The Effects of Family, Neighborhood, and Child Care Contexts on Preschool Children's School Readiness

DISSERTATION

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By

Lieny Jeon, M.S.

Graduate Program in Human Development and Family Science

The Ohio State University

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Dissertation Committee:

Dr. Cynthia Buettner, Advisor

Dr. Howard Goldstein

Dr. Anastasia Snyder
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Abstract

The purpose of this study was to examine how family socioeconomic risk, neighborhood disadvantage, and child-care quality are associated with children’s school readiness. A sample of 420 children from 48 early child-care programs yielded multi-informants’ data from an evaluation study of a Quality Rating and Improvement System (QRIS) that was linked with the 2006–2010 American Community Survey. Multilevel structural equation modeling tested (a) the direct and indirect effects of family socioeconomic risk and neighborhood disadvantage on children’s cognitive and social-emotional development through the home learning environment and parental depression; (2) the direct effects of child-care quality (i.e., QRIS status) on child outcomes; and (3) the moderating effects of child-care quality on the relationship between family/neighborhoods contexts and children’s cognitive and social-emotional skills.

The results revealed that children with a greater number of family socioeconomic risks and a higher level of neighborhood disadvantage demonstrated lower scores on cognitive skills. In addition, the degree of family socioeconomic risk indirectly predicted children’s cognitive ability through parents’ cognitive stimulation at home. Parents who had more family socioeconomic risks and neighborhood disadvantage reported more depressive symptoms, which in turn, predicted children’s greater probability of having
social-emotional problems. The results also indicated that children in the highest QRIS rated child-care programs attained better scores on cognitive skills after controlling for family and neighborhood effects. Further, there was a buffering effect of child-care quality on the relationship between family socioeconomic risk and cognitive skills.

Acknowledging the importance of children’s school readiness in later life, this study investigated the contextual indicators in family, neighborhood, and child-care in relation to children’s cognitive and social-emotional development. Results of this study suggest that the home learning environment explains the mechanism of how socioeconomic disadvantage at home predicts children’s cognitive skills, while parental depression explains the mechanism of how family/neighborhoods disadvantages are associated with children’s social-emotional problems. Intervention or prevention strategies for parents to improve cognitive stimulation at home and to reduce depressive symptoms were suggested in the current study. The results also suggest that policymakers may expect positive returns on QRIS investments in terms of children’s cognitive achievement.
Dedicated to
my parents
and
my husband, Hada Jang
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Vita

January 1983 ....................... Born Ithaca, New York, USA.

2005 .................................. B.A. Child Welfare and Studies,
                               Sookmyung Women’s University, South Korea.

2006-2007 ......................... Graduate Teaching Associate,
                               Sookmyung Women’s University, South Korea.

2010 ................................. 2nd place award, Poster presentation in the Arts,
                               Humanities, and Social Sciences at the Hayes Graduate
                               Research Forum, The Ohio State University

2010 .................................. M.S. Human Development and Family Science,
                               The Ohio State University

2009-2012 ......................... Graduate Research Associate, The Ohio State University

2012-Present ....................... Dissertation Research Fellow, College of Education and
                               Human Ecology, The Ohio State University

Fields of Study

Major Field: Human Development and Family Science

Minor Field: Quantitative Psychology
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Preschool-aged children’s cognitive skills and social-emotional competence have critical implications for success in the transition to formal schooling (Egeland, Kalkoske, Gottesman, & Erickson, 1990; Mistry, Benner, Biesanz, Clark, & Howes, 2010). Children who are more ready to enter the school attain greater academic achievement and increased social-emotional adaptation, which coincide with positive behavioral outcomes (Peisner-Feinberg et al., 2001), fewer crimes, and higher rates of employment in later life (Schweinhart & Weikart, 1981). On the other hand, research has found that children who experience intellectual or social-emotional difficulties during the preschool period experience lower grades, peer rejection, negative feedback from teachers, and lower levels of self-regulation (Shores & Wehby, 1999). Therefore, it is important to examine possible predictors that may influence children’s school readiness and may contribute to children’s school failure. The current study examines two important elements of children’s school readiness: cognitive skills such as children’s vocabulary, literacy, language and mathematical development, and social-emotional competence. Social competence represents children’s behaviors that allow them to effectively manage and engage in social environment, including positive communication and interactions with other people (Raver & Zigler, 1997). Emotional competence can be defined as children’s
ability to regulate their emotions in physiological or environmental needs (Campos, Mumme, Kermoian, & Campos, 1994).

One way to conceptualize children’s school readiness is through an ecological systems approach that considers the extent to which environments predict young children’s development (Bronfenbrenner, 1976, 1986). The ecological systems theory conceptualizes multiple environmental influences on child development and the specific aspects of the contexts that are significantly associated with children’s school readiness (Bronfenbrenner, 1994). In the current study, home, neighborhood, and child-care settings are considered as the influential environments for children’s school readiness because preschool aged-children are more likely to face those three contexts than other external environments.

Extant literature suggests that family is the primary context for preschool-aged children’s development (e.g., Bronfenbrenner, 1994). Exposure to risk factors in the family situation has been associated with young children’s school failure (e.g., Fergusson, Horwood, Gretton, & Shannon, 1985; Mistry et al., 2010; Whittaker, Harden, See, Meisch, & Westbrook, 2011), and, specifically, family’s socioeconomic status (SES) appears to be the most important feature for children’s school readiness (Brooks-Gunn & Duncan, 1997). Family socioeconomic disadvantage such as single marital status, low levels of parental educational attainment, and low household income result in less social and economic resources for young children and higher levels of intellectual and social-emotional problems (Rimm-Kaufman, Curby, Grimm, Brock, & Nathanson, 2009), reducing the likelihood that children will gain appropriate school readiness. It is also
possible that family socioeconomic risk factors indirectly affect children’s development through more proximal risk factors such as parental depression and home learning environments (Mistry et al., 2010). Parents with low levels of family SES may not have enough resources and opportunities to provide learning materials, role modeling, or cognitive stimulating support to their child (Johnson, Martin, Brooks-Gunn, & Petrill, 2008). In addition, family socioeconomic disadvantage restricts parents’ emotional well-being and increases the possibility of depressive symptoms (Petterson & Albers, 2001). Limited physical and emotional resources from parents, in turn, may impact children’s difficulties in cognitive ability and social-emotional functioning (Mistry et al., 2010).

Additionally, living in disadvantaged neighborhoods, where a sizable proportion of residents live in poverty or are less educated, has been associated with children’s development beyond other markers of family disadvantage (e.g., Dupere, Leventhal, Crosnoe, & Dion, 2010; Leventhal & Brooks-Gunn, 2000). It is thought that neighborhood disadvantage impedes children’s development by decreasing the quality of learning experiences within the family and within neighborhood institutions serving children, most notably child care and school settings (Kohen, Leventhal, Dahinten, & McIntosh, 2008). Although the family context has been widely considered as an important contributor for young children’s development, little research has examined the effects of neighborhood contexts on preschool-aged children’s school readiness (Klebanov, Brooks-Gunn, Chase-Lansdale, & Gordon, 1997). There are a number of studies that have examined the relationships between neighborhood disadvantage and adolescent’s development (e.g., Browning & Cagney, 2002), but studies targeting
younger children are limited. Young children are somewhat restricted in terms of their interactions with the ecological systems outside the home, however, many children enter external contexts during the preschool period as a result of their mothers’ employment (Klebanov et al., 1997). It is, therefore, important to understand the direct and indirect roles of neighborhood contexts for preschool-aged children’s development above and beyond family disadvantage. The current study will examine whether or not there is a direct effect of neighborhood disadvantage on children’s school readiness and the process of how neighborhood disadvantage indirectly predicts children’s cognitive skills and social-emotional competence via home contexts, including parental depression and cognitive stimulation. It is expected that the lack of available social-emotional resources and role models for parents existing within the context of disadvantaged neighborhoods is associated with parental depression and parents being less likely to create enriched home environments, which, in turn, may increase the possibility of children’s school failure.

As women’s labor force participation has increased in recent decades, more children spend time in child-care settings. There is evidence that children who attend higher quality child-care are more likely to start school with better academic skills (e.g., Joo, 2010) and socio-emotional functioning (e.g., Burchinal, Peisner-Feinberg, Bryant, & Clifford, 2000; Mistry et al., 2010). The importance of child-care quality, therefore, has grown, and both policymakers and researchers have engaged in efforts to identify, implement, and evaluate strategies that improve child-care quality (Blau & Hagy, 1998; Love et al., 2003).
Among those strategies are Quality Rating and Improvement Systems (QRIS), which policymakers in a number of states have recently launched to verify and heighten the structural quality of preschools by defining quality standards (Zellman & Perlman, 2008) and setting in place a system to recognize and encourage adoption of those standards. Despite the growing popularity of these quality rating systems, a limited number of studies have investigated the impacts of these efforts on child outcomes. This study will examine the effect of a QRIS, which globally measures the structural quality of preschools, on children’s school readiness above and beyond the effects of family and neighborhood disadvantage. Further, although research describes links between child-care quality and children’s school readiness, child-care quality may not be equally important for all children (Peisner-Feinberg et al., 2001). There is evidence that children from disadvantaged homes or neighborhoods who attend high-quality child care programs have better outcomes than those attending lower-quality programs (e.g., Burchinal, Howes, et al., 2008; Votruba-Drzal, Coley, & Chase-Lansdale, 2004). However, other authors suggest that high-quality child care processes contribute equally to preschool-aged children’s development (e.g., Rimm-Kaufman et al., 2009), indicating little agreement on the moderating effects of high-quality child care on the associations between home and neighborhood risks and child outcomes. Therefore, an additional question that will be explored in this study is if high-quality child care is more important for some children than others, depending on environmental risks in their family and their neighborhood.
In summary, while addressing the contexts surrounding children’s lives, the primary goal of the current study is to understand the associations between specific contextual predictors, family SES, neighborhood disadvantage, home environments, and child-care structural quality in relationship to children’s school readiness, especially for cognitive skills and social-emotional competence. Using a sample of children from an evaluation study of a QRIS, I will examine the direct and indirect effects of family and neighborhood socioeconomic disadvantage on children’s cognitive skills and social-emotional competence through home environments (i.e., parental depression and degree of cognitive stimulation at home). In addition, the direct and moderating effects of child-care quality on the relationships between family, neighborhood, and children’s school readiness will be investigated.

1.1. Literature Review

1.1.1. Theoretical Framework

The significant contextual influences on children’s development in early childhood can be conceptualized by an ecological systems framework, which suggests that the contexts surrounding children’s lives can significantly affect their development (Bronfenbrenner, 1976). The ecological approach emphasizes structure and process quality in context to understand a developing child with two main assumptions (Andersson, 1989; Eamon, 2001). First, “human development takes place through processes of progressively more complex reciprocal interaction between an active, evolving biopsychological human organism and the persons, objects, and symbols in its
immediate environment” (Bronfenbrenner, 1994, p.38). The interaction is more effective in regular, enduring patterns over extended periods of time; these enduring forms of interaction are referred to as proximal processes (Bronfenbrenner, 1994). For example, proximal process occurs between parents and child or within relationships with peers, school learning activities, and task achievement (Eamon, 2001). Second, proximal process varies with the characteristics of a developing individual, the contexts in which the processes are occurred, and the nature of the developmental outcome being considered (Bronfenbrenner, 1994). According to these two assumptions, the environmental contexts that surround a child and the proximal process occurring in the contexts will influence children’s development.

Based on those two assumptions in the ecological systems theory, there are five socially organized subsystems from the innermost to the outside level. These subsystems were differentiated to facilitate understanding of the complexity of the environment surrounding a developing individual: (1) microsystem, which is the face-to-face setting where the developing person directly experiences activities, social roles and interpersonal relations; (2) mesosystem, which is a process between two or more microsystems that contain the developing person; (3) exosystem, which is a process between two or more environments, but at least one does not contain the developing person; (4) macrosystem, which is a pattern of broader cultural background; (5) chronosystems, which represents changes or consistencies of both the characteristics of the developing person and environments over the life course. Among these nested structures, the primary system that has the most impact on children’s development in the early childhood period is the
microsystem, such as family, neighborhood, and school (Bronfenbrenner, 1986) because young children’s direct experiences with the broader systems are limited. Associations between three contexts, home, neighborhood, and child-care, and children’s school readiness have been supported by a number of empirical studies and a variety of the different models conceptualizing the process in contexts.

1.1.2. Home Environment and Children’s School Readiness

In numerous studies, family and home environments have been considered as the primary context for a growing child (e.g., Callender, Olson, Choe, & Sameroff, 2011; Whittaker et al., 2011). There have been a number of family-related variables proposed to explain child outcomes, such as family disadvantage (Brooks-Gunn & Duncan, 1997), parental depression (Cummings & Davies, 1994), parents’ emotional support (Pachter, Auinger, Palmer, & Weitzman, 2006), and home literacy environments (Griffin & Morrison, 1997). Of the family-related predictors considered, family socioeconomic status (SES) appears to be the most influential feature for children’s school readiness. It is well known that family disadvantage (e.g., poverty) predicts low levels of cognitive skills and social-emotional competence in children (e.g., Whittaker et al., 2011). In most family studies, family SES has been included as either a primary variable or as a controlling variable in models that investigated children’s development (e.g., Bracken & Fischel, 2008; Egeland et al., 1990), and family SES has consistently explained a large portion of the variance in child development (e.g., Biederman et al., 1995; Eamon, 2001).
There are several dimensions that represent family SES, the most consistent one being household income. Bronfenbrenner (1986) pointed out that household income is one of the most important contextual factors of family life in the United States because financial resources are necessary to attain other resources needed to support parents and children’s health and wellbeing. According to the U.S. Census Bureau (2011) an increasing number of children have been added to the poverty population since 2001. In 2010, more than 15.75 million children (about one in five children) in the United States were in poverty status (U.S. Census Bureau, 2011). Previous studies have indicated that children in poverty often face multiple socio-demographic risks and that the accumulation of risk factors impedes their school readiness (Duncan & Brooks-Gunn, 2000). In addition, children raised in low-income families demonstrated gradual declines in their academic performance during early and middle childhood (Burchinal, Campbell, Bryant, Wasik, & Ramey, 1997).

Parents’ educational attainment is another strong predictor of children’s literacy skills and social-emotional development (Walker et al., 2011). When parents are more educated, children typically demonstrate greater school readiness (e.g., Johnson et al., 2008). An additional dimension of family SES is family structure. Family structure and forms have become varied over the past several decades due to the increased rate of divorce, non-marital childbearing, cohabitation, and stepfamilies; that in turn, increased the proportion of children living apart from a biological parent (Stewart, 2010). Hofferth (2006) linked residence with biological and non-biological married and unmarried parents to the behavioral problems of children aged 3-12. Children in all family types
except the married-biological-parent family demonstrated higher levels of behavioral problems. Moreover, studies have described that children with single mothers achieved lower cognitive achievement scores than those with married mothers (e.g., Mistry et al., 2010).

Research has examined a variety of contextual risk variables in the home; however, when a sample size is small or the risk factors are highly correlated, it is difficult to simultaneously explain all individual risk factors in the analytic model (Burchinal, Roberts, Hooper, & Zeisel, 2000). Therefore, it is necessary to conceptualize a variety of family socioeconomic risks in effective ways. For example, Sameroff, Seifer, Zax, and Barocas (1987) first tried to understand the effects of accumulated family risk factors and developed the cumulative risk index, which counts the number of risk factors in a family. They included chronicity of maternal illness, anxiety, maternal education, occupation, minority status, family size, stressful life events, and spontaneous mother-child interaction in the index and found that the single cumulative index significantly predicted children’s IQ scores. Later, empirical studies found that children reared in families with a large number of negative influences do worse than children in families with few risk factors (e.g., Biederman et al., 1995; Mistry et al., 2010; Sampson, Sharkey, & Raudenbush, 2008). The limitation of the cumulative risk index is that it is not possible to evaluate the relative importance of each variable. The cumulative risk index, however, helps to reduce the correlations among the predictors and modeling with a non-sufficient sample size (Burchinal, Roberts, Hooper, et al., 2000). Moreover, Sameroff et al. (1987)’s cumulative risk index did not separate family socioeconomic risks and
psychological risks that might have different effects on child outcomes. In this study, a cumulative family risk index with socioeconomic risks was created to overcome a limitation of the previous study. It also addresses the problem of a limited sample size in comparison to the number of variables included in the model.

Besides a direct link between contextual disadvantage in family and child outcomes, previous studies have also demonstrated that family SES indirectly affects child’s lives through more proximal factors, such as the home learning environment (Mistry et al., 2010) and parents’ psychological well-being (e.g., depression, Brown, 2000). Bronfenbrenner (1979) suggested that examining children’s proximal environments, which stem from more contextual features, is important in understanding children’s well-being. First, a stimulating and linguistically enriched home environment supports children’s language and communication skills and it also has implications for children’s social and behavioral functioning (Griffin & Morrison, 1997). Children’s home learning environments are typically explained by access to a library card, the frequency of reading to the children, and availability of reading materials and learning-oriented toys (Caldwell & Bradley, 1984). When parents are at greater socioeconomic risk, parents are more likely to have difficulties in providing enriched learning environments for a child due to a lack of time and financial or social resources, which in turn, may impede children’s cognitive and social skills (Goldenberg, Reese, & Gallimore, 1992). For example, better educated mothers provided a greater number of books for their children and had better reading abilities that allowed them to stimulate children’s early reading, which in turn, predicts children’s better literacy skills (Johnson et al., 2008). Second,
parental depression is one of proxies that can explain the negative pathways from family socioeconomic risk to children’s school readiness (Cummings & Davies, 1994). Depression is a mental health disorder characterized by low mood, low self-esteem, and accompanied by loss of interest or pleasure in enjoyable activities (Pinquart & Sörensen, 2003). Parents’ depressive symptoms hamper mothers’ sensitivity and stimulating caregiving (Cummings & Davies, 1994) and are associated with negative interactions in the family (Duncan & Brooks-Gunn, 2000), leading to children’s internalizing and externalizing problems or problems in psychological functioning (Pachter et al., 2006), and deficits in school readiness including academic competence (Shaw, Connell, Dishion, Wilson, & Gardner, 2009). Parents who had greater socioeconomic cumulative risks were less likely to be emotionally healthy than those who were not at risk (Mistry et al., 2010) because these parents might already be emotionally exhausted by the socioeconomic burden at home. In summary, the current study posits possible pathways from family SES to child outcomes through parental depression and cognitive stimulation at home.

1.1.3. Neighborhood and Children’s School Readiness

Most studies investigating the nature of environmental influences on preschool-aged children’s outcomes have primarily focused on individual- or family-level risk factors. However, neighborhood influences are definitely a part of the extrafamilial microsystem in ecological systems theory (Bronfenbrenner, 1977), and living in disadvantaged neighborhoods has predicted children’s cognitive and social-emotional development after controlling for other family disadvantages, albeit effect sizes have
been small to moderate (e.g., Dupere et al., 2010; Leventhal & Brooks-Gunn, 2000, 2003). For example, Xue, Leventhal, Brooks-Gunn, and Earls (2005) demonstrated that young children living in highly disadvantaged neighborhoods had more externalizing and internalizing behavioral problems than those who were raised in more affluent neighborhoods, after adjusting for child and family demographics. Furthermore, studies have found significant long-term effects of concentrated disadvantage in neighborhoods on children’s language and cognitive skills (e.g., Lloyd & Hertzman, 2010; Lloyd, Li, & Hertzman, 2010). The associations between neighborhood disadvantage and negative child outcomes may be due to the influence of peers, a lack of role models and monitoring, and scarce resources available in the neighborhoods (Jencks & Mayer, 1990). On the other hand, the presence of neighborhood resources such as libraries and daycare give enriched opportunities for young children’s learning, and the availability of monitoring and role models positively influences children’s development (Chase-Lansdale, Gordon, Brooks-Gunn, & Klebanov, 1997). However, the neighborhood-level explanations may be limited during the preschool years because families still play the primary role in a child’s environment during this period (Bronfenbrenner & Morris, 1998). Bronfenbrenner (1979) argued that larger socioeconomic structures (e.g., neighborhood) affect individual’s development through more proximal contexts, such as families and schools. Hence, it is important to consider family-level mediators in exploring how neighborhood disadvantage predicts children’s development in early childhood.
Research has shown that neighborhood disadvantage impedes children’s development through decreasing the quality of learning experiences within the family and/or through increasing the likelihood of parental depression (e.g., Burchinal, Nelson, Carlson, & Brooks-Gunn, 2008; Dupere et al., 2010). Adults living in more disadvantaged neighborhoods are more likely to be exposed to stressors, such as noise, pollution, crime, and disorder, all of which appear to be harmful to emotional health (Hill, Ross, & Angel, 2005). In addition, less advantaged neighborhoods have fewer infrastructures, which may impede parents’ opportunities to access and provide literature resources for children (Neuman & Celano, 2001). These detrimental effects for parents, in turn, impact children’s outcomes (e.g., Klebanov et al., 1997; Kohen et al., 2008). Kohen et al. (2008) suggested that neighborhood SES may predict key components of the family variables, such as parental mental health and parenting behaviors, in a similar manner to that in which family SES influences more proximal home environments. They found that even though there was no direct association between neighborhood SES and children’s verbal ability and behavior problems, there were indirect effects between neighborhood SES and the child outcomes through maternal depression and parenting styles after controlling for family SES (Kohen et al., 2008). It is, therefore, suggested that both neighborhood structures and family factors should be considered simultaneously as important contributors in the process of how neighborhoods influence children’s outcomes. In the current study, it is expected that neighborhood disadvantage predicts learning environment at home and parental depression, which in turn, would be associated with children’s school readiness.
1.1.4. Child-care and Children’s School Readiness

Besides the home and neighborhood, a setting that serves as an important context directly involving children in their early years is out-of-home child-care (Bronfenbrenner, 1976). As a result of the majority of children spending some part of their lives in non-parental child care (Burchinal, Peisner-Feinberg, et al., 2000), child-care quality has been a concern to parents, researchers, and policy makers because preschoolers need enriched and stimulating learning environments to enhance their social, emotional and cognitive development (e.g., Belfield, Nores, Barnett, & Schweinhart, 2006; Buyse, Verschueren, & Doumen, 2011). In response to the necessity of improving child-care quality, a number of experimental (e.g., Belfield et al., 2006; Reynolds, Temple, White, Ou, & Robertson, 2011; Schweinhart & Weikart, 1981) and non-experimental studies (e.g., Early et al., 2007; Peisner-Feinberg et al., 2001) have attempted to understand the effects of child-care quality on a range of children’s developmental outcomes. For example, the High/Scope Perry Preschool Project (PPP) is one of the well-established early childhood experimental studies that provided high quality child-care for high-risk African-American children (Schweinhart & Weikart, 1981). The PPP provided a small teacher to child ratio (1:6) and an extensive curriculum that was designed to stimulate children’s intellectual and social development. Compared to the children in the control group, participants who were in the high quality program group had greater commitment to school, higher academic motivation and achievement, and less delinquent behaviors at age 15 (Schweinhart & Weikart, 1981). They also demonstrated higher rates of high-school
graduation and employment, fewer crimes, and higher income at age 40 (Belfield et al., 2006).

Extensive non-experimental research also has demonstrated that there are consistent direct effects of child-care quality on children’s cognitive development, especially for literacy and language development (e.g., Burchinal, Roberts, Riggins, et al., 2000; NICHD Early Child Care Research Network, 2002a). To a lesser extent, links have been found between the quality of child-care and children’s social-emotional development (e.g., Curby et al., 2009; Gallagher & Lamber, 2006). For example, Peisner-Feinberg et al. (2001) found that global child-care quality was strongly associated with children’s literacy skills and was associated with children’s math skills and problem behaviors with smaller effect sizes. A meta-analysis of studies on child-care quality and a variety of child outcomes using data from 20 large-scale studies of early childhood settings (Burchinal, Kainz, & Cai, 2011) found that on average, child-care quality had .081 of partial correlation with preschool-aged children’s overall developmental outcomes. Specifically, the partial correlation was .085 for children’s academic and cognitive development, .122 for their language development, and .051 for their social development. Surprisingly, the effects of child-care quality in large-scale studies on overall child outcomes did not reach the modest level effect. For children’s social outcomes, the effect size was even smaller than those of other outcomes.

**Quality Rating and Improvement Systems.** Driven by the importance of high quality of early care and education for children, federal and local governments have
developed several strategies to integrate early child-care structural quality indicators (e.g., teacher-to-child ratio, group size, and teachers’ professional characteristics such as education, qualifications and training) and to promote access to higher levels of child-care through state level licensing and national accreditation (National Association for the Education of Young Children, 2005). A number of states launched Quality Rating and Improvement Systems (QRIS) (a) to improve child-care quality through providing incentives/resources and coaching for child-care practitioners, (b) to provide transparent information to consumers (e.g., parents) regarding quality of child-care, and (c) to facilitate children’s developmental outcomes (Zellman & Perlman, 2008). The first QRIS was implemented in Oklahoma in 1998 and as of 2010, more than half of states in the U.S. had initiated some form of statewide government-funded QRISs (Zaslow & Tout, 2010). QRISs are completely voluntary for child-care programs in most states, while in some states, the QRISs assign the lowest rating level to all licensed programs and programs can voluntarily decide to attain higher ratings (Swenson-Klatt & Tout, 2011). According to the QRIS logic model (Zellman & Perlman, 2008), once the rating system is developed and disseminated across the state, parents are expected to learn about ratings and to use ratings in selecting higher quality programs for their children. The rationale is that if sufficient high-quality choices are available for parents, parents would be less likely to select low-quality programs. In this process, because programs would want to be a top choice of parents, programs are anticipated to apply to the voluntary systems to achieve a quality rating, and to improve program quality. As a result, low-quality programs or programs without ratings might be undersubscribed and eventually have to
close. In this process, the system supports participating programs in their efforts to improve quality by providing incentives and staff development trainings (Child Trends, 2010).

Although QRIS is a growing interest for early childhood research, to date there are a limited number of studies that have found any impact of these efforts on child outcomes. In addition, those studies that examined the relationships between QRIS and child outcomes have not found strong relationships (Zellman, Perlman, Le, & Setodji, 2008). The study of Colorado’s QRIS found a few associations between individual QRIS components and children’s cognitive and social outcomes; however, the overall ratings did not significantly predict child outcomes (Zellman et al., 2008). In a study of Missouri’s QRIS, researchers found that children in higher quality programs had increased social and emotional skills, and children in poverty attending higher quality programs made significant progress in literacy skills and social-emotional development; however, the effects were not strong (Thornburg et al., 2011). Given this gap between research and practice in QRIS, in the current study, I investigated the effectiveness of a QRIS that covers five components of structural quality: ratios and group size, staff education and qualification, specialized training, administrative practices, and early learning. In previous child-care studies, these quality benchmarks have been found to have positive associations with a range of child outcomes (e.g., Bogard, Traylor, & Takanishi, 2008; Early et al., 2006; Howes, 1997; Howes, Whitebook, & Phillips, 1992). For example, children in smaller group sizes with lower teacher-to-child ratios had better cognitive and social skills as a result of appropriate caregiving and creating a secure
environment (Howes, 1997). In addition, children with teachers who had at least an 
Associate of Arts degree and who had Child Development Associate (CDA) certificates 
were more ready to enter school (Early et al., 2006; Torquati, Raikes, & Huddleston-
Casas, 2007) and teachers with higher numbers of training hours were predictive of 
Further, children in more organized classrooms with specific early learning curriculum 
had better social skills and behaviors in classroom through clear cues from teachers 
(Mashburn et al., 2008).

**Moderating effects of child-care quality.** Although research studies have 
indicated that higher levels of child-care quality predict better school readiness in 
children, the influence of child-care quality may vary depending on a child’s background 
(Burchinal, Peisner-Feinberg, et al., 2000; NICHD Early Child Care Research Network, 
2002b). Of particular interest for researchers is whether or not experiences in high-quality 
child care can help close the gap between children at risk of school failure and those who 
are functioning at age level (Rimm-Kaufman et al., 2009). In the literature, it has been 
hypothesized that high quality child-care will buffer negative influences of family risks 
such as poverty, maternal depression, a lack of learning materials, or minority status (e.g., 
NICHD Early Child Care Research Network, 2000, 2002b; Votruba-Drzal et al., 2004). 
However, there are mixed results for this hypothesis. Some studies have demonstrated 
that high quality child-care is linked more strongly to child outcomes for black or 
Hispanic children than for white, non-Hispanic children (Burchinal, Peisner-Feinberg, et
al., 2000; Burchinal, Ramey, Reid, & Jaccard, 1995), for children from low-income families than those from middle-class families (e.g., Caughy, DiPietro, & Strobino, 1994; Vandell et al., 2010), for children with single mothers than for those with married parents (e.g., NICHD Early Child Care Research Network, 2002b), for children from lesser cognitively stimulating homes than for those from the enriched home learning environments (e.g., Bryant, Burchinal, Lau, & Sparling, 1994; Votruba-Drzal et al., 2004), or for children with less educated mothers than for those with more educated mothers (e.g., Lee, 2010; Peisner-Feinberg et al., 2001). For example, Votruba-Drzal et al. (2004) found that higher quality child-care buffered the negative effect of a lack of cognitive stimulation at home on children’s literacy skills. In addition, children in high quality child-care had fewer behavioral problems as home cognitive stimulation was more enriched, whereas even children from better home environments had more behavioral problems when enrolled in low quality child-care. Romano, Kohen, and Findlay (2010) found that although there was no relationship between child-care quality and children’s aggression and internalizing problems for middle-class children, behavioral problems for children from low-income families were significantly decreased as child-care quality increased.

In studies of the moderating effects of child-care quality, however, it should be noted that the effect sizes of interactions between child-care quality and family risks in most studies were small to modest (e.g., Love et al., 2003; Romano et al., 2010) and there has also been a large portion of studies that did not find moderating effects of child-care quality on the associations between family risks, such as income, maternal education, and
race, and children’s achievement and social-emotional problems (NICHD Early Child Care Research Network, 2000; Zhai, Brooks-Gunn, & Waldfogel, 2010), indicating that child-care quality equally predicted children’s outcomes regardless of home environments (Burchinal & Cryer, 2003; NICHD Early Child Care Research Network, 2000). For example, NICHD Early Child Care Research Network (2000) found that the overall quality of child-care was consistently related to children’s cognitive skills and language-related school readiness at preschool age; however, they did not find any evidence that child-care quality to child outcomes varied as a function of family income, quality of home environment, or ethnic group. Burchinal and Cryer (2003) created a composite score of various observational quality measures. The higher composite score predicted children’s better receptive language, reading skills, prosocial behaviors, and behavior problems. In addition, the correlations between the quality of child-care and child outcomes were stronger for African-American and Hispanic children than for white children. However, interactions between ethnicity and child-care quality were non-significant in the subsequent analyses. Bryant et al. (1994) examined the relationships between a measure of global quality in Head Start classrooms and child outcomes including language development and adaptive social behaviors. The results indicated that children in higher quality classrooms achieved better scores on pre-academic skills, regardless of the quality at home. However, children from better home environments seemed to benefit more from classroom quality in the area of problem solving and reasoning than did children from less stimulating homes (Bryant et al., 1994). Burchinal, Peisner-Feinberg, et al. (2000) tested the associations between child-care quality and
children’s social and cognitive development from different poverty levels and ethnic groups. Even though there were direct effects of global child-care quality on children’s vocabulary, reading, and math skills and behavior problems, for the moderating effect of child-care quality, they only found an interaction between ethnicity and child-care quality for language development.

1.2. The Present Study

As presented in the review, children’s development occurs within the multiple environments in which they live, so that children’s school readiness cannot be studied without a simultaneous consideration of the multiple ecological systems. However, a limited number of studies have simultaneously investigated the effects of family, neighborhood, and child care environments on child outcomes. First, there are a number of studies emphasizing the negative effects of family disadvantage on young children’s development (e.g., Brooks-Gunn & Duncan, 1997); however, the studies examining the importance of external contexts other than home are comparatively scarce. Specifically, the studies conceptualizing neighborhood effects have mostly focused on children and adolescents together (e.g., Brooks-Gunn, Duncan, Klebanov, & Sealand, 1993; Leventhal & Brooks-Gunn, 2000; Sampson, Morenoff, & Gannon-Rowley, 2002; Wilson, 1987). However, it is expected that neighborhood mechanisms work differently for younger children and adolescents because they have different exposure to extrafamilial influences (Duncan, Brooks-Gunn, & Klebanov, 1994). As mentioned previously, the neighborhood
context may more indirectly predict preschoolers’ developmental outcomes via home contexts rather than directly affecting children’s development.

Given these research gaps, this study models both direct and indirect effects of family and neighborhood disadvantage on preschool-aged children’s school readiness through two mediators: cognitive stimulation and parental depression. The pathway from family/neighborhood disadvantage to child outcomes through cognitive stimulation can be viewed as the investment perspective, and another pathway from family/neighborhood disadvantage to child outcomes through parental depression can be considered as the family process perspective (Guo & Harris, 2000; Yeung, Linver, & Brooks–Gunn, 2002). The investment perspective emphasizes the detrimental effects on children’s development in families with socioeconomic home and neighborhood risks as a result of a lack of energy, time, and financial resources to invest in cognitive stimulating learning environments at home. On the other hand, the family process perspective in the current study is an expansion of the family stress model (Conger, Ge, Elder, Lorenz, & Simons, 1994), which emphasizes the negative effects of parental distress or depression that were predicted from economic burden on children or adolescents’ developmental abilities. In the current study, families’ cumulative socioeconomic risk factors are used to examine the family process perspective rather than just using household income. Even though there are a few studies that examined the investment perspective and the family process perspective in a context of family (Yeung et al., 2002) or neighborhood (Kohen et al., 2008), there is a lack of studies that simultaneously considered the effects of family and
neighborhood socioeconomic disadvantages on child outcomes via these two mediating mechanisms.

Next, despite the growing popularity of QRIS, there are only a few studies that examined the effects of QRIS on child outcomes. To provide more accurate information to consumers and to improve the features of the system, it is necessary to understand relationships between QRIS and child outcomes. In addition, there is no research that examined the effects of QRIS on child outcomes with considerations of family and neighborhood effects together. Therefore, in this study, the direct effects of a QRIS on children’s developmental outcomes after controlling for family and neighborhood disadvantage and home environments are examined. In addition to the direct effect of child-care quality on child outcomes, the role of child-care context in compensating for family and neighborhood risks in relation to children’s school readiness has been of great interest in the child-care literature (e.g., Burchinal, Peisner-Feinberg, et al., 2000; Howes et al., 2008). There was an agreement on the importance of child-care quality on children’s better developmental outcomes, especially for children from greater environmental risks. However, effect sizes were varied across what quality measures were used and what aspects of children’s developmental outcomes were selected. In addition, there were mixed results on the moderating effects of child-care quality for more developmentally vulnerable children. More efforts are needed to clarify key components of child-care quality that are related to child outcomes and that allow children to overcome family and neighborhood disadvantages surrounding them. It is particularly important to understand the moderating effect of QRISs because QRISs are
not specifically designed for vulnerable families and children; rather these initiatives target all child-care programs and all children regardless of their poverty status. If child-care quality is more strongly related to school readiness for children at greater risk than for other children, it is necessary to consider how the system can provide greater benefit to vulnerable children and how the system can be more available in disadvantaged areas.

Taken together, existing work will be extended by simultaneously examining family, neighborhood, and child-care environments as contributors to children’s cognitive and social-emotional competence using multi-informants, including direct assessments and parent-report. Five research questions are addressed and Figure 1 shows each hypothesized path.

Research question 1: To what extent do family and neighborhood socioeconomic disadvantage relate to children’s school readiness? It is hypothesized that children in more disadvantaged family and neighborhood environments are more likely to exhibit low levels of cognitive skills and social-emotional problems (H1).

Research question 2: Are there indirect effects of family and neighborhood disadvantage on children’s developmental outcomes through the home learning environment? It is expected that parents in more disadvantaged families and neighborhoods are less likely to provide cognitive stimulation at home and more likely to exhibit depressive symptoms, which in turn, will predict low levels of children’s cognitive skills and more likelihood of having social-emotional problems (H2).
Research question 3: To what extent does the structural quality of child-care contribute to children’s school readiness? It is predicted that children in QRIS-participating programs or the highest rated QRIS-participating programs will demonstrate better cognitive and social-emotional outcomes than those in non-participating programs or in lower QRIS rating levels after controlling for family and neighborhood disadvantage and home environments (H3).

Research question 4: To what extent does child-care quality serve as a moderator of the relation between at risk environments in the home and neighborhood and children’s development? It is expected that high-quality child-care (i.e., QRIS-participating programs or the highest rating level of QRIS programs) will be more strongly predictive of cognitive and social-emotional developmental outcomes for children in socioeconomically at risk environments (H4).

Research question 5: Does child-care quality moderate the indirect effects of family and neighborhood risk factors on child outcomes through home environments? It is hypothesized that high-quality child-care will buffer negative indirect effects of family and neighborhood disadvantage on children’s cognitive and social-emotional functioning through cognitive stimulation at home and parental depression (H5).
Between-program (Child-care level)

Within-program (Child level)

Figure 1. Conceptual Model.

Note. Each path is labeled with the corresponding hypothesis. H1 indicates direct effects; H2 indicates indirect effects; H3 indicates direct effects; H4 indicates conditional direct effects; and H5 indicates conditional indirect effects. One representative path was shown for H4 and H5.
Chapter 2: Methods

2.1. Overview of Design

2.1.1. Procedure

The data used in the current study is from a larger study conducted in 2010-2011 that evaluated the effectiveness of a Quality Rating and Improvement System. A total of 48 full-time center-based early child-care and education programs were randomly selected from a list of all licensed child-care programs in a Midwestern state. Twelve programs were randomly selected from each of the three quality levels in the QRIS and from state-licensed programs that did not participate in the QRIS. In each program, two preschool classroom teachers were randomly selected to take part in the study, and from those teacher’s classrooms, five children were selected for inclusion in the study. After administrators confirmed participation in the study, each program received a study packet including consent forms, questionnaires for administrators, teachers and parents, and return envelopes. A $500 incentive for study participation was provided for each child-care program. Participating teachers received a $50 incentive when they completed a teachers questionnaire and an observational assessment (Social Skills Improvement System; Gresham & Elliott, 2008) on five study participating children in their classrooms. Additionally, trained research assistants conducted classroom observations and direct
assessments of children’s behavioral self-regulation, literacy and math skills. In total, 446 children were assessed by a QRIS research team. For the current study, 10 children were dropped from the sample of 446 assessed children because their parents did not return a parent questionnaire, which included demographics and home environment information, after their child was assessed (n = 436).

2.1.2. Analytic Sample

In the present study, the QRIS parent/child dataset was linked to 2006 – 2010 American Community Survey 5-year estimates data at the census tract level to characterize the neighborhood environments. Census tracts are generally considered to be demographically homogeneous and tract boundaries contain from 1,500 to 8,000 residents (U.S. Census Bureau, 2000). Children’s census tracts were identified via their addresses. Of the 1088 census tracts in the Ohio area, study participating children came from 354 different census tracts. Among 436 children in the QRIS dataset, 15 children were dropped: 12 of children’s addresses were missing and there were 3 sibling pairs who had the same addresses. Therefore, 421 children were included in the analytic sample. A total of 107 children were from the 12 QRIS non-rated programs (25.5%), 101 were from the 12 lowest-rated (i.e. level 1) programs (24.0%), 112 were from the 12 middle-rated (i.e. level 2) programs (26.4%), and 101 were from the 12 highest-rated (i.e. level 3) programs (24.1%). Comparisons of children in the analytic sample (n = 421) to the broader sample of the QRIS study (n = 436) revealed no significant difference in
children’s age, gender, race/ethnicity, household income, parental educational attainment and marital status.

2.1.2. Weighting Methodology

Weighting the sample of child-care programs was required because even though the same number of programs was randomly selected from each level (i.e., unrated, step 1, step 2, or step 3), the number of programs in the population were unevenly distributed across QRIS status. In this case, parameter estimates can be biased due to unequal selection probabilities (Stapleton, 2002). Probability weights can also strengthen the ability to generalize findings to the larger population of all preschool-aged children registered in QRIS-participating full-time child care centers in a state.

First, the QRIS research team identified all full-time state licensed centers having more than 30 preschool-aged children (at least two classrooms). This yielded a total of 1537 child-care centers in the state. The distribution of total number of programs in each stratum is described in row (1) in Table 1. Row (2) provides the percentage these programs are of all child-care centers in the state. The distribution of programs in the sample in each stratum was given in row (3). Again, row (4) provides the percentage these programs are of all 48 centers in the sample. Because programs were evenly selected, all cells had 25 percent for this row. Finally, I divided the percentages of all programs in each level (row 2) by the percentages of programs in this sample in the same level (row 4) to see whether this sample contains a larger or a smaller percentage of programs in a level than the percentage for all programs. When the weight is greater than
one, the percentage of programs in the sample is smaller than the percentage in the level based on all programs. In other words, when the percentage of sample programs is greater than the percentage in the level based on all programs, the weight is smaller than one. As shown in Table 1, the weight becomes smaller as the QRIS level is increased because there are fewer high-quality rated preschool programs in Ohio. Weighting can adjust for the differences in the distribution of programs across the QRIS levels and I expect that by employing weighting, the findings in the current study can be generalized to all full-time QRIS-registered early child-care centers in the state that have more than two classrooms.

<table>
<thead>
<tr>
<th></th>
<th>Unrated</th>
<th>Star 1</th>
<th>Star 2</th>
<th>Star 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Total</td>
<td>899</td>
<td>269</td>
<td>229</td>
<td>140</td>
<td>1537</td>
</tr>
<tr>
<td>(2) % of all centers</td>
<td>58.49</td>
<td>17.50</td>
<td>14.90</td>
<td>9.12</td>
<td>100</td>
</tr>
<tr>
<td>(3) Sample</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>48</td>
</tr>
<tr>
<td>(4) % of centers in sample</td>
<td>25.00</td>
<td>25.00</td>
<td>25.00</td>
<td>25.00</td>
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</tr>
<tr>
<td>(5) Weight: (2)/(4)</td>
<td>2.34</td>
<td>0.70</td>
<td>0.60</td>
<td>0.36</td>
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</tr>
</tbody>
</table>

Table 1. Weighting Methodology

2.1.3. Participants

Weighted demographic characteristics of the analytic sample are described in Table 2. Children’s mean age was 55.3 months with a 6.4 standard deviation (SD) and approximately half of children were girls (46.8%). More than half of children were White, non-Hispanic (61.9%), 20.9% of children were Black, non-Hispanic, 7.2% were Hispanic,
and 10.6% were other race including multi-racial, American Indian or Alaska Native, Asian, and Native Hawaiian or Pacific Islander. The average annual household income was from $50,001 to $75,000. There were 32.4% of parents who had less than $30,000 of annual household income and 57.5% of parents had at least a high school degree. Additionally, 38.0% of respondents were single, separated, divorced, or widowed. The rest of parents were married or cohabiting. The relationship of the parent questionnaire respondents with the participating children was primarily mothers (88.89%), 8.8% were fathers, 2.08% were grandparents, and one respondent was legal guardians (0.23%). Table 2 also describes teacher and child-care program characteristics.
<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>Total</th>
<th>Unrated M (SD) / %</th>
<th>Rated t / χ²</th>
<th>N</th>
<th>Total</th>
<th>Step1,2 M (SD) / %</th>
<th>Step 3 t / χ²</th>
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<tr>
<td>Age (in months)</td>
<td>421</td>
<td>55.26</td>
<td>56.63 (6.43)</td>
<td>54.92 (6.67)</td>
<td>2.38*</td>
<td>313</td>
<td>54.92 (6.67)</td>
<td>-.32</td>
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<tr>
<td>Sex (1 = girl)</td>
<td>417</td>
<td>46.76</td>
<td>46.73 (5.50)</td>
<td>46.77 (6.50)</td>
<td>.00</td>
<td>310</td>
<td>46.77 (5.50)</td>
<td>1.34</td>
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<tr>
<td>White, non-Hispanic</td>
<td></td>
<td>61.93</td>
<td>56.60 (6.73)</td>
<td>63.02 (6.92)</td>
<td>11.37**</td>
<td>311</td>
<td>63.02 (6.92)</td>
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<td>Black, non-Hispanic</td>
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<td>20.86</td>
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<td>7.19</td>
<td>8.49 (6.75)</td>
<td>6.75 (6.75)</td>
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<tr>
<td>Other race</td>
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<td>10.55</td>
<td>4.72 (6.72)</td>
<td>12.54 (6.88)</td>
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<td><strong>Home Characteristics</strong></td>
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<td>Median Household income</td>
<td>398</td>
<td>$50,001 - $75,000</td>
<td>310</td>
<td>$50,001 - $75,000</td>
<td>$40,001 - $75,000</td>
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<td>Income (1 = less than $30,000)</td>
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<td>32.41</td>
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<td>31.67 (31.67)</td>
<td>.31</td>
<td>300</td>
<td>31.67 (31.67)</td>
<td>6.09*</td>
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<td>Educational attainment (1 = An AA degree)</td>
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<td>57.45</td>
<td>50.48 (59.81)</td>
<td>59.81 (2.80)</td>
<td>311</td>
<td>59.81 (2.80)</td>
<td>54.76 (70.30)</td>
<td>6.85**</td>
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<td>Marital Status (1 = single)</td>
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<td>37.95</td>
<td>39.25 (37.50)</td>
<td>37.50 (37.50)</td>
<td>.10</td>
<td>312</td>
<td>37.50 (37.50)</td>
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Table 2. Demographics across QRIS status
Table 2 Continued

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<th>Rated M (SD)</th>
<th>t / χ²</th>
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<th>Rated M (SD)</th>
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<td><strong>Neighborhood Characteristic</strong></td>
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<td>Concentrated disadvantage</td>
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<td>0.00 (.83)</td>
<td>.14 (1.00)</td>
<td>-.05</td>
<td>2.12*</td>
<td>313</td>
<td>-.05</td>
<td>.03</td>
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<td><strong>Teacher Characteristics</strong></td>
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<td>AA degree</td>
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<td>76.77</td>
<td>66.67</td>
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<td>Majored in ECE</td>
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<td>61.52</td>
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<td>3.17†</td>
<td>69</td>
<td>66.67</td>
<td>59.09</td>
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<td>Having a CDA</td>
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<td>14.61</td>
<td>13.64</td>
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<td>14.93</td>
<td>14.81</td>
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<td>Experience in ECE (years)</td>
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<td>10.47</td>
<td>9.68</td>
<td>11.47</td>
<td>1.01</td>
<td>75</td>
<td>11.47 (.94)</td>
<td>10.82</td>
<td>13.56</td>
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<tr>
<td><strong>Center Characteristics</strong></td>
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<tr>
<td>Teacher-Child Ratio</td>
<td>41</td>
<td>6.74 (.37)</td>
<td>6.57 (.35)</td>
<td>7.30</td>
<td>-.83</td>
<td>32</td>
<td>6.57 (.35)</td>
<td>6.70 (.44)</td>
<td>6.13</td>
<td>-.68</td>
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<tr>
<td>Percent of subsidy</td>
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<td>44.79</td>
<td>46.88</td>
<td>37.84</td>
<td>.70</td>
<td>32</td>
<td>46.88</td>
<td>53.50</td>
<td>24.52</td>
<td>-2.29*</td>
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<tr>
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<td>44.44</td>
<td>48.68</td>
<td>30.43</td>
<td>2.38</td>
<td>35</td>
<td>48.68</td>
<td>24.49</td>
<td>92.59</td>
<td>32.32**</td>
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<td>Head Start program</td>
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<td>0</td>
<td>19.23</td>
<td>5.63*</td>
<td>35</td>
<td>19.23</td>
<td>19.61</td>
<td>18.52</td>
<td>.01</td>
</tr>
</tbody>
</table>

*Note.* All analyses were weighted. AA = Associate of Arts; CDA = Child Development Associate; ECE = Early Childhood Education.

† \( p < .10 \); * \( p < .05 \); ** \( p < .01 \).
2.2. Measures

2.2.1. Children’s School Readiness

**Cognitive skills.** Trained research assistants directly measured children’s literacy and mathematical skills as representations of children’s cognitive skills using three direct assessments: the Peabody Picture Vocabulary Test Third Edition (PPVT-III, Dunn & Dunn, 1997); the Phonological Awareness Literacy Screening Pre-Kindergarten (PALS-PreK, Invernizzi, Sullivan, Meier, & Swank, 2004); and a subtest from the Woodcock-Johnson Test of Achievement III (WJ-III, Woodcock, McGraw, & Mather, 2001). The *PPVT–III* measures children’s receptive vocabulary, which represents verbal ability (Dunn & Dunn, 1997). This is a norm-referenced test that reflects each child’s performance relative to the expected performance of children in the population who are the same age, converting raw scores into standardized scores. The *PALS-PreK* is a measure of preschooler’s early phonological awareness and literacy skills that are predictive of future reading success (Invernizzi et al., 2004). Six subtests from this measure were tested: alphabet recognition (upper- and lower-case knowledge), letter sounds recognition, beginning sound awareness, print and word awareness, and rhyme awareness. Because subtests were developed in sequence and are mutually related, a single variable was created to represent children’s phonological awareness by summing six subtests (Cronbach’s α = .85 in the present sample). To measure children’s mathematical abilities, a subtest, Applied Problems, from the *WJ-III* (Woodcock et al., 2001) was used. The Applied Problems subtest scores on the ability to analyze and solve math problems. Children are asked to solve practical problems through deciding
mathematical operation to be used, and conducting simple calculations. The WJ-III provides an age-standardized score for each raw score.

**Social-emotional competence.** Children’s social and emotional competence was measured using parents’ reports on *Ages and Stages: Social-Emotional* (Squires, Bricker, & Twombly, 2002). The ASQ: SE is a child-monitoring system for social and emotional behaviors that was developed to identify a child who needs referral consideration (Squires et al., 2002). Parents responded to 35 questions on a 3-point scale regarding how frequently the children exhibit certain problems in behaviors (*10 = most of the times, 5 = sometimes, and 0 = rarely or never*). The ASQ: SE items represent seven behavioral areas: self-regulation, compliance, communication, adaptive functioning, autonomy, affect, and interaction with people. The sum of 35 items was calculated (*\( M = 38.3, SD = 26.8, range = 0 – 140 \)*) to make higher scores represent higher levels of problems in social-emotional competence. However, the continuous score was not considered in the analysis because it did not reflect normal distribution (i.e., right-skewed with a floor effect, skewness = 1.41, kurtosis = 5.11). Non-normality is frequently found in a scale measuring behavioral problems because there are more children who do not have behavioral programs in the general population (Squires et al., 2002). As suggested by Squires et al. (2002), a cutoff score was, therefore, calculated to transform into a binary variable (*1 = having social-emotional problems, 0 = not having social-emotional problems*) using the semi-interquartile range (i.e., median + [quartile 3 – quartile1] / 2). The cutoff score in this study was 45. There were 118 children (28.8%) in a having social-emotional problems
(i.e., recommended referral consideration) category and 293 children (71.3%) in a not having social-emotional problems category.

2.2.2. Independent Variables

**Family socioeconomic risk.** Family SES was measured by counting the number of family socioeconomic risks as reported by parents. Three indicators were singled out as an index: single parent status (dummy coded as 1 = single, separated, divorced or widowed and 0 = married or cohabitating), parents’ educational level (dummy coded as 1 = less than an Associate of Arts (AA) degree and 0 = at least an AA degree), and family income (dummy coded as 1 = annual income less than $30,000 and 0 = more than $30,001). The Cronbach’s α for three indicators in the current study was .77.

**Neighborhood disadvantage.** Following previous work (Sampson et al., 2002), five characteristics of census tracts representing concentrated disadvantage were extracted from the U.S. Census Bureau data: the percentage below the poverty line, the unemployment ratio, the percentage of female-headed households with children, the percentage of people receiving public assistance, and the percentage of African-Americans (e.g., Browning & Cagney, 2002; Burchinal, Nelson, et al., 2008; Sampson et al., 2002). In addition, the percentage of people receiving food stamps was newly added in this study (Cronbach’s α for 6 indicators = .75). Because this scale was established using 1990 U.S Census data, confirmatory factor analysis was conducted to verify the single factor structure. Indicators were standardized and averaged to represent a measure of neighborhood disadvantage.
**Home environments.** The quality of cognitive stimulation at home and parental depression were measured by parents’ responses to questions about home environments. First, a degree of *cognitive stimulation* was measured by the Home Observation of the Environment-Short Form (HOME-SF), which was adapted from the National Longitudinal Survey of Youth (NLSY) child survey (Center for Human Resources Research, 1993). The original observation of the HOME inventory was developed by Caldwell and Bradley (1984). Among several age-specific versions, the preschool form, which was developed for children from three- to five-years old, was used in the current study. The HOME-SF measures the quality of the home learning environment, that is, how well parents stimulate cognitive development by 10 items asking about literacy environments for a child. Sample items include “About how often do you read stories to your child?” and “About how many children’s books does your child have?” The items were recoded into 0 if the child does not receive stimulations from the parent or 1 if the parent provides cognitive stimulation to the child. Ten items were summed to represent a total score of home cognitive stimulation (Cronbach’s $\alpha = .54$). Second, the short form of Center for Epidemiological Study of Depression Scale (CES-D, Radloff, 1977) was used to measure *parents depressive symptoms*. Parents responded to a total of nine items describing the feelings that they had during the past week, using a 4-point scale ($1 = Rarely or none of the time (less than 1 day), 2 = Some or a little of the time (1-2 days), 3 = Occasionally or a moderate amount of time (3-4 days), 4 = Most or all of the time (5-7 days)$). For example, the question that “You did not feel like eating; your appetite was
poor.” was asked. Nine items were summed to a single score of depression with higher scores representing more depression (Cronbach’s $\alpha = .76$).

**Child-care quality.** QRIS status was used to represent the structural quality of child-care programs. The QRIS that was employed in this study had three quality levels above state licensing standards (step 1, step 2, or step 3). A high rating represents higher quality programs: fewer children per classroom; additional requirement for teacher qualification (e.g., educational attainment or major in early childhood education) and specialized training for teachers; a more comprehensive early education curriculum and assessments for children; and increased workforce professionalization and stabilization efforts. Since the sample in this study was drawn from both QRIS-participating programs and non-participating programs, two separate binary variables were created to represent QRIS status: QRIS participation (dummy coded as 1 = *QRIS-participating programs* and 0 = *non-participating programs*) and QRIS level using a sub-sample of children in QRIS-participating programs (dummy coded as 1 = *the highest step 3 programs* and 0 = *the lower step 1 or 2 programs*)

**Control variables.** Several child characteristics that have been reported as having a relationship with home environments or child outcomes (e.g., Dumas et al., 2005; Griffin & Morrison, 1997; Payne, Whitehurst, & Angell, 1994) were used as covariates in the hypothesized model. Child age, gender (dummy coded as 1 = *girls* and 0 = *boys*), and race/ethnicity (dummy coded into three dichotomous variables, White, non-Hispanic (reference category); *Black, non-Hispanic; Hispanic;* and *other race*) were included as covariates.
2.3. Data Analytic Strategy

2.3.1. Preliminary Analysis

Simple t-tests and chi-square tests\(^1\) were conducted to examine the children and family demographic characteristics across QRIS status in order to account for the issue of selection bias. First, demographic characteristics of children in QRIS-participating programs and QRIS non-participating programs were compared. Second, using a subsample of children in QRIS participating programs, children in the highest level of QRIS programs were compared to those who were in the lower level programs.

Confirmatory factor analyses (CFA) were conducted in Mplus 7.0 (Muthén & Muthén, 2012) to confirm whether or not indicators of family socioeconomic risk\(^2\) and neighborhood disadvantage load on each single factor. To reduce subjectivity of interpretation on factors, indicators with factor loadings greater than .40 on a factor were considered ‘significant’ and were used to define the family and neighborhood risk indexes (Ford, MacCallum, & Tait, 1986). Additionally, multilevel CFA was conducted to confirm whether or not three assessments measuring children’s cognitive skills can be reduced to a single factor. The measurement model fit for a latent variable, ‘cognitive skills,’ and factor loadings were examined. Multiple criteria of model fit indices were utilized: (1) the p-value of chi-square statistics ($\chi^2$) should be larger than .05; however, a significant $\chi^2$ is still acceptable until other fit indices are considered since the $\chi^2$ is sensitive for the sample size (Bollen, 1989); (2) a comparative fit index (CFI) of .90 or

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\(^1\) In analyses of associations with categorical variables, chi-square tests were employed, and for analysis of differences between group means, independent t tests were conducted.

\(^2\) The Mplus accounted for categorical indicators of family socioeconomic risk.
higher indicates an acceptable model fit; and (3) the root mean square error of approximation (RMSEA) less than .06 indicates an adequate model fit (Browne & Cudeck, 1993).

2.3.2. Multilevel Structural Equation Modeling

In primary analyses, two-level multilevel structural equation modeling (MSEM) was conducted in Mplus 7.0 (Muthén & Muthén, 2012) to simultaneously test research questions as it allows examination of the direct and indirect relationships among observed and latent variables while it controls for nested data structure. Because the data clearly have a multi-level structure, with children (level 1) nested within preschools (level 2), MSEM has an advantage over the traditional structural equation modeling in that it estimates more accurate standard errors and random effects from a clustered design (Preacher, Zyphur, & Zhang, 2010). In addition, Mplus simultaneously estimates a continuous outcome (a latent variable of cognitive skills) and a categorical outcome (an observed variable of social-emotional problems) in a MSEM framework (Muthén & Muthén, 2012). Within-program (level 1) variables included family socioeconomic risk, neighborhood disadvantage, parental depression, cognitive stimulation at home, children’s cognitive skills and social-emotional problems. Between-program (level 2) variables included QRIS status. The maximum likelihood with robust standard error

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3 In the current study, 15.7% of children were nested within neighborhood level. The observations per census tract group were ranged from 1 to 4 with an average of 1.2. However, I conducted two-level MSEM (child-level and child-care level) rather than three-level MSEM, which accounts for neighborhood-level, because there was no significant variation in child outcomes at neighborhood-level. More specific information is provided in Appendix A.
(MLR) estimator was used to adjust non-normality of some indicators and the non-independence of observations due to the nested neighborhood census tracts. In all MSEM analyses, unequal selection probability was adjusted by the sample weight at the between-program level. The model fit was tested through comparing the log-likelihoods for nested models (i.e., null model and alternative model). The log-likelihood ratio test statistics follow a chi-square distribution with the degrees of freedom of difference between the null model and the alternative model. If the null hypothesis of the chi-square test \( H_{null} = \text{the null model is the same with the alternative model, the simpler model is better} \) is rejected with a p-value less than .05, the alternative model (i.e., more complex model including additional paths) was considered as having a better fit than the null model.

Prior to examining the hypothesized models, an unconditional model without predictors was analyzed in order to estimate the variance between child-care programs \((\tau_{00})\) and within programs \((\sigma^2)\). The intraclass correlations (ICC), which measures the variation in child outcomes between child-care programs, were calculated following equation 1 for continuous outcomes (Raudenbush & Bryk, 2002) and equation 2 for a categorical outcome\(^4\) (Snijders & Bosker, 1999).

\(^4\) In the logistic multilevel model, the level-1 variance is expected to be heteroscedastic, therefore, the level-1 variance is not produced in the analysis. However, the level-1 variance is assumed to have a standard logistic distribution with mean of 0 and variance of \(\pi^2/3\), which can be used to calculate ICC (Snijders & Bosker, 1999). Raudenbush and Bryk (2002) argued that the ICC from this index might be less informative due to the heteroscedasticity of the level-1 variance; however, the ICC was calculated in this study to be consistent with a continuous outcome for interpretations.
\[
\text{ICC}_{\text{cognitive}} = \frac{\tau_{00}}{\tau_{00} + \sigma^2} \tag{1}
\]

\[
\text{ICC}_{\text{social-emotional}} = \frac{\tau_{00}}{\tau_{00} + \left(\frac{\pi^2}{3}\right)} \tag{2}
\]

Where \( \tau_{00} \) represents the level 1 variance and \( \sigma^2 \) represents the level 2 variance.

In the mediation model, the following parameters were examined to test hypothesis 1 and 2: (1) the direct effects of family and neighborhood disadvantages on children’s cognitive and social-emotional development after controlling for covariates; (2) the effects of family and neighborhood disadvantage on cognitive stimulation and parental depression after controlling for covariates (path \( a \)); (3) the effects of cognitive stimulation and parental depression on child outcomes after controlling for family and neighborhood disadvantages and covariates (path \( b \)); (4) the indirect effects of family and neighborhood disadvantage on child outcomes through cognitive stimulation and parental depression (path \( a \times \) path \( b \)). This procedure follows recent work on mediation analysis (Hayes, 2009; MacKinnon, 2008), which quantifies the indirect effect rather than following the conservative causal steps of Baron and Kenny (1986). Even though independent variables, mediating variables, and outcome variables are all within-level variables in this model (1-1-1 mediation), MSEM should be considered to account for random effects from the nested data structure (Preacher et al., 2010). The random intercept model was estimated in this analysis following equation 3 – 5 where the \( Y_{ij} \) for the categorical outcome is the log of the odds of having a social-emotional problem.5

5 \( Y_{ij, \text{social-emotional}} = \log\left[p_{ij}/(1-p_{ij})\right] \) where \( p \) is a probability of having social-emotional problems
\[ Y_{ij, \text{cognitive}} = \beta_{oij} + \beta_{ij} \text{ (family risk)} + \beta_{2j} \text{ (neighborhood disadvantage)} + \beta_{3j} \text{ (parental depression)} + \beta_{4j} \text{ (cognitive stimulation)} + \beta_{5j...9j} \text{ (covariates)} + r_{ij} \]  

(3)

\[ Y_{ij, \text{social-emotional}} = \beta_{oij} + \beta_{ij} \text{ (family risk)} + \beta_{2j} \text{ (neighborhood disadvantage)} + \beta_{3j} \text{ (parental depression)} + \beta_{4j} \text{ (cognitive stimulation)} + \beta_{5j...9j} \text{ (covariates)} \]  

(4)

\[ \beta_{oij} = \gamma_{00} + u_{0j} \]  

(5)

\[ \beta_{ij...9j} = \gamma_{10...90} \]

The standardized coefficients for the continuous outcome, cognitive skills, were considered as effect sizes and the odds ratios were interpreted as effect sizes for the categorical outcome, social-emotional problems. An odds ratio of 1 explains no change in the odds of having social-emotional problems; an odds ratio greater than 1 indicates that as one-unit increase in the predictor, the odds of having social-emotional problems increase; and an odds ratio less than 1 indicates that as one-unit increases in the predictor, the odds of having social-emotional problems decrease.

In the moderated mediation model, the direct effects of QRIS status on child outcomes (H3) were first examined after controlling for family and neighborhood disadvantages, parental depression, cognitive stimulation at home and other child-level covariates via the random slope model. Second, conditional direct effects (H4) of family and neighborhood disadvantage on children’s cognitive skills and social-emotional problems across QRIS status were examined (equation 6 – 8). The random slopes from level 1 were regressed on QRIS status at level 2 in order to estimate cross-level interactions.
\[ Y_{ij,\text{cognitive}} = \beta_{0j} + \beta_{1j} (\text{family risk}) + \beta_{2j} (\text{neighborhood disadvantage}) + \beta_{3j} (\text{parental depression}) + \beta_{4j} (\text{cognitive stimulation}) + \beta_{5j...9j} (\text{covariates}) + r_{ij} \]  

(6)

\[ Y_{ij,\text{social-emotional}} = \beta_{0j} + \beta_{1j} (\text{family risk}) + \beta_{2j} (\text{neighborhood disadvantage}) + \beta_{3j} (\text{parental depression}) + \beta_{4j} (\text{cognitive stimulation}) + \beta_{5j...9j} (\text{covariates}) \]  

(7)

\[ \beta_{0j} = \gamma_{00} + \gamma_{01} (\text{QRIS status}) + u_{0j} \]  

(8)

\[ \beta_{1j} = \gamma_{10} + \gamma_{11} (\text{QRIS status}) + u_{1j} \]  

\[ \beta_{2j} = \gamma_{20} + \gamma_{21} (\text{QRIS status}) + u_{2j} \]  

\[ \beta_{3j...9j} = \gamma_{30...90} \]  

where \( \gamma_{110} \) represents the effects of family risk on child outcomes; \( \gamma_{20} \) represents the effects of neighborhood disadvantage on child outcomes; \( \gamma_{01} \) represents the direct effects of child-care quality (QRIS status) on child outcomes; \( \gamma_{11} \) and \( \gamma_{21} \) represent cross-level interactions.

Third, conditional indirect effects (H5) of family risk and neighborhood disadvantage on child outcomes through cognitive stimulation at home and parental depression across QRIS status were examined following equation 9 – 11. The statistical model for the mediated moderation in MSEM is described in Figure 2.

\[ Y_{ij,\text{cognitive}} = \beta_{0j} + \beta_{1j} (\text{family risk}) + \beta_{2j} (\text{neighborhood disadvantage}) + \beta_{3j} (\text{parental depression}) + \beta_{4j} (\text{cognitive stimulation}) + \beta_{5j...9j} (\text{covariates}) + r_{ij} \]  

(9)

\[ Y_{ij,\text{social-emotional}} = \beta_{0j} + \beta_{1j} (\text{family risk}) + \beta_{2j} (\text{neighborhood disadvantage}) + \beta_{3j} (\text{parental depression}) + \beta_{4j} (\text{cognitive stimulation}) + \beta_{5j...9j} (\text{covariates}) \]  

(10)
\[
\begin{align*}
\beta_{0j} &= \gamma_{00} + \gamma_{01} \text{ (QRIS status)} + u_{0j} \\
\beta_{1j} &= \gamma_{10} + \gamma_{11} \text{ (QRIS status)} + u_{1j} \\
\beta_{2j} &= \gamma_{20} + \gamma_{21} \text{ (QRIS status)} + u_{2j} \\
\beta_{3j} &= \gamma_{30} + \gamma_{31} \text{ (QRIS status)} + u_{3j} \\
\beta_{4j} &= \gamma_{40} + \gamma_{41} \text{ (QRIS status)} + u_{4j} \\
\beta_{5j...9j} &= \gamma_{50...90} 
\end{align*}
\]
Figure 2. Mediated Moderation Statistical Model.

*Note.* Independent variables include family and neighborhood risks; mediators include cognitive stimulation and parental depression; dependent variables include cognitive skills and social-emotional problems; and moderators include QRIS participation and QRIS level. Boxes represent fixed effects and circles represent random effects (see equation 1 and 2).

Testing H3 – H5, I first examined the child-care effects in a full-sample to examine the difference between children in QRIS-participating programs and QRIS non-participating programs. Next, I examined a subsample of children from QRIS-participating programs to test the difference between children in the highest rating level of QRIS programs and in the lower quality level of QRIS programs.
2.3.1. Missing Data and Outliers

Missing data was handled in the model using Full Information Maximum Likelihood (FIML) estimation in Mplus. This method is preferred because it offers less biased estimators over other traditional approaches (Acock, 2005) and it allows me to preserve all available data, rather than estimating missing data (Arbuckle, 1996). Of 421 participants, three children (0.7%) did not complete at least one of direct cognitive skills assessments; six parents (1.4%) did not report the measure of children’s social-emotional development; 23 parents (5.5%) did not respond to at least one of family socioeconomic risk indicators (i.e., income, educational attainment, and marital status); 2.4% (n = 10) were missing on at least one of items on home environments (i.e., cognitive stimulation and parental depression); 2.9% (n = 12) were missing on at least one of control variables (i.e., child age, gender, and race/ethnicity). In total, 376 parents completely responded to all items, which were used in the current study (10.5% of missing). Missing was evenly distributed across QRIS status ($\chi^2(3) = 1.42, p = .70$). Participants with at least one missing data and participants with complete data were compared in Table 3. Missing and non-missing were differed by race/ethnicity (Hispanic), household income, marital status, and cognitive stimulation, therefore, the missing was not completely at random.

There was 1 outlier in the vocabulary test, PPVT-III. The outlier was detected through graphical visual inspection and calculating standard deviations away from the mean (the rule of thumb was ±3 SD). The deletion of one outlier yielded a total sample size of 420 in the final analysis.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Missing</th>
<th>Non-missing</th>
<th>$\chi^2 / t$</th>
</tr>
</thead>
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<td><strong>Child Characteristics</strong></td>
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<td></td>
</tr>
<tr>
<td>Age (in months)</td>
<td>56.45 (.99)</td>
<td>55.23 (.33)</td>
<td>1.20</td>
</tr>
<tr>
<td>Sex (1 = girl)</td>
<td>46.34</td>
<td>46.81</td>
<td>0.00</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
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<td></td>
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<tr>
<td>White, non-Hispanic</td>
<td>47.73</td>
<td>62.5</td>
<td>3.61†</td>
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<td>20.45</td>
<td>20.74</td>
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<td>Hispanic</td>
<td>15.91</td>
<td>6.12</td>
<td>5.69**</td>
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<td>Other race</td>
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<td>0.10</td>
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<td>63.64</td>
<td>30.59</td>
<td>10.36***</td>
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<td>Less than an AA degree</td>
<td>58.78</td>
<td>45.00</td>
<td>2.81†</td>
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<td>Single Marital Status</td>
<td>36.17</td>
<td>53.49</td>
<td>4.92*</td>
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<tr>
<td>Cognitive Stimulation</td>
<td>8.13 (.30)</td>
<td>8.83 (.07)</td>
<td>-3.10**</td>
</tr>
<tr>
<td>Parental Depression</td>
<td>3.39 (.80)</td>
<td>3.79 (.20)</td>
<td>0.56</td>
</tr>
</tbody>
</table>

*Note. All analyses were weighted.
† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Table 3. Comparisons of missing and non-missing data
Chapter 4: Results

4.1. Preliminary Analyses

Table 2 provides the results from t-tests and chi-square tests that were conducted to examine the differences in child, family, teachers, and child-care program demographic characteristics across QRIS status. The analyses using the full-sample revealed that children in QRIS-participating programs were older, there were more children in QRIS-participating programs who had minority status, and a higher level of neighborhood disadvantage was demonstrated in QRIS-participating programs. In the subsample of children in QRIS-participating programs, children in the highest QRIS level programs had fewer parents with income less than $30,000, single marital status, and more parents with at least a high school degree. In addition, there was a higher percentage of subsidy children in the lower levels of QRIS-participating programs. Randomly selected teachers’ characteristics did not differ by QRIS status. When comparing the highest QRIS level programs and the lower programs, there was greater percentage of children receiving subsidy in the lower QRIS level programs.

The CFA in preliminary analyses revealed that three indicators of family socioeconomic risk loaded on a single factor with a good model fit ($\chi^2 (3, N=420) = 860.96, p < .01, \text{RMSEA} = .00, \text{CFI} = 1.00$), therefore, a single score summing risk
indicators was calculated. Six indicators of neighborhood disadvantage were also loaded on a single factor with an adequate fit ($\chi^2 (6, N=420) = 21.21, p < .01$, RMSEA = .07, CFI = .99). All six indicators were standardized and averaged to represent a neighborhood concentrated disadvantage. The results from the CFA are displayed in Table 4.

Another CFA in the multilevel framework was conducted to test the measurement model for cognitive outcomes. Three assessments measuring vocabulary, literacy skill, and math ability significantly loaded on a single factor with an excellent model fit ($\chi^2 (3, N=420) = 5.12, p > .05$, RMSEA = .04, CFI = .99). Table 5 shows descriptive statistics for key measures and the measurement model fit for the latent variable, ‘cognitive skills.’
<table>
<thead>
<tr>
<th>Variable</th>
<th>M (SE) / %</th>
<th>Range</th>
<th>n</th>
<th>Factor loadings</th>
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<td>32.41</td>
<td>0-1</td>
<td>398</td>
<td>.99***</td>
</tr>
<tr>
<td>Less than an AA degree</td>
<td>42.55</td>
<td>0-1</td>
<td>416</td>
<td>.75***</td>
</tr>
<tr>
<td>Single marital status</td>
<td>37.95</td>
<td>0-1</td>
<td>419</td>
<td>.79***</td>
</tr>
<tr>
<td>Model fit: (\chi^2) (3, N=420) = 860.96, (p &lt; .01), RMSEA = .00, CFI = 1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Neighborhood Disadvantage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of below the poverty line</td>
<td>11.34</td>
<td>0-65</td>
<td>420</td>
<td>.87***</td>
</tr>
<tr>
<td>Unemployment ratio</td>
<td>6.01</td>
<td>1-22.3</td>
<td>420</td>
<td>.74***</td>
</tr>
<tr>
<td>% of Female-headed households with children</td>
<td>8.26</td>
<td>0-40.9</td>
<td>420</td>
<td>.76***</td>
</tr>
<tr>
<td>% of people receiving public assistance</td>
<td>3.07</td>
<td>0-20</td>
<td>420</td>
<td>.78***</td>
</tr>
<tr>
<td>% of people receiving food stamps</td>
<td>10.62</td>
<td>0-60</td>
<td>420</td>
<td>.96***</td>
</tr>
<tr>
<td>% of African American</td>
<td>20.60</td>
<td>0-100</td>
<td>420</td>
<td>.63***</td>
</tr>
<tr>
<td>Model fit: (\chi^2) (6, N=420) = 21.21, (p &lt; .01), RMSEA = .07, CFI = .99</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*** \(p < .001\)

Table 4. Confirmatory Factor Analyses for Family and Neighborhood Disadvantage Indicators
<table>
<thead>
<tr>
<th>Variable</th>
<th>M (SE) / %</th>
<th>Range</th>
<th>n</th>
<th>Factor loadings</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Socioeconomic Risk</td>
<td>1.31 (.07)</td>
<td>0-4</td>
<td>397</td>
<td>-</td>
<td>.77</td>
</tr>
<tr>
<td>Neighborhood Disadvantage</td>
<td>0.00 (.04)</td>
<td>-.97-3.5</td>
<td>420</td>
<td>-</td>
<td>.91</td>
</tr>
<tr>
<td>Parental depression</td>
<td>3.45 (.20)</td>
<td>0-21</td>
<td>410</td>
<td>-</td>
<td>.76</td>
</tr>
<tr>
<td>Home Cognitive Stimulation</td>
<td>8.73 (.07)</td>
<td>3-10</td>
<td>415</td>
<td>-</td>
<td>.54</td>
</tr>
<tr>
<td>Cognitive skills</td>
<td></td>
<td></td>
<td></td>
<td>.61</td>
<td></td>
</tr>
<tr>
<td>PPVT standardized score: Vocabulary</td>
<td>102.01 (.70)</td>
<td>60-140</td>
<td>418</td>
<td>.54***</td>
<td>-</td>
</tr>
<tr>
<td>PALS sum: Literacy skills</td>
<td>59.01 (1.62)</td>
<td>1-108</td>
<td>420</td>
<td>.65***</td>
<td>.85</td>
</tr>
<tr>
<td>WJ: Math Applied Problems</td>
<td>13.36 (.23)</td>
<td>0-24</td>
<td>419</td>
<td>.88***</td>
<td>-</td>
</tr>
</tbody>
</table>

Measurement model fit: \( \chi^2 (3, N=420) = 5.12, p > .05, \) RMSEA = .04, CFI = .99

Social-emotional competence (1 = having problems)\(^a\)

QRIS participation (1 = participated programs)\(^a\)

QRIS status (1 = level 3)\(^a\)

Note. Descriptive statistics and measurement model fit were weighted. M = mean; SE = weighted standard error; PPVT = Peabody Picture Vocabulary Test III; PALS = Phonological Awareness Literacy Screening; WJ = Woodcock Johnson Test of Achievement III

\(^a\) Percentages were not weighted due to unavailability.

† \( p < .10; * p < .05; ** p < .01; *** p < .001 \)

Table 5. Key Variable Descriptive Statistics and Factor Loadings in Confirmatory Factor Analysis
4.2. Bivariate Correlational Analysis

Bivariate Correlations between each of the key measures were provided in Table 6. QRIS participation was negatively correlated with neighborhood disadvantage and QRIS level was negatively correlated with family risk. Family risk was positively correlated with neighborhood disadvantage, parental depression, and children’s social-emotional problems and negatively correlated with cognitive stimulation and children’s cognitive skills. Neighborhood disadvantage was also positively correlated with parental depression and children’s social-emotional development, and negatively correlated with cognitive stimulation and children’s cognitive ability. Two mediators, parental depression and cognitive stimulation at home, were negatively correlated with each other. The correlation between children’s cognitive skills and social-emotional functioning was significant but modest. The severe multi-collinearity problem was not found in the bivariate correlational analysis.
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. QRIS participation</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1 = participated)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. QRIS level</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1 = step 3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Family Risk</td>
<td>-.04</td>
<td>-.12*</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Neighborhood Risk</td>
<td>-.10*</td>
<td>-.05</td>
<td>.37***</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Parental Depression</td>
<td>-.02</td>
<td>-.03</td>
<td>.28***</td>
<td>.19***</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Cognitive Stimulation</td>
<td>.11*</td>
<td>.18**</td>
<td>-.40***</td>
<td>-.22***</td>
<td>-.14**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Cognitive skills</td>
<td>.07</td>
<td>.25***</td>
<td>-.49***</td>
<td>-.37***</td>
<td>-.13**</td>
<td>.36***</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>8. Social-emotional Problems</td>
<td>-.08</td>
<td>.16***</td>
<td>.16***</td>
<td>.18***</td>
<td>.17***</td>
<td>-.18***</td>
<td>-.25***</td>
<td>-</td>
</tr>
</tbody>
</table>

* p < .05; ** p < .01; *** p < .001

Table 6. Bivariate Correlations between Key Variables in Confirmatory Factor Analysis
4.3. Multilevel Structural Equation Modeling

4.3.1. Unconditional Model

Intraclass correlations (ICC) were computed for children’s cognitive skills and social-emotional problems to determine the proportion of variance attributable to preschool- or child-level variance. ICCs for cognitive skills were first calculated using a latent variable and using each assessment representing cognitive skills. As shown in Table 7, for all of dependent variables, there were considerable variations in the intercepts for the full sample and the subsample. In the full sample, due to preschools, there was 44% of variability in a latent outcome of cognitive skills. More specifically, 34% of variability was in vocabulary ability; 37% of variability was in literacy skills; and 41% of variability was in math ability. In the subsample, 28%, 27%, 36%, and 39% of variability were found due to child-care programs in overall cognitive skills, vocabulary, literacy, and math abilities respectively. In addition, 7% of child-care level variability existed in children’s social-emotional problems in the full sample and 12% of variability from child-care was in the subsample.
<table>
<thead>
<tr>
<th></th>
<th>Cognitive Skills</th>
<th>PPVT Vocabulary</th>
<th>PALS Literacy</th>
<th>WJ Math</th>
<th>Social-emotional Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All programs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child-care level variance</td>
<td>35.92</td>
<td>6.40</td>
<td>16.31</td>
<td>2.60</td>
<td>.23</td>
</tr>
<tr>
<td>Child level variance</td>
<td>46.14</td>
<td>12.48</td>
<td>27.94</td>
<td>3.75</td>
<td>-</td>
</tr>
<tr>
<td>ICC</td>
<td>.44</td>
<td>.34</td>
<td>.37</td>
<td>.41</td>
<td>.07</td>
</tr>
<tr>
<td><strong>QRIS-participating programs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child-care level variance</td>
<td>20.75</td>
<td>4.78</td>
<td>16.08</td>
<td>2.44</td>
<td>.43</td>
</tr>
<tr>
<td>Child level variance</td>
<td>53.04</td>
<td>13.00</td>
<td>28.15</td>
<td>3.84</td>
<td>-</td>
</tr>
<tr>
<td>ICC</td>
<td>.28</td>
<td>.27</td>
<td>.36</td>
<td>.39</td>
<td>.12</td>
</tr>
</tbody>
</table>

*Note. ICC = intraclass correlation. All estimates were weighted at between child-care level. All variances were significant.*

Table 7. Intraclass Correlations for Child Outcomes from Unconditional Models
4.3.2. Mediation Model

The mediation model tested H1 and H2 in MSEM. As shown in Table 8, the model with covariates, child age, gender, and race/ethnicity, fitted the data better than the unconditional model; the direct effect model adding family and neighborhood socioeconomic disadvantage variables fitted the data better than the model only with covariates; and the mediation model fitted the data better than the direct effects model.

<table>
<thead>
<tr>
<th>Model</th>
<th>Log-likelihood</th>
<th>Scaling correction factor</th>
<th>Number of parameters</th>
<th>-2 log-Likelihood ratio test statistics</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unconditional model</td>
<td>-4951.83</td>
<td>0.93</td>
<td>14</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>With covariates</td>
<td>-4830.78</td>
<td>0.95</td>
<td>24</td>
<td>254.14***</td>
<td>10</td>
</tr>
<tr>
<td>Direct effects model</td>
<td>-4816.87</td>
<td>1.14</td>
<td>28</td>
<td>12.52**</td>
<td>4</td>
</tr>
<tr>
<td>Mediation model</td>
<td>-4687.94</td>
<td>1.08</td>
<td>56</td>
<td>249.78***</td>
<td>28</td>
</tr>
</tbody>
</table>

Table 8. Model Fit Comparisons for the Mediation Model

Figure 3 and Table 9 provide the results from the mediation model. Hypothesis 1 was supported only for children’s cognitive skills. Children with greater number of family socioeconomic risks had significantly lower scores on cognitive skills after controlling for neighborhood disadvantage, home environments, children’s age, gender, and race/ethnicity. In addition, children in more disadvantaged neighborhoods demonstrated significantly lower levels of cognitive achievement after controlling for family socioeconomic risk, home environments, children’s age, gender, and
race/ethnicity. The effect size for the family risk effect ($\beta = -.21$) was greater than the effect size for the neighborhood effects ($\beta = -.13$). On the other hand, family and neighborhood socioeconomic risks were not significantly associated with the likelihood of having social-emotional problems.

To test hypothesis 2, first, the paths from family/neighborhood disadvantage to home environments (i.e., parental depression and cognitive stimulation at home) were examined. Parents having greater number of socioeconomic risks in family context experienced more depressive symptoms ($\beta = .24, p < .001$) and lower levels of cognitive stimulation at home ($\beta = -.34, p < .001$) than parents who had a fewer number of socioeconomic family risks after controlling for children’s age, gender, and race/ethnicity. In addition, neighborhood disadvantage significantly predicted parental depression ($\beta = .16, p = .03$) but did not predict cognitive stimulation ($\beta = .00, p = .98$) after accounting for children’s age, gender, and race/ethnicity. Second, the paths from home environments to child outcomes were examined. Although parental depression was not significantly related with children’s cognitive skills, stimulating learning environments at home significantly predicted better child cognitive abilities after controlling for family/neighborhood socioeconomic risks, parental depression, children’s age, gender, and race/ethnicity. In addition, children in more stimulating home environments demonstrated less likelihood of having social-emotional problems after adjusting for family/neighborhood socioeconomic risks, parental depression, children’s age, gender, and race/ethnicity (Odds Ratio [OR] = .84). The odds ratio suggested that the odds of having social-emotional problems decreased by 16% when the degree of cognitive
stimulation at home increased by one unit. On the other hand, children having more depressed parents demonstrated greater odds of having social-emotional problems (OR = 1.08), indicating that the odds of having social-emotional problems increased by 7.8%, with a one unit increase in parental depression after controlling for family/neighborhood risks, cognitive stimulation, children’s age, gender, and race/ethnicity.

The indirect effects were calculated by the products of the paths from family/neighborhood risks to home environments, and the paths from home environments to child outcomes. As shown in Table 9, the cumulative socioeconomic risk in family was significantly associated with children’s cognitive skills through cognitive stimulation provided at home after controlling for neighborhood disadvantage, parental depression, and other child-level covariates, indicating that parents with a greater number of family risks had more depressive symptoms, which in turn, predicted lower levels of children’s cognitive achievement. Even though there was no significant direct effect of family risk on children’s social-emotional functioning, there were statistically significant indirect effects of family socioeconomic risk on social-emotional competence through cognitive stimulation at home (marginally significant \( p = .07 \)) and parental depression (\( p = .04 \)) after controlling for neighborhood disadvantage and child covariates. The 1.06 of odds ratio for both indirect paths suggested that when family socioeconomic risk increases by one unit, the odds of having social-emotional problems increases by 6% through parental depression and cognitive stimulation at home. Finally, children in more disadvantaged neighborhoods exhibited marginally significant higher odds of having social-emotional
problems through parental depression after controlling for family risk, parental depression, children’s age, gender, and race/ethnicity (OR = 1.06, p < .09).

In the mediation model, covariates (i.e., child age, gender, and race/ethnicity) explained 10.2% of the variance in children’s social-emotional competence and 42.3% of the variance in children’s cognitive skills. Predictors including mediators (i.e., family/neighborhood risk, parental depression, and cognitive stimulation at home) additionally explained 4% of the variance in children’s social-emotional competence and 13.8% of the variance in children’s cognitive skills. Overall, 14.2% of the variance in children’s social-emotional competence and 56.1% of the variance in children’s cognitive skills was explained by the model. In addition, 7.1% of the variance in parental depression and 15.4% of the variance in cognitive stimulation at home was explained by family/neighborhood risks and child-level covariates.
Figure 3. The results from the mediation model in multilevel structural equation modeling

Note. Unstandardized path coefficients and standard errors are reported. A dashed line indicates non-significant effects. Child age, gender, and race/ethnicity were controlled for. †p < .10; *p < .05; **p < .01; ***p < .001
<table>
<thead>
<tr>
<th>Covariates</th>
<th>Cognitive Skills</th>
<th></th>
<th></th>
<th>Socio-emotional Problems</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>95% CI</td>
<td>β</td>
<td>B</td>
<td>SE</td>
</tr>
<tr>
<td>Child age</td>
<td>.68***</td>
<td>.06</td>
<td>[.55, .80]</td>
<td>.53</td>
<td>- .03*</td>
<td>.02</td>
</tr>
<tr>
<td>Child sex</td>
<td>1.18</td>
<td>.74</td>
<td>[-.26, 2.63]</td>
<td>.07</td>
<td>.11</td>
<td>.23</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>-4.48**</td>
<td>1.42</td>
<td>[-7.26, -0.45]</td>
<td>-.22</td>
<td>1.09**</td>
<td>.36</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-3.37*</td>
<td>1.36</td>
<td>[-6.03, -0.71]</td>
<td>-.11</td>
<td>.79†</td>
<td>.43</td>
</tr>
<tr>
<td>Other race</td>
<td>-0.29</td>
<td>.95</td>
<td>[-2.15, 1.57]</td>
<td>-.01</td>
<td>.86*</td>
<td>.38</td>
</tr>
<tr>
<td>Predictors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family risk</td>
<td>-1.24**</td>
<td>.40</td>
<td>[-2.03, -0.45]</td>
<td>-.21</td>
<td>-.08</td>
<td>.10</td>
</tr>
<tr>
<td>Neighborhood disadvantage</td>
<td>-1.29*</td>
<td>.53</td>
<td>[-2.33, -0.25]</td>
<td>-.13</td>
<td>.14</td>
<td>.18</td>
</tr>
<tr>
<td>Mediators</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive stimulation</td>
<td>1.04***</td>
<td>.32</td>
<td>[.40, 1.67]</td>
<td>.17</td>
<td>- .18*</td>
<td>.09</td>
</tr>
<tr>
<td>Parental depression</td>
<td>-0.14</td>
<td>.09</td>
<td>[-.31, .04]</td>
<td>-.07</td>
<td>.08*</td>
<td>.03</td>
</tr>
</tbody>
</table>

Table 9. Mediation of the Effects of Family/Neighborhood Disadvantage on Child Outcomes through Home Environments
<table>
<thead>
<tr>
<th>Indirect effects</th>
<th>Cognitive Skills</th>
<th>Socio-emotional Problems</th>
<th>95% CI for OR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$B$</td>
<td>$SE$</td>
<td>95% CI</td>
</tr>
<tr>
<td>Family risk →</td>
<td>-.34**</td>
<td>.12</td>
<td>[-.57, -.12]</td>
</tr>
<tr>
<td>Cognitive stimulation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family risk →</td>
<td>-.10</td>
<td>.07</td>
<td>[-.24, .04]</td>
</tr>
<tr>
<td>Parental depression</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neighborhood dis. →</td>
<td>.00</td>
<td>.10</td>
<td>[-.19, .19]</td>
</tr>
<tr>
<td>Cognitive stimulation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neighborhood dis. →</td>
<td>-.11</td>
<td>.08</td>
<td>[-.26, .05]</td>
</tr>
<tr>
<td>Parental depression</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. $N = 420$. OR = Odds Ratio.

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$
4.3.3. Moderation Model

Hypothesis 3 – 5 were tested in the following analysis of the moderating effects of child-care quality on the associations between family/neighborhood disadvantages, home environments, and child outcomes using the full sample and the subsample of children in QRIS-participating child-care programs. However, the moderation models in both samples were not converged due to the limited sample size in comparison with the number of parameters in the model. Therefore, two outcomes, cognitive skills and social-emotional functioning were separately examined in MSEM. None of hypotheses was significant in the analyses using the full sample, including the cognitive model and the social-emotional model.

Hypothesis 3 was only supported for children’s cognitive skills in the subsample of children in QRIS-participating programs. As shown in Table 10, children who were in the highest level QRIS programs attained better scores in cognitive assessments than those who in lower level programs after controlling for family/neighborhood disadvantage, home learning environment, parental depression, child age, gender, and race/ethnicity ($\gamma_{01} = 2.56, SE = .05, p < .001$). To test the cross-level interactions in hypothesis 4, random slopes of family risk and neighborhood disadvantage were regressed on QRIS status. The cross-level interaction between QRIS status and neighborhood disadvantage was not significant and was deleted from the model to improve the model fit. The model fit comparison between the null model without the level 2 indicator, QRIS quality level, and cross-level interactions and the alternative model with the QRIS indicator and the interaction between QRIS and family risk showed
that the alternative model fitted the data better (log-likelihood test statistics = 25.02, df = 2, p < .001). The analysis revealed that there was a significant moderating effect of QRIS quality level on the relationship between family risk and children’s cognitive skills after controlling for neighborhood disadvantage, parental depression, cognitive stimulation at home, and other covariates (\(\gamma_{11} = 1.30, SE = .05, p < .001\)), indicating that the negative effect of family risk on children’s cognitive skills was buffered for the children in the highest level of QRIS programs. Figure 4 shows the slopes of family risk effects for children’s cognitive skills in highest QRIS rating level (\(\gamma_{10} = .13, p = .76\)) and the lower QRIS rating level (\(\gamma_{10} = -1.16, p = .001\)). As indicated, the negative relationship between family socioeconomic risk and children’s cognitive skills was no longer significant for children in the highest QRIS child-care quality level. Hypothesis 5 was tested by regressing the random slopes of parental depression and cognitive stimulation on QRIS level; however, cross-level interactions were not statistically significant. Finally, there was no significant path for child-care effects in the social-emotional competence model.
Figure 4. Conditional Direct Effects of Family Socioeconomic Risk on Children’s Cognitive Skills by QRIS Rating Level

Highest QRIS level $\gamma_{10} = .13^{n.s.}$

Lower QRIS level $\gamma_{10} = -1.16^{**}$
<table>
<thead>
<tr>
<th>Within level</th>
<th>Cognitive Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Covariates</strong></td>
<td>(Subsample of QRIS rated programs, N = 313)</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td><strong>SE</strong></td>
</tr>
<tr>
<td><strong>Within level</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Covariates</strong></td>
<td></td>
</tr>
<tr>
<td>Child age</td>
<td>.65***</td>
</tr>
<tr>
<td>Child sex</td>
<td>.56</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>-2.99*</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-4.12**</td>
</tr>
<tr>
<td>Other race</td>
<td>-.20</td>
</tr>
<tr>
<td><strong>Predictors</strong></td>
<td></td>
</tr>
<tr>
<td>Family risk</td>
<td>-1.16**</td>
</tr>
<tr>
<td>Neighborhood disadvantage</td>
<td>-1.94**</td>
</tr>
<tr>
<td>Cognitive stimulation</td>
<td>1.14 ***</td>
</tr>
<tr>
<td>Parental depression</td>
<td>-.11</td>
</tr>
<tr>
<td><strong>Between level</strong></td>
<td></td>
</tr>
<tr>
<td>QRIS quality level (1=step 3)</td>
<td>2.56***</td>
</tr>
<tr>
<td>QRIS × family risk</td>
<td>1.30***</td>
</tr>
</tbody>
</table>

*Note.* Standardized coefficients are not produced in the random slope model.

* p < .05; ** p < .01; *** p < .001

Table 10. Moderating Effects of Child-care Quality in a Subsample of Children in QRIS-participating Programs
Chapter 5: Discussion

This study was designed to examine the effects of contextual features of home, neighborhood, and child-care on preschool-aged children’s cognitive and social-emotional development using a sample of children registered in full-time child care centers in a Midwestern state. The hypotheses were tested using the multilevel structural equation modeling (MSEM), which accounts for the nested data structure while it simultaneously examines the hypothesized pathways (Preacher et al., 2010). The MSEM is rarely used in the early childhood research although it is more ideal and appropriate to explain child-care effects than traditional structural equation modeling. Recently, the advanced software such as Mplus (Muthén & Muthén, 2012) allows more feasible and easier analysis in the MSEM framework (Heck & Thomas, 2009). In the present study, all analyses were completed in the MSEM framework to reduce statistical bias in estimates. The findings in this study add to a limited body of literature investigating family, neighborhood, and child-care contexts together in relation to children’s school readiness.
5.1. The Mediating Effects of Home Environment

Hypothesis 1 (H1), addressing the direct effects of family and neighborhood disadvantage on child outcomes, and hypothesis 2 (H2), expecting the indirect effects of family and neighborhood disadvantage on child outcome through home environments, were tested in the mediation model. H1 was only supported for children’s cognitive skills, not for social-emotional functioning. In general, there were mediating effects of cognitive stimulation at home and parental depression on the associations between family socioeconomic risk/neighborhood disadvantage and children’s cognitive/social-emotional skills that supported H2. However, the mediating mechanism, statistical significance level, and the effect sizes differed by specific child outcome. Consistent with previous studies (e.g., Guo & Harris, 2000; Yeung et al., 2002), the investment perspective (i.e., socioeconomic risk -> learning environment at home -> child outcomes) was more strongly supported in the relationship between family risk and children’s cognitive skills. This may be because socioeconomically disadvantaged parents lack resources for investments in the cognitive stimulating home environments that can be beneficial to children’s learning opportunities. Research has found a greater relationship between learning materials (e.g., books, magazines, or recorders) and activities such as shared reading in the home with children’s literacy or mathematical skills (Johnson et al., 2008) than with social-emotional development.

On the contrary, the relationship between socioeconomic risk in home/neighborhoods and children’s social-emotional functioning may be better explained by the family process model (i.e., socioeconomic risk -> parental depression -> child
outcomes). Interestingly, neither family socioeconomic risk nor neighborhood disadvantage directly predicted the probability of children having social-emotional problems. Rather, disadvantages at home and neighborhoods were indirectly associated with children’s social-emotional development through parental depression. Parents who have a greater number of socio-demographic risks and who live in disadvantaged neighborhoods may feel more pressure and may be emotionally vulnerable due to a lack of available physical and psychological resources (Duncan et al., 1994). That is, the pressure and stress from socioeconomic difficulties may be reflected in parents’ depressive symptoms. Parents’ depressed mood has been found to be a strong predictor of low levels of sensitivity and unhealthy interactions in the family (Petterson & Albers, 2001), which in turn, may hamper children’s healthy social-emotional development (Whittaker et al., 2011). Even though researchers adapted the family process model into neighborhood contexts, only a few studies have found significant effects of neighborhood disadvantage on child outcomes through parental depression (Kohen et al., 2008). The findings in the current study indicate that it is reasonable to consider the detrimental effect of neighborhood disadvantage on child outcomes in a similar manner to how the family process mechanism explains the association between family disadvantage and child outcomes through parental depression. The family process model in a neighborhood context may be explained by collective efficacy theory, which emphasizes the importance of mutual trust and solidarity in neighborhoods (Sampson, 1997; Sampson et al., 2002). According to the collective efficacy model, parents in disadvantaged neighborhoods have less trust in the social networks in their community, which in turn, might predict social
isolation and mental health problems such as depression and anxiety for both parents and children (Browning & Cagney, 2002; Xue et al., 2005).

### 5.2. The Moderating Effects of Child-care Quality

Given that 64% of US women with children under the age of 6 participate in the labor force (U.S. Department of Labor, 2011), there has been increased efforts to improve early child-care quality in order to provide better child-care experiences for children and to stimulate children’s school readiness (Whitebook, Sakai, & Howes, 1997). One state-level strategy for providing better quality child-care is the development of QRISs (Zellman & Perlman, 2008). In the present study, (a) the direct effects of QRIS on child outcomes (Hypothesis 3, H3), (b) the conditional direct effects of family/neighborhood disadvantages on child outcomes across QRIS participation status and QRIS quality rating levels (Hypothesis 4, H4), and (c) the conditional indirect effects of family/neighborhood disadvantages on child outcomes through home environments across QRIS participation status and QRIS quality rating levels (Hypothesis 5, H5) were examined. When I analyzed all sampled children to test differences between children in QRIS-participating programs and non-participating programs, neither H3, H4, nor H5 was supported. However, H3 and H4 were partially supported using a subsample of children in QRIS-participating programs to test the difference between children in the highest rating level and the lower rating levels; H5 was not supported in this subsample again. Although this study examined both children’s cognitive and social emotional skills, H3 and H4 were only supported for children’s cognitive skills. It is worthwhile to note
that children in the highest level of QRIS rating demonstrated better cognitive skills, which consisted of direct assessments of literacy, language and mathematical abilities, even after controlling for family/neighborhood socioeconomic disadvantage, cognitive stimulation at home, parental depression, child age, gender and race/ethnicity. To date, this is the first study that simultaneously accounts for family and neighborhood contexts. The unique contribution of QRIS rating level to differences in cognitive skills after adjusting for other contextual variables may be the result of lower ratios and smaller group sizes at higher levels of the quality-rating system; that is, children are able to receive more individualized instructions and learning activities because of the smaller group size (Howes, 1997), and this, in turn, may allow children to better gain cognitive skills. Further, children in the highest level of QRIS programs may more effectively learn vocabulary, literacy skills, or how to apply and solve mathematical problems from more highly trained teachers and a well-organized environment, both of which are components in the QRIS benchmarks.

It should be noted that there was a moderating effect of a QRIS rating on the relationship between family socioeconomic risk and cognitive skills (H4), indicating that the negative effect of family disadvantage was buffered in the highest level of QRIS programs. Although QRIS was not specifically developed to target children in poverty, the use of well-organized curriculums in the highest level of QRIS programs might stimulate cognitive development, especially for children at risk. In contrast with the hypothesis, none of the other cross-level interactions were statistically significant, indicating that QRIS equally predicted children’s cognitive skills regardless of
neighborhood disadvantage, parental depression, and cognitive stimulation at home. This may be due to the limited variations in those variables to detect significant interactions (e.g., children in high-quality child care had less disadvantaged neighborhoods); or may be due to the limited sample size in comparison with the number of paths in the statistical model.

Finally, there was no direct and moderating effect of QRIS status on the probability of social-emotional problems. It is thought that although social-emotional development is of great interest for early childhood researchers and practitioners, child-care early learning curriculums provide relatively less focus on social-emotional development than cognitive development and this might limit the effectiveness of QRIS on social-emotional functioning. In the child-care literature, relatively small effects of child-care quality on children’s social-emotional development have been reported (e.g., Burchinal et al., 2011; NICHD Early Child Care Research Network, 2002a). Burchinal et al. (2011) pointed out that the effects of child-care quality on child outcomes can be underestimated when measures of the quality or outcomes are inadequate. Directly assessed cognitive outcome measures, which were utilized in this study, are well-established standardized tests that have shown good reliability and validity (e.g., Dunn & Dunn, 1997); however, the parent-reported social-emotional functioning measure is comparatively less objective and reliable. In addition, the cutoff point used in this study was not validated in a representative sample. In fact, measuring children’s social-emotional skills is more difficult than measuring cognitive skills by an objective assessment because children’s social-emotional problems are less likely to be
demonstrated in a onetime observation (Hyson et al., 2011). For example, an observational assessment, Head Toes Knees Shoulders (Ponitz, McClelland, Matthews, & Morrison, 2009), was designed to measure children’s self-regulatory skills; however, this scale only had correlations with children’s cognitive skills, not with overall social-emotional functioning because children were more likely to use their cognition in this short onetime observation (Ponitz et al., 2009). In addition, the QRIS is still in the stage of validating quality indicators and cutoff points for each indicator (Swenson-Klatt & Tout, 2011). More efforts on validating benchmarks and greater consideration of children’s social-emotional development are needed to improve the effectiveness of the QRIS on children’s social-emotional functioning.

5.3. Limitations

The present study has several limitations. First, parents’ self-reported annual household income was measured by an interval scale. Therefore, the income does not reflect the relative poverty threshold, which might provide more accurate information on the poverty level. Second, the present study used parents’ self-reported responses to measure household/parent characteristics (family risk, cognitive stimulation, and depression) and children’s social-emotional functioning. Parents may over-report scores on their home environments or children’s social-emotional skills. It is also possible that depressed parents perceived their children as having more social-emotional problems. Thus, the results of the pathways from family risk to social-emotional development through cognitive stimulation and depressive symptoms may be biased due to the shared
method variance. Third, neighborhood disadvantage was characterized by census tract level data, which was matched with children’s home addresses. However, parents and children might experience multiple neighborhoods (e.g., location of child-care or job) in their everyday experience (Wheaton & Clarke, 2003), and it might change the influence of neighborhood where they live. In addition, the length of living in the census tract could not be accounted for in this study. Fourth, the effects of QRIS on children’s cognitive skills may be overestimated because although the assessors were blind to the objectives of the study, they could not be blind to the QRIS status. The banners indicating QRIS levels were displayed in front of each QRIS-participating program. Fifth, most participants in this study were European American and middle-class parents. Even though the percentage of parents in poverty, educational attainment, and marital status reflected the general population in Ohio (U.S. Census Bureau, 2010), this might limit our findings for the effects of family/neighborhood risks and the moderating effects of QRIS. Sixth, even though the weighting strategy was utilized to generalize the findings to the targeted population, preschool-aged children in full-time child care centers in the state, the findings cannot be generalized to the other state or other types of child-care programs such as part-time or home-based child care. Finally, I conducted cross-sectional analysis and the causal relationships cannot be guaranteed in this observational study. There are possible selection bias and omitted or unexplained variable bias. Further, this study did not adjust for the homogeneity in classrooms.
5.4. Implications for future research and practice

Despite limitations, the findings of the current study suggest several implications for the future research and practice. The current study investigated the investment perspective and family process perspective in family and neighborhood contexts. The mechanisms of these two perspectives (i.e., mediated mediation) can be an interesting topic for further exploration. For example, the effects of parental depression and cognitive stimulation, which were predicted from family/neighborhood risk, on child outcomes might be mediated by parent-child interaction, the degree of household chaos, or emotional support (socioeconomic risk -> home environments -> mediator -> child outcomes). Another pathway of how neighborhood disadvantage influences parental depression can be also examined; one example of possible mediators can be collective efficacy as discussed previously (socioeconomic risk -> mediator -> parental depression - > child outcomes). Furthermore, longitudinal studies are needed to test the lasting effect of socioeconomic risks on child outcomes through parental depression and cognitive stimulation. In the mediation analysis, there was a lack of mediation effects through parental depression and cognitive stimulation although the path from neighborhood disadvantage to socio-emotional functioning through parental depression was marginally significant. However, because there was a significant direct effect of neighborhood disadvantage on children’s cognitive skills, it is needed to find out the predictors that mediate the relationships between neighborhood disadvantage and child outcomes in the future research.
In practice, since family socioeconomic risk and neighborhood disadvantage generally predicted child outcomes through parental depression and the home learning environment, intervention programs targeting parents may reduce the negative effects of socioeconomic risks in family and neighborhood. Although the pathways worked differently for specific outcomes\(^6\), a package of interventions dealing with parents’ psychological well-being, providing learning materials, and educating parents to create the cognitive stimulated learning environment (e.g., how to read books to a child) might be considered to stimulate children’s overall school readiness including cognitive ability and social-emotional development. Direct investment in socioeconomic family/neighborhood risks requires a large scale investment of public resources (Duncan et al., 1994). Interventions for parents, which can be implemented at individual-level, might be one efficient way to prevent further difficulties in child outcomes.

The present study found that QRIS policy produces benefits for children’s cognitive development and helps compensate for the negative effect of family risk in relation to cognitive skills. Since improvement of children’s academic achievement is a state and national policy goal, QRISs may be a good place to allocate public budget dollars. Additionally, state funding can be used to reserve more slots in higher level QRIS programs for subsidized children as a way to buffer the negative effects of family risk. Although an association between the QRIS level and cognitive outcomes was found, there was no difference in social-emotional functioning across the QRIS quality levels, and children in QRIS-participating programs and non-participating programs did not

\(^6\) The investment perspective was more supported for children’s cognitive skills and the family process perspective was more supported for social-emotional functioning
demonstrate a difference in all child outcomes. To stimulate children’s social-emotional functioning, the QRIS training sessions for child-care professionals may be designed to have greater emphasis on the components of behavior management and emotional support. Additionally, QRISs might consider inclusion of a criterion that evaluates curriculum or activities for social-emotional development. Finally, the findings of this study are expected to help the dissemination of QRIS by policymakers and child-care professionals.

In future QRIS research, each benchmark in the QRIS should be separately investigated to determine specific structural indicators that influence particular child outcomes. This would be useful information for system modification. Consideration of the QRIS rating history for each program should provide better understanding of the relationships between QRIS and child outcomes. The proxies that support children’s developmental outcomes through the QRIS status also need to be further investigated to elucidate the mechanism on how QRIS affect children’s school readiness.

5.5. Conclusion

The aim of this study was to understand the links between cumulative family socioeconomic risk, neighborhood disadvantage, home environments, child-care quality, and children’s school readiness, including cognitive skills and social-emotional functioning. Preschool-aged children’s literacy, math, and social-emotional skills have been found to predict their later achievement (e.g., Duncan et al., 2007; Pianta & Cox, 1999). However, a national sample of kindergarten teachers reported that 16% of children
enter kindergarten without sufficient school readiness skills (Rimm-Kaufman, Pianta, & Cox, 2000). Teachers perceived that children who have less literacy or mathematical ability, problems with social skills, and trouble in peer relationships or following directions are more likely to experience difficulty in transition to school (Rimm-Kaufman et al., 2000). According to the ecological systems perspective (Bronfenbrenner, 1994), it is important to find pathways for how contexts surrounding children impact their developmental outcomes in the early childhood stage in order to intervene and prevent children’s difficulties in school readiness. In this study, family, neighborhood, and child-care were considered as primary contexts that predict children’s cognitive skills and social-emotional problems. Following the investment perspective and the family process perspective, this study examined several pathways from family/neighborhood socio-demographic risks to child outcomes through cognitive stimulation at home and parents’ depressive symptoms. In addition, the effectiveness of the QRIS, which represents the structural quality of child-care, on child outcomes was tested to fill a gap in the child-care literature.

Children’s cognitive skills were directly predicted by family socioeconomic cumulative risks, neighborhood disadvantage, and child-care quality after accounting for each other context, home environments, child age, gender, and race/ethnicity. Stimulating home learning environments mediated the relationship between family socioeconomic risk and children’s cognitive skills as suggested by the investment perspective. Further, the detrimental effect of family socioeconomic risk on children’s cognitive skills was buffered by the quality level of child-care. On the other hand, as suggested by the family
process view, whether or not children have social-emotional problems was only indirectly predicted by family socioeconomic risk and neighborhood disadvantage through parental depression.

Although, as mentioned previously, weaknesses exist, the findings from this study provide implications for researchers, early childhood education and care practitioners, and policymakers. This study provides ideas for researchers and practical information that may help practitioners making decisions on where to invest limited resources to improve children’s development, as the findings suggest possible benefits of parenting interventions. At the policy level, even though the ultimate goal of the QRIS is to improve children’s school readiness, there are only few studies examining the effectiveness of the policy on child outcomes because QRISs are in a stage of validating benchmarks and disseminating information on the system to child-care programs and parents. This study suggests that the QRIS model has the potential to influence children’s developmental outcomes, especially in the area of academic achievement. It can be considered as a good starting point for further exploration. Quality rating systems will take time to build and evaluate in terms of children’s outcomes and school readiness (Zellman & Perlman, 2008). Although this study suggests that outcomes may be positive, research in other states is needed to understand the effects of each unique quality rating system. Early-childhood care and education programs that can facilitate children’s development can be viewed as a long term investment (Barnett, 1985). Although not conclusive, these early results suggest that federal and state policymakers may be able to
expect positive returns on the current QRIS investments, which, in turn, may provide the impetus for more robust systems.
References


Appendix A: Three-level Variance
In this data, a total of 420 children were nested within 354 census tracts (15.7%); and census tracts were nested within child-care programs. To determine whether or not the three-level multilevel analysis is more appropriate than the two-level multilevel analysis, intraclass correlations for neighborhood level and child-care level were calculated from the three-level multilevel analyses. The unconditional models without predictors produced variances in each level for four child outcomes: receptive vocabulary, literacy skills, mathematical abilities, and social-emotional problems. All analyses were weighted at child-care level. As shown in Table 11, the random neighborhood effects (i.e., variance at level 2) were not significant for all four outcomes. The proportion of variance among neighborhoods within child-care programs was ranged from 0 to .08; while the proportion of variance among child-care programs was ranged from .21 to .32. Due to a lack of variation in neighborhood level, I determined to carry out the two-level analysis (children nested within child-care programs) in this study.
<table>
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<th>WJ math</th>
<th>Social-emotional problems</th>
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Table 11. Intraclass Correlations for Child Outcomes from Three-level Unconditional Models