) Explore relationships between domain specific and cumulative risk on child internalizing and externalizing behaviors and emerging language abilities separately for COHI and children with native-born parents

Participants

The sample was obtained from the first two cohorts of an ongoing BTSC study. Data for 130 children were drawn from the pre-intervention phase. Of the 130 children who were selected, seven children were excluded because a screening visit was scheduled but was not completed, and one additional child was excluded for excessive missing data due to a shortened data collection visit. The final sample was 122 children ($M=25$ months, $SD=9.6$, $range=5-46$ months, 39% female).

Sample demographic characteristics are displayed in Table 1 (Appendix B). To summarize key characteristics, there were 12 sibling pairs and the large majority of parents (97.3%) were female. A majority of parents, 68.5% self-identified as Hispanic, and roughly half of the sample, 51.4%, reported Spanish as their primary language. Slightly more than half of the children had at least one foreign born parent; 55% (94% born in a Latino country). The average net income (after taxes) was \$22,060 and 74% were living at or below the poverty line.

Procedure

Data Reduction

Seventeen items were selected to reflect five risk domains: ACF-demographic risk, poor mental health, economic hardship, housing conditions, and parent preference to use Spanish and heritage orientation (See APPENDIX C for details). Of the 17 items, 12 were dichotomous variables. The remaining five variables were continuous scores and then artificially dichotomized. It is important to acknowledge the issues involved in artificially dichotomizing risk factors (MacCallum, Zhang, Preacher, &Rucker 2002). For

instance, to create a “cut point”, methods such as creating a median split, heavily rely on the specific data and are therefore not easily (if at all) generalizable to different samples. To address this potential issue, dichotomous cut-off points for items were created using standard cut-off points (i.e. depressed vs. not depressed on the CES-D) or by creating cut points that were conceptually relevant (e.g. reporting having moderate to high difficulty in paying bills vs. little to no difficulty). See Appendix C for means and standard deviations of dichotomized variables. To examine the domain specific question the items within the risk were summed. For the cumulative risk question, all 17 items were summed.

Missing Data

Prior to calculating domain scores, the items were examined for missing data. The maximum percentage of missing data for any domain item was 6%. The item that had 6% missing data was the one that assessed families living at or below the poverty-line. It was not calculated for seven families because they were unable to report how much money their spouse made. In total only 21 children (17%) had one or more of the values missing for the 17 items. The maximum percentage of missing data for a given subject was 12% ($n=2$). Where there was missing data, Little’s MCAR test (Little, 1988) was used to determine whether the data was missing at random (MAR). The results of the MCAR test revealed that the data was missing at random for all items.

Measures

ACF-demographic Risk

To identify “high risk” families the ACF identified five demographic risks. These five items focus on maternal socio-demographic characteristics and government support. Four of the five measures focus on the mother’s demographic profile. They include parents having less than a GED/high school education, having her first child as a teenager, being single (at the time of the study) and being unemployed in addition to not being enrolled in school (at the time of the study). The final risk is that the family currently receives welfare/TANF. A total of five items were in this domain score.

Maternal Mental Health

Maternal mental health was assessed by using the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977), and the Generalized Anxiety Disorder 7 item scale (GAD-7; Spitzer, Kroenke, Williams, & Lowe, 2006). The 20-item CES-D assessed current depressive symptomology over the past week. Parents endorsed the frequency of depressive symptoms on a 4-point scale (0-not at all or less than 1 day, 1-one or two days, 2- three to four days, and 3-nearly every day). A total symptom score was calculated. To dichotomize the item for the domain score, risk was identified if a parent showed depressive symptoms at or above the clinical cut-off (score of 16; Weissman, Sholomaskas, Pottenger, Prusoff, & Locke, 1977). The GAD-7 assessed anxiety symptoms over the past two weeks. The GAD-7 is also on a 4-point scale (0-not at all, 1-several days, 2-more than half the days, and 3-nearly every day). A summed score was obtained and then dichotomized by standard cut-off scores of moderate to severe anxiety

vs. mild or no anxiety (10 or more or fewer than 10 symptoms respectively; Spitzer et al., 2006). Two items were in this domain score.

Economic Hardship

There were four items (resource restriction, material need, economic pressure, and meeting the poverty threshold) used for this risk domain. Three of the four items were taken from the Iowa Youth and Families Project (Conger & Elder, 199): resource restriction, material needs and economic pressure. Resource restriction assessed whether the family experienced a loss of a vital resource (phone, electricity, and eviction) and if they were unable to maintain rental or mortgage costs in the past 12 months. The items in the questionnaire were coded 0/1 (false/true), and a summed score was created. The resource restriction variable was a continuous variable; therefore, it was dichotomized. Because the loss of any one of these vital resources is important a 1 was assigned if a family reported 1 or more loss of a vial resource. Material need focused on whether or not the family was able to meet housing, food, clothing, and medical costs in the past 12 months. Because the score for material need was continuous a 1 was assigned if the family was unable to meet one or more core material need. Economic pressure was assessed by looking at whether families were able to make “ends meet” and pay the families’ bills at the end of each month. If the family was unable to make ends meet and/or had some level of difficulty paying the bills a 1 was assigned. Finally, the fourth item, meeting the poverty threshold was used. A poverty threshold was selected over absolute income because the federal poverty guidelines use gross and net income, total size of household, number of children and adjusts for inflation, to determine a threshold. An absolute income on the

other hand would not have taken these factors into consideration. If the family met or fell below the federal poverty level a 1 was assigned.

Housing Conditions

There were four items (crowding, perceived crowding, moves in the last year, and changes in household members) in the housing conditions domain. An objective score of crowding was assessed by dividing the number of bedrooms by the number of people in the home (Turner, Guzman, Wildsmith, & Scott, 2015). If there were three or more people per room then the family was classified as living in crowded conditions. Perceived crowding was assessed by asking if the family felt they had enough space in their current living arrangements. Housing instability was captured by asking whether the family had two or more moves in the past year and whether there were additional members added to the household in the past year.

Language Preference and Heritage Orientation

Though agnostic about whether or not the following indices are disadvantages or potential sources of strength two items were used in this domain score: Parent's Spanish language use and heritage orientation. Parental language use was assessed by asking four questions about which language the target parent uses to interact with family, friends, co-workers and media. An additional question asks which language they prefer to speak overall. The questions are on a 5-point scale (0-Spanish all the time, 3-Spanish/English equally, 5-English all of the time). Scores were reverse-coded and then averaged across the questions; a higher average indicated using more Spanish. The continuous score was dichotomized by assigning a 1 if the average was equal or greater to 3, which indicates

that the parent spoke Spanish more than English. Finally, acculturation was assessed with the 20-item Vancouver Index for Acculturation (VIA; Ryder, Alden, & Paulhus, 2000). Parents were asked the extent to which they identify with their own heritage and American mainstream culture. The questions are on a 9-point scale; ranging from 0 (strongly disagree) to 9 (strongly agree). The scores for the VIA contain two coexisting dimensions of acculturation: heritage and mainstream. The heritage subscale assessed the extent that an individual identifies with his/her heritage culture, and the mainstream subscale assessed the extent that an individual identifies with American mainstream culture. To create a heritage orientation score, heritage score was subtracted from the mainstream. A zero or negative score suggests that the family was bicultural or oriented towards mainstream culture, whereas a positive score reflected less acculturation and a higher orientation towards their heritage culture. The continuous heritage orientation score was dichotomous by assigning a 1 to heritage orientation score higher than 0.

Cumulative Risk

The cumulative risk score was created by summing the ACF-demographic, poor maternal mental health, economic hardship, housing conditions and parent language preference and heritage orientation. Children therefore could have a range of 0-17 for a cumulative risk score.

Child Internalizing and Externalizing Behaviors

To assess internalizing and externalizing behaviors, the parent was asked to complete either the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001) for children 1.5 years or older or the Brief Infant Toddler Social Emotional Assessment

(BITSEA; (Briggs-Gowan, Carter, Irwin, Wachtel & Cicchetti, 2004) for children under 18 months. Both questionnaires ask parents to rate the frequency of behaviors on a 3-point Likert scale 0 (never true), 1 (sometimes true) and 2 (very often true). Both the CBCL ($\alpha=.76-.88$; Rescorla, 2005; $\alpha=.96$ in our sample) and the BITSEA ($\alpha=.69-.80$; Briggs-Gowan & Carter, 2008; $\alpha=.79$ in our sample) have shown appropriate internal consistency. To combine the two questionnaires a proportion of the endorsed score by the total possible score, adjusted for missing items, was used.

Child Language Development

The Preschool Language Scales, fifth edition (PLS-5; Zimmerman et al., 2011) was administered by research assistants to capture children's language development. The PLS-5 is a bilingual English/Spanish language development assessment suitable for children from birth to 8 years that captures a child's auditory and expressive language comprehension. Materials for the PLS-5 include age appropriate manipulatives (such as a toy bear, blocks, and box) and a picture book manual. For bilingual Spanish/English speaking children, each test item was first conducted in Spanish, and if the child answered incorrectly, the item was administered in English. Baseline was established when a child correctly answered three consecutive items. A ceiling was met when a child answered six consecutive items incorrectly. Because the assessment was conducted in the home of the child, the child assessor attempted to remove extraneous stimuli, such as the child's personal toys and other distractions including siblings or visitors. If the child started to tire during the test, the assessor gave the child an opportunity for a break. In some cases, the child assessor administered the manipulatives and the picture manual items together to

keep the child's attention. The PLS-5 administration manual suggests this strategy of administration, which is in contrast to the chronological administration of items, for children that might be distracted.

For bilingual Spanish/English children, we obtained adjusted scores from the PLS-5 Administration and Scoring Manual for Dual Language Learners. These adjusted scores are necessary because bilingual children's language abilities may appear reduced if only one language is considered (Hammer et al., 2010). For analyses, a total standardized score that combined the receptive and expressive abilities was used. The PLS-5 Total Language score has demonstrated strong reliability ($\alpha=.80$; Pae, 2012).

COHI Classification

Children were stratified into COHI vs children with native-born parent groups based on maternal nativity and ethnicity. If a parent indicated that they were born outside the U.S. and were born in a country that is part of the geographic Latino area, then their child was classified as COHI. As an important note, to eliminate undue distress surrounding immigration concerns, parents were not asked about legal or citizenship status in the U.S.

Analytic Approach

Ordinary least squares (OLS) regression analyses were run to test the relationships among multiple domains of risk for each child outcome separately (language, internalizing, and externalizing behaviors). In addition to looking at each domain risk on child outcomes, the cumulative risk score was also tested across the child outcomes. Mplus software (Muthen & Muthen, 2009) was used to employ the OLS regression analyses.

Mplus allows for analyses of missing data by utilizing full information maximum likelihood (FIML), which is the justification for not using other software such as SPSS. When data are missing at random, the FIML approach uses all information available and yields unbiased estimates. Using SPSS for OLS regressions would result in list wise deletions for cases with missing data. This would consequently further reduce the sample size, which may yield biased estimates. In addition, the domain scores were standardized in the domain specific analyses because of the uneven number of risks in each category.

The last aim of the study was to determine if the patterns of risk to child outcomes were different for COHI vs children with native-born parents. The interpretations of the models do not go beyond descriptive because the sizes of the groups are too small.

Preliminary Analyses

The intercorrelations among all of the study variables are displayed in Table 3 (See Appendix D). Analyses for possible covariates of child's age and sex, family income and cohort were run on the risk variables. There were no effects of child's age or cohort on any of the variables. There were child sex differences for child language ($t=-2.16$, $df=43.04$, $p<.04$), such that on average male children had poorer language abilities than female children. In analyses examining child language skills, child's sex was used as a control. Income was negatively associated with ACF-demographic risk, economic hardship, and cumulative risk. Sex and income were intended to be used as covariates in the OLS regression models; however, these variables did not change the direction or the significance of main effects and interactions. To ease the estimated parameters in the regression models they were not used as covariates in the final models.

Results

Aim 1

Results for the regression analyses (Table 4, see Appendix E) revealed that poor maternal mental health was positively associated with both child internalizing and externalizing behaviors ($b=.31$, $SE=.09$, $p<.001$; $b=.38$, $SE=.09$, $p<.001$, respectively). The relationship was such that poorer maternal mental health was associated with higher parent reported child internalizing and externalizing behaviors. Child externalizing behaviors were additionally associated with parent's language use and heritage orientation ($b=-.24$, $SE=.09$, $p<.01$). This association was negative such that when parents reported a preference for Spanish and had higher heritage orientation, parents also reported fewer externalizing behaviors for their children. Finally family economic hardship was negatively associated with child language skills ($b=-.34$, $SE=.12$, $p<.01$), such that more family economic hardship was associated with lower child language scores. There were no associations between ACF-demographic risk or housing conditions on any child outcome.

Aim 2

Results revealed that cumulative risk was positively associated with child internalizing behaviors ($b=.32$, $SE=.09$, $p<.001$), such that more cumulative risk was associated with higher parent reported child internalizing behaviors. There was no association between cumulative risk and child externalizing behaviors. Cumulative risk was negatively associated with child language scores ($b=-.28$, $SE=.10$, $p<.01$), specifically more cumulative risk was associated with lower child language scores.

Aim 3

In the group with native-born parents (Table 5, see Appendix F), child internalizing and externalizing behaviors were positively associated with poor maternal mental health ($b=.40$, $SE=.12$, $p<.01$; $b=.46$, $SE=.11$, $p<.001$, respectively). Specifically, poorer maternal mental health was associated with poorer child psychosocial outcomes. There were no associations between ACF-demographic risk, housing conditions or parent Spanish preference use and heritage orientation on child psychosocial outcomes. Cumulative risk was positively associated with child internalizing behaviors ($b=.33$, $SE=.12$, $p<.01$), such that more cumulative risk was associated with more child internalizing behaviors. There were no associations between cumulative risk and child externalizing behaviors.

Additionally for children with native-born parents (Table 5, see Appendix F), child language abilities were negatively associated with cumulative risk ($b=-.37$, $SE=.14$, $p<.01$). Such that, more reported cumulative risk, the lower the child scored on language abilities. When parents reported using more Spanish and had higher heritage orientation there was a negative association with child language abilities ($b=-.44$, $SE=.13$, $p<.001$), specifically a parent's preference to use Spanish and higher heritage orientation was associated with lower child language scores.

In the COHI group (Table 6, see Appendix G), child internalizing behaviors were positively associated with housing conditions ($b=.28$, $SE=.12$, $p<.05$), and with ACF-demographic risk ($b=.25$, $SE=.12$, $p<.05$), such that poorer housing conditions and more ACF-demographic risks were associated with higher parent-reported child internalizing behaviors. Conversely, parents who reported a preference for Spanish use and had higher

heritage orientation showed a negative association with child internalizing behaviors ($b=-.25$, $SE=.12$, $p<.05$). Such that parents who reported a preference for Spanish use and had higher heritage orientation reported fewer internalizing behaviors for their children. Lastly, similar to the group with native-born parents, cumulative risk ($b=.38$, $SE=.12$, $p<.01$) was positively associated with child internalizing behaviors, such that more cumulative risk was associated with higher parent-reported child internalizing behaviors. There were also no associations in the COHI group between cumulative risk and child externalizing behaviors.

Additionally in the COHI group, child language abilities were negatively associated with economic hardship ($b=-.33$, $SE=.15$, $p<.05$) but positively associated with parents Spanish use and heritage orientation ($b=.31$, $SE=.13$, $p<.01$). To specify, more economic hardship was associated with poorer child language scores but a parent's preference for Spanish use and heritage orientation was associated with higher child language scores. There were no associations among ACF-demographic risk, poor maternal mental health, or poor housing conditions, and child language scores.

Discussion

This study had three aims: first, to characterize the patterns of domain specific factors across early maladaptive psychosocial behaviors and emerging language abilities; second, to validate the relationship between cumulative risk and internalizing and externalizing behaviors and emerging language abilities, and third, to explore the relationship between domain specific and cumulative risk and child outcomes separately for COHIs and children born to native parents.

Domain Specific and Cumulative Risk on Child Outcomes

When domain specific factors were examined across various child outcomes, differential effects of risk were evident on child language and internalizing and externalizing behaviors. For instance, more economic hardship was associated with poorer child language abilities but showed no association with child internalizing or externalizing behaviors. Conversely, poor maternal mental health was related to more child internalizing and externalizing behaviors but was not associated with child language abilities. Separately, these associations are consistent with the broader literature. Specifically, language abilities are closely tied to income disparities (Campbell et al., 2003), and poor maternal mental health is closely linked to child psychosocial symptomology (Connell & Goodman, 2002). Therefore, it may be the case that the links are so robust that even when they are included with other family level characteristics, the effects on the respective outcomes remain the stronger association.

As part of a CBPR approach, I considered the use of the previously identified demographic risk factors as defined by ACF (2002). However, when other risks were also examined simultaneously, this indicator was not associated with any of the child outcomes. It may be the case that these risk factors are only differentially related to child outcomes when other factors are not considered. Although no relationships were found in this study and for these demographic risks and child outcomes, I do not discourage the use of ACF-identified demographic risks. These risks have been used to successfully categorize families (Raikes et al., 2013) and are good indicators of risk, particularly when other detailed information from families is not available.

Interestingly, in the whole sample analyses preference for Spanish use and heritage orientation did not show the same direction of associations with externalizing behaviors as did poorer maternal mental health. While poorer maternal mental health was associated with more child externalizing behaviors, a preference to use Spanish and higher heritage orientation was indicative of fewer externalizing behaviors. While surprising, this may fall in line with studies that demonstrate that lower English language proficiency is associated with positive outcomes in children of immigrants accessing EHS (Magnuson, Lahaie, & Waldfogel, 2006). This connection is rarely found in samples that are not exclusively immigrant samples. Examining what potential protective mechanisms are at play is a key step for future research, and building awareness around the fact that a strong heritage culture association and Spanish language preference may act as a strength.

When these factors were combined into a composite risk score, cumulative risk was only associated with two of the three outcomes: child emerging language abilities and child internalizing behaviors. Thus, using a cumulative risk strategy may be an effective starting place, but may not as clearly identify differences and intervention targets as examining individual domains of risk. As a result, stakeholders who wish to identify multiple risks for families living in poverty should consider keeping the risks separate instead of combining across different domains of risk.

Patterns between COHIs and Children with Native-Born Parents

To address the large gaps that remain in understanding the experiences of Hispanic immigrant children living in poverty, domain specific factors and cumulative risk were examined stratified by group. It is beyond the scope of the analyses presented here to compare these groups directly; however, this preliminary evidence suggests that the strongest associations of risk on child outcomes, at least for language abilities and maladaptive psychosocial behaviors, are different by group. Early difficulties with emerging language abilities were associated with economic hardship and a parent's preference for Spanish use and higher heritage orientation in both groups. However, child language was positively associated with preference for Spanish use/heritage orientation in the COHI group and negatively associated in the group with native-born parents. This is particularly interesting because parental preference for Spanish language use being associated with higher language abilities for the COHI group could be an early indicator of the benefits of bilingualism in children (Agirdag, 2014). Further investigation of the relationship for lower child language scores in the group with native-born parents should be examined as there is a switch from better to poorer child language abilities when families are no longer immigrants and parents continue to prefer Spanish.

Early internalizing and externalizing behaviors were also associated differentially in each group. Among the children in families with native-born parents, maternal mental health was related to both externalizing and internalizing behaviors. This is a well-established finding in the literature; however, it is interesting that the patterns for internalizing and externalizing behaviors were different for COHIs. Instead, for COHIs, hous-

ing conditions, ACF-demographic risk, cumulative risk, and Spanish preference/heritage orientation were associated with internalizing behaviors but not maternal mental health. Maternal mental health was associated with externalizing behaviors but not the other family-level factors. The small sample sizes in these group comparisons requires a great deal of interpretive caution. However, these findings do suggest that it may not be appropriate to expect the same family-level factors to influence child outcomes for COHI's as have been well-established with samples of children with native-born parents.

Together these findings suggest that it is indeed possible to show associations among early indicators of academic achievement and well-being in infants and toddlers and family-level environmental factors. Further, these data suggest that a careful consideration of whether and how family-level indicators serve as risks within diverse populations, without assuming cross-population similarities, is important.

Limitations

There were several limitations to this study. Most notably, and already discussed, this study had a small sample size, specifically for COHI and children with native-born parents group comparison, limiting the full evaluation of the proposed aims. Though this study had a small sample, it contained rich data. For example, I was able to identify several items to consolidate into five domains of family-level environmental factors and was able to select three different child outcomes. These data were taken from a single time point and are correlational associations; therefore, no causal conclusions can be made. For instance, I cannot conclude that cumulative risk leads to poor child outcomes, or that a preference for Spanish use leads to better child outcomes, but they do provide valida-

tion that the cumulative risk and child outcomes are potential targets for early intervention.

CHAPTER FOUR: LINKS AMONG FAMILY AND CHILD CHARACTERISTICS AND EHS PROGRAM TYPE AND COMPLIANCE

Aims and Hypotheses

- 1) Explore how family-level characteristics (nativity and income), domain specific risks, and dosage vary by EHS program type.
- 2) Examine the relationship between EHS dosage and early child maladaptive psychosocial behaviors and emerging language abilities.
 - a) I hypothesize that more dosage, as indexed by attendance, will be associated with fewer child internalizing and externalizing behaviors and higher child language ability scores.
- 3) Explore the impact of EHS compliance on the relationship between cumulative risk and child internalizing and externalizing behaviors and emerging child language.

Participants

The children in this study were from only one of our EHS community partners (because only one partner was able and interested in providing administrative data); therefore, this is a subset of 76 children from the 122 children in the previous chapter. They were different from children from our other community partners on two demographic characteristics: age and COHI status. Children from this organization were younger ($t=2.51$, $df= 121$, $p<.01$) and were less likely to be from a Hispanic immigrant

family ($\chi^2=1.22, p<.001$). There were no other differences. Again, parents were almost exclusively female (98.7%) with only one male parent and a slight majority of parents identified as Hispanic (59.2 %) and just over a third of parents (38.2%) spoke Spanish primarily. Under half of the children (42.1%) in the study were children of Hispanic immigrants. The average income was \$22,818 and 71% were living at or below the poverty line.

Procedure

Child care utilization options, attendance and program attendance expectations were compiled from administrative level attendance records. Data were prepared by a senior researcher who is also tracking center level data for participants in the parent BTSC study. Attendance and attendance expectations for children in the EHS program were collected for six months from the screening date. If a child became ineligible and dropped from the program during the six-month period their required attendance requirements were adjusted to reflect how many attendance days (visits or classroom days) the family was expected to attend. Family and risk characteristics were collected from the family during a screening visit as described in the general methods section.

Measures

Measures for domain specific risk factors, nativity, and cumulative risks factors are identical in Chapter Three.

EHS Program Type

To assess EHS utilization I used the program type in which the child was enrolled. There were three program types that were offered to families at this EHS site: center-based, home-visitation, and combination. Center-based children were enrolled in full-time programs (five times a week and full-day). Children in home visitation programs children were expected to meet with a certified family educator (CFE) once a week. Finally, children in combination classes were required to attend half-day care for two days a week and have a home visit meeting with the teaching staff twice per month.

EHS Dosage and Compliance

To operationalize EHS dosage the total number of days the child attended a classroom and home-visit irrespective of program type or attendance expectations in a six-month period was used. Home visit days and child care days were documented separately but were combined to create the dosage variable. Compliance was calculated as a proportion by dividing the actual attendance by the attendance requirements (adjusted for program type, changes in eligibility or enrollment within the six-month data collection period).

Analytic Approach

The first two aims are descriptive in nature. Therefore, a series of ANOVAs, t-test and bivariate correlations were employed to examine 1) relationships among family and child characteristics and use of EHS program type and 2) the association between EHS dosage and child outcomes. Aim 3 was to test the moderation of compliance on cumulative risk and child outcomes. A series of ordinary least square (OLS) regression models

with Mplus software (Muthen & Muthen, 2009) were utilized. The software allows for missing data and the advantage of full information maximum likelihood (FIML) estimations. Because of the possible impact of EHS program type on compliance, two dummy codes were created to compare across program types: centervshome and combovshome. For the ease of interpretation, home-base care was used as the reference group for each dummy code. Before creating the interaction terms, cumulative risk and compliance were grand-mean centered. Three interaction terms were created: cumulative risk by compliance, centervshome by compliance and combovshome by compliance. To determine the relationships of interactions found between compliance and cumulative risk on child outcomes, simple slope analyses were calculated using ModGraph-I (Jose, 2013).

Preliminary Analyses

To test for differences in EHS program type by child's age and sex, and cohort a one-way ANOVA with Bonferroni comparisons was employed (Table 7, see Appendix H). There were no differences by child's age or sex. There were differences in program type by cohort. Specifically, children in center-based programs were more likely to be in cohort 2 as compared to both home-based and combination program types. These effects of cohort are possibly due to the fact that recruitment is not random but rather occurs systematically by center and classroom or home visitor within program to maximize recruitment and access to families at a particular site.

To test for effects of family income and child's age and sex on EHS dosage and compliance bivariate correlations were run (Table 8, see Appendix I). Child's age and sex were not correlated with dosage or compliance. Family income was positively related to

dosage. Children with higher income were more likely to have higher overall attendance (because of enrollment in center-based programs).

Cohort and income were intended to be used as covariates in the OLS regression models; however, these variables did not change the direction or the significance of main effects and interactions. To ease the estimated parameters in the regression models they were not used as covariates in the final models.

Results

Aim 1

To explore EHS program type by income, COHI status, and specific domain risk factors a series of ANOVAs were run. Results reveal that there were no differences in income across EHS program types. COHI families were more likely to use home base options than center-based options.

Examining domain specific risk factors there were no differences in economic hardship or housing conditions for families utilizing the different types of care options (Table 9, see Appendix J). There were, however, differences in ACF-demographic risk, poor maternal mental health, and parent's Spanish language use and heritage orientation. Specifically, center-based children had parents who reported less ACF-demographic risk indices (single parent, using TANF, etc.) than did parents who had children enrolled in either home or combination program types. Children in combination programs had mothers who reported poorer maternal mental health than did mothers with children enrolled in home-based programs. Finally, parents enrolled in home-based programs were more likely to report more use of Spanish and higher heritage orientation than center-based parents.

Dosage and compliance differed across EHS program types. Not surprisingly, for dosage all the program types differed from each other as this is by design. Children in the center-based programs had the most dosage followed by combination programs and then home-based programs. Lastly, compliance differed for families choosing center-based vs. home-based programming. Specifically, families in home-based had lower compliance than those in center-based programs. This is notable as compliance is calculated as the proportion of attendance to attendance requirements and suggests that even though expectations for home-based programs are much lower, families still took advantage of a smaller percentage of what was offered.

Aim 2

To examine associations of dosage as measured here and child outcomes bivariate correlations were run (Table 10, see Appendix K). On average, for this sample, there were no associations between dosage and child outcomes.

Aim 3

OLS regression models (Table 11, see Appendix L) revealed that there was no interactive effect for between compliance and cumulative risk on child externalizing symptoms. However, there was a main effect of compliance such that children that met a higher proportion of attendance had fewer parent-reported externalizing symptoms ($b=-.19$, $SE=.01$, $p<.05$). Additionally, center-based children had more parent reported externalizing symptoms than home-based children ($b=.19$, $SE=.06$, $p<.01$). Finally, there was a main effect of cumulative risk ($b=.02$, $SE=.01$, $p<.05$); children at high cumulative risk had more parent-reported externalizing symptoms than children at low risk. Together this

suggest that cumulative risk and compliance have effects on child externalizing separately rather than interactively.

The interaction term for child internalizing symptoms was significant ($b=-.09$, $SE=.03$, $p<.01$). Examining simple slopes, for children in the low risk group as compliance increased so did parent-reported child internalizing symptoms and for children in the high risk group there was no difference across compliance levels. Though graphically it appears that there was a difference in internalizing symptoms for low risk children, the simple slope calculation is not significant (Figure 1, see Appendix A). Together this suggests that when there is a higher compliance to program attendance requirements there was an association with lower parent-reported child internalizing symptoms, specifically for children with high levels of risk.

There was no interaction effect of cumulative risk and compliance on child language abilities. There was a main effect of cumulative risk ($b=-1.46$, $SE=.62$, $p<.05$). Specifically, children with low cumulative risk had higher language scores than children with high cumulative risk. This suggests that across all levels of compliance, children with high cumulative risk remain vulnerable to the negative consequences of cumulative risk on child language abilities.

Discussion

After validating the relationship between cumulative risk and child internalizing and externalizing behaviors and emerging child language abilities, next it was important to understand relationships among family and environmental factors, dosage and EHS program type. These aims together lead us to the over-arching goal exploring how EHS

compliance to program requirements moderate the relationship between cumulative risk and child outcomes.

Family Characteristics and EHS Program Type

Closely examining utilization patterns reveal that there were no differences across EHS program type by economic hardship, housing conditions, or income. As EHS is targeted at providing access to families living in poverty, to see an even distribution across groups on these income related factors may suggest that among low-income families, economic factors are not the primary driver for selection of program options. Parents that utilized center-based options reported less ACF-demographic risk. This could be because the ACF risk identifiers includes unemployment. It is likely that parents who are employed are also utilizing full-day/full-week programs as a viable child care option while they work. What was unexpected was that parents in combination EHS programs reported higher mental health symptomology. There is no known literature to speak to this; therefore, it is worthy of further attention and if these findings were to be replicated it could provide implications for targeted outreach for mental health services for these families.

COHI families were most likely to use home-based options. This is in-line with other research findings that Hispanic families tend to choose home-based options more often than center-based care (Takinashi, 2004). This may have implications for access and recruitment efforts. Specifically, providing more home-based programs in areas with large Hispanic populations to increase overall access to EHS programs may be warranted. Further, children in home-based programs were more likely to prefer the use of Spanish

and had higher heritage orientation; however, because this is inclusive of immigrant relevant experiences (less English language usage, more heritage culture orientation), this may simply be the same variance captured by the COHI/non-COHI variable.

As expected, dosage was different among the EHS program types. Center-based children had the most overall dosage and home-based children had the least. An interesting pattern showed that compliance to attendance expectations were different for home- and center-based programs. Specifically, those families in the home-based option were less likely to meet the attendance expectations. This finding is slightly counter-intuitive because in terms of convenience, having fewer attendance requirements and someone coming to your home might lend to more compliance; however, this was not the case. Future studies should focus on understanding what processes are at play. For instance, perhaps this is due to differences between the center and home context in the levels of engagement with EHS providers, or the perceived need for care of families with those using center-based options (i.e. needing child care to allow parents to work or go to school). Since this was a small sample from one child care center, these patterns could also be center specific and therefore future considerations of center-level factor should be examined.

Relationship between EHS Dosage and Child Outcomes

If there ever were such a thing as an “age old question” in EHS research, it would be “how much EHS is needed to make improvements on child outcomes”? Unfortunately, this question will remain unanswered. There were no linear associations found between dosage and child outcomes. It may be the case that I was under-powered to fully examine

this association, especially given that effect sizes of early intervention have been modest at best (Love et al., 2011). Alternatively, the lack of association may also reflect the way that dosage was measured.

Impact of EHS Compliance on the Relationship between Risk and Child Outcomes

While dosage did not have an impact on child outcomes, EHS compliance had a moderating effect on the relationship between cumulative risk and internalizing behaviors. This pattern was compensatory in nature, meaning that EHS compliance counterbalanced the negative effects of higher internalizing behaviors for those with more cumulative risk. Specifically, families at high risk reported fewer child internalizing behaviors as compliance to program requirements increased. This relationship may suggest that more compliance to EHS programs reduces child internalizing behaviors. Perhaps one explanation is that parents of children with fewer internalizing symptoms were more able to meet the attendance expectations of the programs in which they were enrolled. An alternative explanation is that while cumulative risk impacts child internalizing behaviors, parents who are able to overcome these risks and regularly participate in the EHS programs they selected have other unmeasured strengths that are protective against maladaptive child psychosocial behaviors.

For child externalizing behaviors, risk and compliance worked independently, rather than interactively, more compliance to EHS programs was associated with fewer child externalizing behaviors. Separately, more cumulative risk was associated with greater reported child externalizing behaviors. Further, parents of children in center-based programs reported more externalizing behaviors than did home-based children. This pat-

tern is consistent with other findings that more exposure to child care is associated with more externalizing behaviors (McCarty, 2010). Though not fully understood there are several possible reasons for this association. One offered explanation is that with increased time in peer group settings the opportunities to display externalizing behaviors also increase, thus resulting in higher reports. Though these findings have largely been found with teacher reports, this study used parent reports, together may suggest that these findings also extend to parent report measures as well.

Finally, although there was no interaction effect of cumulative risk and EHS compliance on language abilities, a significant relationship did exist between cumulative risk and language outcomes. Specifically, children with high cumulative risk had lower language abilities than those at low cumulative risk. Thus, suggesting that children were vulnerable to the effects of cumulative risk irrespective of their compliance to EHS programs. The finding that more cumulative risk is associated with poorer language development regardless of EHS exposure, warrants that further efforts to improve language abilities within EHS may be needed, especially for the highest risk families.

Limitations

Although this study provided important contributions to the literature on family level factors and EHS utilization, and child outcomes, it was not without limitations. First, due to the small sample size and numerous estimated parameters it is possible that analyses were statistically underpowered. The notion that this study was statistically underpowered could explain why I did not find some expected results, for example, an association between dosage and child outcomes. Additionally, due to the small sample size,

I was unable to look at domain specific family level environmental factors and was only able to use the cumulative risk variable, despite the better predictive power of the domain-specific approach. Nonetheless, the current results can provide a framework for future research to those that utilize larger nationally represented data sets to examine the impact of EHS across a slew of domain specific risks.

CHAPTER FIVE: CONCLUSIONS AND IMPLICATIONS

Taking a CBPR approach, the main goal of this study was to understand the impact of EHS on the relationship between cumulative risk and child outcomes (language abilities and internalizing and externalizing behaviors). To explore this question several smaller aims were necessary. First was to characterize the associations between family-level environmental factors and child outcomes across all children and separately for children of Hispanic immigrants. Also essential was the exploration of EHS utilization and dosage patterns. I was able to validate several associations between risk, both additive and cumulative, across a range of child outcomes. The exploration of EHS program types and dosage patterns revealed interesting patterns for COHI families and for different family-level characteristic domains. As it relates to the ultimate goal of the paper, there is evidence that EHS can have a buffering effect in the context of high risk, but only for internalizing behaviors.

Alongside the CBPR approach this research was grounded in the ecological theory of human development and cumulative risk perspectives. Ecological theory of human development (Bronfenbrenner, 1979) is based on the premise that immediate and distal settings as well as the interactions within and between those settings influence the developing child (Bronfenbrenner & Morris, 1998). This study showed that the family and child care contexts do have an effect on the developing child. Additionally, more distal factors like language use and heritage orientation also have possible effects for child development. What is interesting is that more immediate settings (i.e. maternal mental health and housing conditions) may theoretically have more immediate effects, however

when all risks were simultaneously evaluated distal effects (i.e. heritage orientation) were also present. Additionally, I used a cumulative risk perspective which incorporated multiple risks found within ecological systems (Burchinal et al., 2000). There was evidence that cumulative risk is predictive of child outcomes, however it appears that using an additive model (multiple regression) instead of a composite risk score may provide clearer perspectives on the needs of families, ultimately leading to targeted intervention elements for families. Future studies should evaluate whether these effects of different family characteristics are simply additive or if there are interactive effects among the contexts and factors within the ecological systems.

As part of a larger and ongoing effort, these studies do suffer from limited sample sizes. This limitation may explain some notable null effects, particularly given the complexity of the questions asked and the number of parameters estimated. However, it is notable that the findings that do emerge are either consistent with other published work, or theoretically reasonable. Together with the dearth of information regarding COHI's experiences, and the importance of correctly understanding (and not assuming) the nature of the relationships between family-level risk and child outcomes, these studies do make four important contributions.

First, I replicated some well-established findings, suggesting that I was not severely underpowered and that my measurement and analytic approach were appropriate. For example, I replicated the well-known finding that children in child care are more likely to exhibit externalizing symptoms than home-based children. Also that Hispanic immigrant families prefer home-based programming. Apart from child care utilization

research, I was also able to replicate several domain specific risk associations such as more economic hardship is related to poorer language abilities. In addition, I was able to simulate how facing multiple risks may differentially influence the developing child, most notably that maternal mental health predicted psychosocial symptoms but not language abilities.

Second, the results indicate different associations between risk domains and outcomes for COHI and children with native-born parents. Specifically, internalizing was associated with housing conditions for COHIs but for not children in the other group. This finding may be driven by measurement difficulties with assessing “inadequate” housing conditions. For instance, the three to one bedroom ratio for crowding may not accurately assess crowding, particularly in families where co-sleeping is the norm. Examining the measurement invariance across these measures, once the ongoing project is finished will further clarify these relationships.

Third, the results suggest that although families with less language proficiency and less acculturation to U.S. mainstream culture are often treated as an at-risk group, these factors in my sample leaned towards being potentially protective, for COHI children, even for the domain of language skill. This is critically important for practice because it highlights the issue of using “risk” labels. For instance, not speaking English is challenging in a predominately English speaking country, but as was revealed it may not be detrimental to child development but instead may be a strength, at least among immigrant families. It is further important because understanding and connecting with family strengths could both improve outcomes and enhance engagement of families with EHS.

Finally, the amount of EHS exposure had a moderating effect between cumulative risk and internalizing behaviors. Specifically, greater compliance to program requirements were associated with fewer child internalizing symptoms. For child externalizing symptoms, there was no interaction but there were separate associations with child care option, cumulative risk and compliance. Furthermore, when accounting for EHS exposure, cumulative risk still has an effect on language. These findings suggest that EHS policy makers should examine the ways in which compliance with program expectations could modify internalizing symptoms, and how families with children with more internalizing symptoms could be better supported to meet expectations. As a result, EHS stakeholders can create more effective programming that improves language and decreased externalizing behaviors. Overall these findings provide relevant suggestions for EHS policymakers and stakeholders, relating to the CBPR principle that research should be tangible and relevant.

Limitations

The studies presented in this paper were not without limitations. The most notable was the small sample size. The small sample size was due to delays in recruitment but will be increased once the on-going project is complete. Though this was a small sample size I do not expect the direction of the analyses to change. Due to the cross-sectional design of the larger study I was unable to directly assess EHS as an intervention for four reasons. First, I was unable to collect baseline data before EHS enrollment. Second, dosage data were taken six months after the screening visit from which child outcomes were assessed. Therefore the child outcomes are prospective rather than a result of spending

time in EHS programs. In the larger BTSC study child outcomes are taken at several visits after the screening visit, therefore future analyses will consider using those child outcome data collected at later visits while controlling for the research factors, such as control and intervention groups. Third, I was unable to assess EHS as an intervention because I was unable to look at other processes (parenting stress, styles, and/or efficacy) that affect change for children. For instance mechanisms such as parenting efficacy could be important factors for why home-based families are less likely to comply. Perhaps they feel better equipped to teach their children the necessary skills for academic success than a visitor who comes to the home once a week. Finally, because I consolidated home and visit dosage data there may be program specific processes that were masked. For example home-based programming might lead to changes in parenting efficacy that in turn change the child's behavior because of the intensive focus on parents as agents of change. While center-based children might have a bigger focus on peer relationship and child socio-emotional development and therefore the mechanisms for how EHS as an intervention works is different. These limitations should be addressed in future studies to determine how EHS as an intervention impacts children in different program types.

Implications

Practitioners could use the data from these studies in a several of ways. One is to improve services to families experiencing a multitude of risk. Further, careful consideration of how family-level indicators function within diverse populations, without presumptions of similarity across different populations. These studies suggests that more outreach and evaluation of barriers to EHS utilization is needed; specifically for families choosing

home-based programs. One possible factor for consideration is the cultural match or mismatch between the home-visitor and the family given the preference for home-based services in Hispanic families. Finally – a pressing national need is to identify how to use early care and education settings to promote cognitive development and decrease internalizing behaviors without concomitantly increasing externalizing behaviors for those who utilize center-based options.

Future Directions

Two future directions are suggested in light of these findings. The first is the continued focus on COHI families and their life experiences and the other is studying the important role of EHS teachers for these vulnerable children in the context of child care.

Continued efforts to understand the unique experiences of the largest immigrant group in the U.S. beginning early in life is timely and necessary, especially given that this group is expected to grow, due to increased birth rates among Hispanic immigrant women (Murdock et al., 2010). Further, given that low income Hispanic immigrant parents tend to show better than expected outcomes, yet by the third generation, low-income Hispanics fare among the worst on over all well-being (Garcia-Coll & Marks, 2012) understanding how to maintain the initial advantages is of utmost pertinence. Thus, examining how early intervention can help families use their strengths from generation to generation is worthwhile.

Although it was not feasible within the constraints of the current study, future studies would benefit from also taking into consideration the alliance or match between early child care providers and families. It has been demonstrated that a good match be-

tween early child care providers and families maximizes the benefits of early intervention for children because it supports the child's learning and communication styles by allowing a child to easily access their prior working knowledge of the world (Kidd, Sanchez, & Thorp, 2008). Further, differences in cultural background between teachers and students can lead to instruction that is not in-line with the learning style and/or cultural knowledge of students (Ogbu, 1982; Levinson, 2007) and can result in a lower school readiness for entering into kindergarten (Perry, Kay, & Brown, 2007). Fortunately, culturally responsive teachers (Erickson & Mohatt, 1982; Gay, 2002) and home liaisons (Sanders, 2008) can bridge the gap between home and school discontinuities. For example, there is evidence that when preschool teachers are culturally competent, with regard to language and cultural values, children have better transitions into Kindergarten (Rous et al., 2010). Though these findings were for preschool children, this suggests that EHS programs that are culturally responsive and supportive put their children on the right path to academic success. In order to maximize the benefits of EHS, particularly for immigrant children, it is crucial that future studies examine child care level factors.

Conclusion

Taken together, these findings and CBPR approach are encouraging for early intervention and research efforts. Ultimately, they point to the promising impact of EHS programs on the most vulnerable children. Further, with the CBPR approach these findings are likely to end up in the appropriate hands where true change can begin to happen. Because of research efforts such as these, and dynamic flow of information between enti-

ties, EHS programs will eventually provide maximum benefits to all members who partake in high quality early intervention programs such as Early Head Start.

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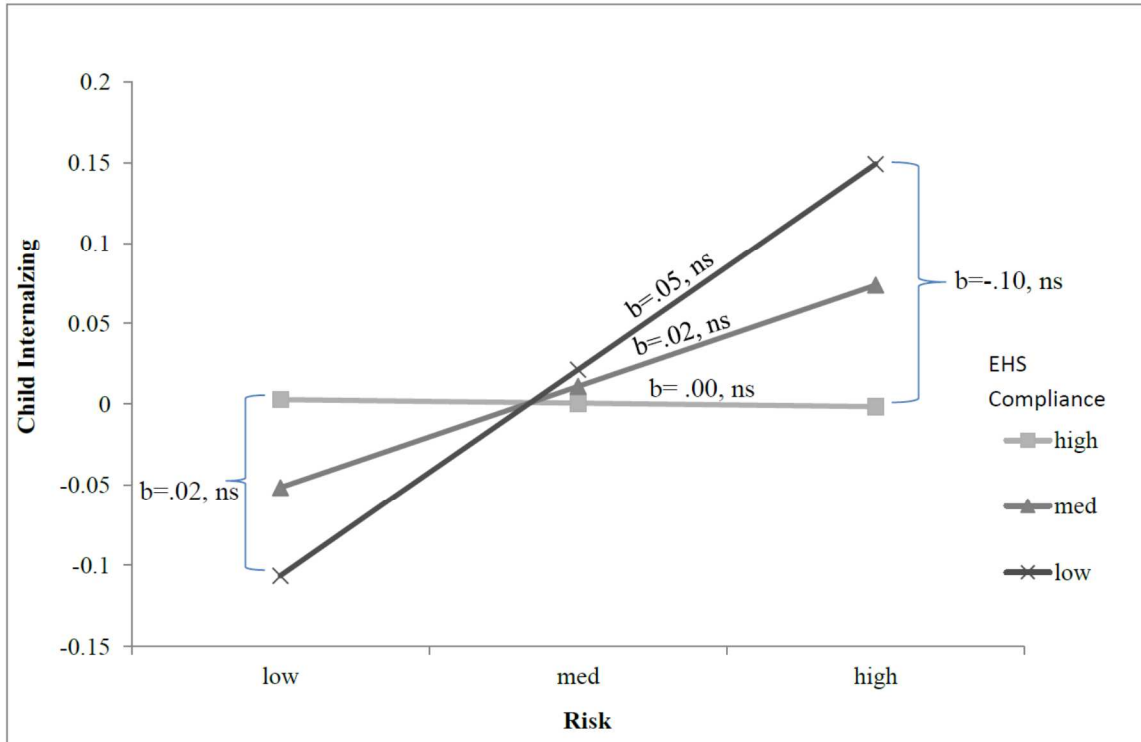
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APPENDICES

APPENDIX A

FIGURE 1

The association between cumulative risk and child internalizing symptoms by EHS compliance.



APPENDIX B

TABLE 1

Parent and Family Demographic Characteristics

Characteristic	Mean (SD)	Range
Age	30 years (6.41)	18-49 years
Net Income	\$22,060 (\$15,141)	\$0-101,345
100% poverty	74% (.44)	
% (n)		
Sex		
Male		2% (3)
Female		98% (107)
Race (NIH-Categories)		
American Indian/ Alaska Native		1% (1)
Asian American		2% (2)
African American		19% (21)
Native Hawaiian/ Pacific Islander		1% (1)
Caucasian American		24% (27)
Bi/Multi Racial		6% (6)
Other unspecified/ decline to answer		47% (52)
Ethnicity		
Hispanic		69% (76)
Non-Hispanic		31% (34)
Language		
English		49% (54)

Spanish	51% (57)
<hr/>	
Nativity	
Foreign Born	55% (61)
US Born	45% (50)
<hr/>	

APPENDIX C

TABLE 2

Cumulative Risk Score: Breakdown by Category

Items	Mean(SD)	Cut-off Point	% Families
ACF-Demographic Risk			
Parental Education	.24(.43)	less than high school education	24.0%
Teenage Mother	.40(.49)	mother had first child as a teenager	40.0%
Single Parent	.83(.38)	parent is single	82.9%
Parent Employment	.51(.50)	parent is not employed or in job training	51.2%
Welfare/TANF Receipt	.26(.44)	parent currently receive welfare /TANF	26.4%
Poor Mental Health			
Depressive Symptoms	.31(.46)	≥ 16 symptoms clinical cutoff for CESD-7	30.9%
Anxiety Symptoms	.18(.38)	≥ 10 symptoms clinical cutoff for moderate anxiety to sever anxiety	17.9%
Economic Hardship			
Resource Restriction	.42(.50)	≥ 1 unable to pay for telephone services, rent, or evicted from household	41.8
Material Need	.30(.46)	≥ 1 unable to pay for clothing, food, or medical costs	29.5%
Economic Pressure	.32(.47)	difficulty paying utility bills	32.0%
Poverty Level	.75(.43)	met federal poverty guidelines for income-to-needs ratio	74.5%
Housing Conditions			
Perceived Crowding	.30(.46)	family feels crowded	30.3%
Objective Crowding	.18(.39)	ratio of people to rooms ≥ 3:1	18.0%
Moves in Past Year	.15(.36)	≥ 2 more moves in past year	14.8%

Household Stability	.23(.42)	≥ 1 changes in household members	22.5%
<hr/>			
Parent Spanish Preference and Heritage Orientation			
Heritage Orientation	.61(.49)	< 0 more heritage orientation	61.5%%
Primary Language Use	.71(.45)	≥ 3 prefer Spanish	71.3%

APPENDIX D

TABLE 3

Intercorrelations among Family-level Environmental Factors and Outcomes

Measure	<i>n</i>	1	2	3	4	5	6	7	8
1. Economic Hardships	122	--							
2. Housing Conditions	122	.28**	--						
3. ACF Demographic Risk	122	.29***	.10	--					
4. Maternal Mental Health	122	.27**	.11	.25**	--				
5. Spanish Preference/Heritage Orientation	121	-.16	.13	-.06	-.18	--			
6. Language Skills	70	-.36**	-.25*	-.09	-.01	-.21	--		
7. Internalizing	113	.21*	.16	.17	.37***	-.13	-.15	--	
8. Externalizing	113	.08	.12	.08	.42***	-.28**	-.03	.59***	--

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

APPENDIX E

TABLE 4

Multiple Regressions of Domain Specific and Cumulative Risk on Child Outcomes

Variable	Child Outcomes					
	Language		Internalizing		Externalizing	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Economic Hardship	-.34**	.12	.07	.09	-.01	.09
Housing Condition	-.10	.11	.13	.09	.14	.09
ACF Demographic Risk	.04	.12	.08	.09	.00	.09
Maternal Mental Health	.06	.12	.31***	.09	.38***	.09
Spanish Preference/Heritage Orientation	-.20	.12	-.07	.09	-.24**	.09
Cumulative Risk	-.28**	.10	.32***	.09	.16	.10

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

APPENDIX F

TABLE 5

Multiple Regressions of Domain Specific and Cumulative Risk on Child Outcomes for Children with Native-born Parents

Variable	Child Outcomes					
	Language		Internalizing		Externalizing	
	<i>B</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Economic Hardship	-.22	.19	0.04	0.14	-.10	.13
Housing Condition	-.11	.16	0.05	0.13	.05	.12
ACF Demographic Risk	-.09	.17	0.02	0.14	.09	.13
Maternal Mental Health	.02	.17	.40**	0.12	.46***	.11
Spanish Preference/Heritage Orientation	-.44***	.13	0.12	0.12	-.15	.12
Cumulative Risk	-.37**	.14	.33**	.12	.24	.13

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

APPENDIX G

TABLE 6

Multiple Regressions of Domain Specific and Cumulative Risk on Child Outcomes for Children of Hispanic Immigrants

Variable	Child Outcomes					
	Language		Internalizing		Externalizing	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Economic Hardship	-.33*	.15	.09	.12	-.13	.13
Housing Condition	-.17	.15	.28*	.13	.26	.13
ACF Demographic Risk	.05	.17	.25*	.12	-.09	.13
Maternal Mental Health	.05	.15	.17	.12	.25*	.12
Spanish Preference/Heritage Orientation	.31*	.13	-.25*	.12	.06	.13
Cumulative Risk	-.19	.15	.38**	.12	.13	.14

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

APPENDIX H

TABLE 7

**Demographic Comparison by EHS program type: One-way ANOVA with Bonfer-
roni Comparisons**

	Home (n=37)	Center (n=26)	Com- bo (n=13)	Total (n=76)	Differences-Bonfoerroni Groups: mean diff (se)
<hr/>					
Age					
<i>Mean</i>	20.86	24.19	26.54	22.97	No group differences
<i>SD</i>	11.28	8.29	5.06	9.64	
<hr/>					
Sex					
<i>Mean</i>	.46	.35	.46	.42	No group differences
<i>SD</i>	.51	.49	.52	.50	
<hr/>					
Cohort					
<i>Mean</i>	1.30	1.77	1.00	1.41	Home vs Center: -.47(.10)*** Center vs Combo: .77(.14)***
<i>SD</i>	.46	.43	.00	.49	

Note. *** $p < .001$

APPENDIX I

TABLE 8

Correlations between Demographics and EHS Dosage

	EHS Dosage (Attendance over 6 month period)
Income	.28*
Age	.05
Sex	-.15
Cohort	.23*

Note. * $p < .05$

APPENDIX J

TABLE 9

Risk Factor Comparison by Enrollment Type: One-way ANOVA with Bonferroni Comparisons

	Home (<i>n</i> =35)	Center (<i>n</i> =23)	Combo (<i>n</i> =12)	Total (<i>n</i> =70)	Differences-Bonferroni Groups: mean diff (se)
Income					
<i>M</i>	\$21,420	\$26,584	\$19,676	\$22,818	No group differences
<i>S</i>	10,479	25,858	13,373	17,414	
<i>D</i>					
COHI					
<i>M</i>	.54	.19	.23	.37	Home v Center: .35(.12)*
<i>S</i>	.50	.40	.44	.49	
<i>D</i>					
Economic Hardship					
<i>M</i>	1.51	1.35	2.25	1.57	No group differences
<i>S</i>	1.04	1.29	1.22	1.89	
<i>D</i>					
Housing Conditions					
<i>M</i>	.94	.96	.156	.65	No group differences
<i>S</i>	.96	.97	.58	.91	
<i>D</i>					
ACF Demographic Risk					
<i>M</i>	2.51	1.17	2.69	2.29	Home v Center: .74(.26)* Center v Combo: .92(.35)*
<i>S</i>	1.17	.82	.95	1.08	
<i>D</i>					
Maternal					

Mental Health	<i>M</i>	.22	.58	1.15	.50	Home v Combo: -.94(.23)***
	<i>S</i>	.58	.81	.90	.79	
	<i>D</i>					
Spanish Preference/Heritage Orientation	<i>M</i>	1.43	.72	.92	1.11	Home v Center: .71(.22)**
	<i>S</i>	.83	.79	.95	.89	
	<i>D</i>					
Dosage						
	<i>M</i>	15.19	70.46	44.46	39.11	Home v Center: -55.27(4.55)***
	<i>S</i>	9.47	27.85	6.45	30.60	Home v Combo: -29.27(5.74)***
	<i>D</i>					Center v Combo: 26.00(6.04)***
Compliance						
	<i>M</i>	.64	.83	.83	.74	Home v Center: -.17(.07)*
	<i>S</i>	.35	.14	.09	.28	
	<i>D</i>					

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

APPENDIX K

TABLE 10

Correlations between EHS Dosage and Child Outcomes

	EHS Dosage (Attendance over 6 month period)
Language Scores	.25
Internalizing Behaviors	-.10
Externalizing	.18

APPENDIX L

TABLE 11

Interaction Relationships among Cumulative Risk, EHS compliance while Controlling for Program Type

	Language		Internalizing		Externalizing	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Cumulative Risk	-1.46*	0.62	0.02***	0.01	0.02*	0.01
Compliance	-6.46	7.99	-0.04†	0.05	-0.19*	0.10
Center v Home	4.02	4.17	0.06	0.03	0.19** *	0.06
Combined v Home	10.51	12.83	-0.06	0.06	0.08	0.10
Center v Home X Compliance	7.92	17.78	-0.33†	0.18	0.01	0.32
Combined v Home X Compliance	-42.23	108.27	0.43	0.40	1.06	0.71
Cumulative Risk X Compliance	1.54	2.82	-0.09**	0.03	-0.08	0.06

Note. † $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$