

ABSTRACT

OKONIEWSKI, KATHERINE CHARLOTTE, The Developmental Status of Children Birth to 5 Experiencing Homelessness: A Cumulative Risk Model. (Under the direction of Mary E. Haskett).

Children birth to 5 years experiencing homelessness are at risk for delayed development across the areas of cognition, language, motor, and social-emotional functioning. Similar trends have been observed in populations of children who experience maltreatment, and early health risk (e.g., premature birth, medical diagnoses, hospitalizations). The current study was designed to examine correlations between number of risk factors and the developmental status of children birth to 5 experiencing homelessness. Findings showed that cumulative risk did not predict outcomes on measures of language, or overall cognition, but did predict motor skills. Mean scores obtained on language, motor, and cognitive scores were not significantly different than those of the standardized sample. Cumulative risk was, however, a unique predictor of social-emotional functioning. Over a quarter of the children in the sample had mental health needs, indicative of delays in social-emotional skills. Future directions for research are discussed to expand the limited literature in the examination of the cumulative experience of these risk factors in the youngest members of the homeless population.

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The Developmental Status of Children Birth to 5 Experiencing Homelessness:
A Cumulative Risk Model

by
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DEDICATION

I would like to dedicate this dissertation to my village. From my parents, Arthur and Theresa Marshall, whose generosity, support, and encouragement is unsurpassed; to my twins and AB who continue to make me a better person and sister every day, thank you. I am forever grateful for the generations that came before them who helped shape the person I am today-- III, Susan Elizabeth, Jack and Regina, and my namesake. To the Okoniewskis, thank you for loving me and making me one of your own. From the longest, to the most loyal and true, to those who lift me up daily, thank you to the woman who have become family. Finally to you Danny, who would have thought in 2003 this would be our life.

BIOGRAPHY

Katherine Charlotte Okoniewski “Casey” was born on October 17, 1987 in Rochester, New York. She graduated from Batavia High School in 2005 and went on to pursue her Bachelor’s degree in Psychology at Hobart and William Smith Colleges in Geneva, New York. Casey attained her Master’s degree in School Psychology at the University of North Carolina at Chapel Hill in 2012. Following graduation, she worked as a preschool and elementary level school psychologist before beginning her doctoral degree at North Carolina State University. Casey will graduate from North Carolina State with a Ph.D in School Psychology in 2017.

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Introduction

Children's development between birth and age 5 is one of the most critical and exciting periods in a person's lifespan. From the explosions in language and motor abilities, to the expansion of cognitive skills and higher level functioning, this timespan encompasses some of the earliest developmental necessities for further growth. Unfortunately, almost half of the nation's children have experienced at least one type of childhood trauma during this sensitive period, impacting the biological and psychosocial development of the child (Center on the Developing Child, 2007). Adverse childhood experiences change the brain and biological chemistry of a child, with greater numbers of risk factors being indicative of a greater chance of developmental delay. This is particularly true when those adverse events occur before the age of 3 years (Center on the Developing Child, 2007). Understanding the relation between risks and the developmental patterns of children is critical for shaping policy and practice in order to provide early support through intervention and community services to foster healthy future growth.

This developmental period is greatly impacted by the complex environments and early experiences of a child. Developmental trajectories are changed and influenced as a result of the balance between protective and risk factors. Research has been conducted to explore the relation between specific risk factors and early development. The experiences of homelessness, maltreatment, and early health factors are associated with significant risk to the cognitive, linguistic, motor, and behavioral development of children from birth to 5 years of age. Studies exploring the cumulative risk as a result these experiences have also shown

effects on this early developmental period. What has not been evaluated is the impact of cumulative risk on young children already at high risk through the experience of homelessness. Researchers have not yet examined how the experience of multiple risk factors including maltreatment and early health risks, combined with homelessness, impact cognitive, linguistic, motor, and social-emotional skills in children birth to 5 years.

The goal of the current study was to better understand the independent and compounding nature of biological and psychosocial risk on the development of children from birth to 5 years experiencing homelessness. This work is important as it moves the literature and research in these fields forward and adds to an empirical foundation for advocacy work in the areas of early intervention and community supports for this population.

The following review introduces the reader to relevant areas of research. Unless explicitly noted, it can be assumed that the studies included were conducted in populations of children ranging in age from birth to 5 years. The following review does not provide a comprehensive analysis; rather, research presented is representative of overall trends in each area.

The Development of Children Birth to 5 Years Experiencing Homelessness

Families are the fastest growing segment of the homeless population, with approximately 55,000 children experiencing homelessness in North Carolina across 2012-2013 (National Center on Family Homelessness, 2015). National statistics show that in 2013 almost 49% of these children were younger than 5 years of age (Child Trends, 2015). The experience of homelessness is associated with a variety of risk factors and additional trauma

beyond not having a stable home. An understanding of the relation between homelessness and children's development is crucial for policy makers and child support professionals when considering interventions and appropriate routes of support.

The developmental impact of the experience of homelessness is evident at a very young age. In a review, Hart-Shegos (1999) noted that delays are observed as early as infancy as a result of the health risks associated with homelessness. Among toddlers who are homeless, delays are found in the areas of speech, adaptive behaviors, and motor functioning. Research has shown that almost 75% of homeless children under the age of 5 have at least one major developmental delay, and approximately 44% have two or more. The primary areas of delay observed include language, motor, overall cognition, and social-emotional development (Hart-Shegos, 1999). For the purpose of the current review the literature will be organized by each domain while acknowledging the overlap of these developmental areas.

Prior research on young children experiencing homelessness has shown a presence of general developmental delays (Bassuk & Rubin, 1987; Bassuk, Rubin & Lauriat, 1986; Park, Fertig & Allison, 2011; Whitman, Accardo, Boyert & Kendagor, 1990). Prevalence rates of delay have varied across studies with some results showing rates as high as 50% and some as low as 5% (Bassuk & Rubin, 1987; Bassuk, Rubin & Lauriat, 1986; Coll, Buckner, Brooks, Weinreb & Bassuk, 1998; Lewis & Meyers, 1989). Additionally, research indicates that these children are at-risk for multiple developmental delays. Bassuk and colleagues (1987) observed that 33% of their sample of 81 children under age 5 had two or more areas of delayed development and 14% had four or more.

Studies have found that these children not only obtain below average standard scores on measures of intelligence, but that low cognitive functioning can be lasting (Park, Fertig & Allison, 2011; Whitman, Accardo, Boyert & Kendagor, 1990). In a study of 39 children ages 5 months to 5 years experiencing homelessness, Whitman and colleagues (1990) found that mean scores for boys were well below average ($M=83$) while scores for girls were within the average range ($M=94$). Across time, researchers Park, Fertig, and Allison (2011) observed that children who had experienced homelessness at least once, or were experiencing homelessness at the time of participation, maintained below average standardized intelligence scores two years after initial testing, with scores at the 20th percentile and 30th percentile respectively.

Delays in Language, Motor, and Social-Emotional Skills

One of the most common areas of delay among young homeless children is language (Bassuk & Rubin, 1987; Bassuk, Rubin & Lauriat, 1986; Lewis & Meyers, 1989; Rafferty & Shinn, 1991). Lewis and Meyers (1989) found that of the developmental delays observed in their sample, all were in the area of language. Similarly, Bassuk and colleagues identified language as the primary delay in all children classified as having a developmental lag (Bassuk & Rubin, 1987; Bassuk, Rubin & Lauriat, 1986). These observed language delays range from overall language acquisition, to specific delays in expressive and/or receptive language skills (Rescorla, Parker & Stolley, 1991; Whitman, Accardo, Boyert & Kendagor, 1990). Whitman et al., (1990) found that the majority of their sample of children experiencing homelessness had a language score almost two standard deviations below the

mean. In an examination of the developmental status of a sample of children experiencing homelessness participating in an initiative to address the needs of this population (Community Action Targeting Children who are Homeless—Project CATCH) researchers Haskett, Armstrong, and Tisdale (2015) found delays in language such that toddler's language/communication abilities were below average and were significantly lower than scores obtained by the norming group on the Brigance Early Childhood Screen.

Motor development has also emerged as an area of delay in young children experiencing homelessness (Coll, Buckner, Brooks, Weinreb & Bassuk, 1998; Lewis & Meyers 1989; Rafferty & Shinn, 1991; Rescorla, Parker & Stolley, 1991). Patterns of visual motor, fine motor, and gross motor delays in samples of these children have emerged. In their 1989 findings, Lewis and Meyers noted that in addition to language delays, almost half of the sample had delays in fine motor skills. Similarly, Rescorla, Parker, and Stolley (1991) observed below average fine motor skills and delays in visual motor abilities impacting gross motor abilities.

In addition to language and motor delays, researchers have also found social-emotional delays in these children. General findings across studies indicate that young children experiencing homelessness are at-risk for demonstrating clinically significant levels of maladaptive behaviors (Bassuk, Richard, & Tsertsvadze, 2015; Hayes, Zonnerville, & Bassuk, 2013; Rescorla, Parker, & Stolley, 1991; Scheingart, Molnar, Klein, Lowe, & Hartmann, 1995). For example, in a meta-analysis of 12 studies reviewing the behavioral development of children birth to 5 experiencing homelessness, Bassuk, Richard and

Tsertsvadze (2015) observed that 14-25% of children across studies had mental health needs and demonstrated behavioral difficulties that warranted clinical evaluation. Researchers Haskett, Armstrong, and Tisdale (2015) used the ASQ:SE to identify young children in emergency and transition housing at-risk for social-emotional difficulties. Results on the ASQ:SE showed that parents of almost 25% of young homeless children had concerns that warranted a referral to mental health services.

Patterns of internalized (e.g., negative behaviors directed towards self) and externalized (e.g., negative behaviors directed towards others and their environment) behaviors are also observed in these samples. Research findings across studies show that 12% - 21% of young homeless children demonstrate clinically significant levels of internalizing behaviors while 15-22% demonstrate significant levels of externalizing behaviors (Park, Fertig, & Allison, 2011; Rescorla, Parker, & Stolley, 1991; Schteingart, Molnar, Klein, Lowe, & Hartmann, 1995). Internalized behaviors such as withdrawal, anxiety, and dependency are frequently observed in these samples while externalized behaviors include aggression, disobedience, hyperactivity, and inattention (Bassuk & Rubin, 1987; Bassuk, Rubin, & Lauriat, 1986; Hayes, Zonnerville, & Bassuk, 2013; Rafferty & Shinn, 1991).

Limitations

The existing literature about the early development of children experiencing homelessness has consistently shown a presence of delays in cognition, language, motor, and social-emotional skills. Limitations observed in the literature include a primary focus in an

area of delay during an experience of homelessness with limited understanding and consideration of multiple risks, particularly those of maltreatment and outstanding early health risk. Additionally, research has tended to focus on cognitive development or social-emotional/mental health needs with a limited combination of both constructs in a single study. A goal of the current study was to address these limitations and add to the understanding of the development of young children who are homeless by taking into consideration multiple risk factors that tend to co-occur with homelessness; specifically, the additional risks of child maltreatment and early health problems.

The Development of Children Birth to 5 Years and Maltreatment

The term *maltreatment* includes a variety of forms of mistreatment of children by adult caretakers and includes neglect, physical abuse, sexual abuse, and psychological/emotional maltreatment. In 2013, it was found that children birth to 1 year had the highest rate of victimization and were at the greatest risk for maltreatment (U.S. Department of Health and Human Services, 2013). Trends have indicated that the younger the child, the greater the risk of maltreatment of any type (Child Welfare Information Gateway, 2015). Findings across studies have also indicated that in populations of children experiencing homelessness, family involvement with child welfare services ranges from 18% - 37% (Culhane, Webb, Grim, Metraux, & Culhane, 2003; Park, Metraux, Brodbar, & Culhane, 2004).

The literature has established a robust link between early childhood maltreatment and delayed development of cognition, language, motor, and social-emotional skills (McCollum,

2006; Scannapieco & Connell-Carrick, 2005). At a physiological level, trauma in the first few years of life significantly impacts brain growth and development, with the resulting physiological change having a direct correlation to the mastery and demonstration of early skills (McCollum, 2006; Scannapieco & Connell-Carrick, 2005). As positive experiences help to shape connections in the brain and physical development, negative experiences can change the chemical composition and structure of the brain, further impacting areas of development (Perry, 2009; Wilson, Hansen, & Li, 2011). The current review will explore developmental areas of cognition, language, motor, and social-emotional development across all types of maltreatment of children birth to age 5.

Delays in the early cognitive abilities of this population have been evaluated and documented since the early 1980s (Casanueva, Cross, & Ringeisen, 2008; Culp, Watkins, Lawrence, Letts, Kelly, & Rice, 1991; Hoffman-Plotkin & Twentyman, 1984; Scannapieco & Connell-Carrick, 2005; Scarborough, Lloyd, & Barth, 2009). Research has shown that children birth to 5 who experienced maltreatment show overall developmental delays between birth and age 2, and cognitive deficits and delays in specific areas such as problem solving skills emerge as they get older (Culp, et al., 1991; Hildyard & Wolfe, 2002). In one of the first studies examining the functioning of maltreated children, Hoffman-Plotkin and Twentyman (1984) found that abused and neglected children ages 3 - 6 years obtained lower scores on assessments of intellectual functioning compared to children who had not experienced maltreatment.

Since the early findings of Hoffman-Plotkin and Twentyman, research has continued to explore the relation between developmental delays and the experience of maltreatment. In 2008, Casanueva and colleagues followed children who experienced maltreatment for five years. Over 2,000 children were included whose age at baseline was between birth and 36 months. At the baseline data collection time point, over 35% of these children had a primary disability identification of developmental delay. As the years passed these rates increased. After one-and-a-half years, 39.2% qualified for Part C Early Intervention Services as a result of a developmental delay; three years later, 41.1% were enrolled in Part B Intervention services, and at the five year follow up, 42% were receiving support (Casanueva, Cross, & Ringeisen, 2008). Similarly, Scarborough, Lloyd, and Barth (2009) followed children for 36 months tracking the percentage of children with developmental delay 18 months and 36 months after the reported experience of maltreatment. In this sample, 23% of 997 participants had a developmental delay at baseline. At the 18-month follow up, 47% of the sample had a developmental delay and at 36 month follow up 55% obtained scores indicative of a delay. Furthermore, researchers observed that one-fifth of their sample scored poorly in more than one domain, suggesting overarching effects beyond general development delays and early cognitive disability (Scarborough, et al., 2009).

Delays in Language, Motor, and Social-Emotional Skills

It has long been proposed that language develops in the context of social interaction and feedback (Scannapieco & Connell-Carrick, 2005). Coster and Cicchetti (1993) presented a review of research in this area with an overarching theme suggesting that delays in

language are a result of poor relationships in the child's microsystem. Based on this theory, combined with the basic understanding of maltreatment as the consequence of a poor relationship between child and caregiver, the risk for expressive and receptive language delays in a maltreated population are evident (Allan & Oliver, 1982; Culp, et al., 1991; Eigsti & Cicchetti, 2004; Scannapieco & Connell-Carrick, 2005; Scarborough, Lloyd, & Barth, 2009). Indeed, researchers have identified general developmental delays present in young children who experienced maltreatment, with language tending to be the most specific area of delay observed, very similar to findings in studies of children experiencing homelessness (Hildyard & Wolfe, 2002; Scannapieco & Connell-Carrick, 2005; Scarborough, et al., 2009). For example, developmental delays were observed among the sample of children in the 2009 study conducted by Scarborough, Lloyd and Barth, with approximately 46 - 50% of the sample experiencing language impairment. Distinct delays in expressive and/or receptive language are present in research findings. Allan and Oliver (1982) examined the linguistic development of physically abused and neglected children. In their evaluation of 79 children, results showed that on auditory comprehension and verbal ability subscales of the Preschool Language Scale, children who experienced neglect had the greatest areas of difficulty in expressive and receptive language skills (Allan & Oliver, 1982). Similarly, Culp and colleagues (1991) found that children who experienced neglect had significantly lower scores on scales of expressive and receptive language as compared to those who did not experience maltreatment.

Some of the most obvious growth from birth to 5 years occurs in the area of fine and gross motor skills. Children are learning to navigate not only their personal space and bodies, but also the environment around them. The majority of the literature that reviews the motor development of children birth to 5 who have experienced maltreatment focuses specifically on physical abuse and resulting delays from physical trauma, such as the impact of early broken bones on walking or limited trunk strength due to internal bleeding or bruising (Scannapieco & Connell-Carrick, 2005).

Neglect has also emerged as a factor related to the early fine and gross motor abilities of children birth to 5. Scannapieco and Connell-Carrick (2002) observed that children who experienced neglect had difficulty with fine motor skills such as reaching, grabbing, holding independently, and early self-care skills such as feeding with utensils. As these children get older, crawling, walking, and general coordination also appear to be impacted with a resulting observation of general incoordination and trouble navigating physical space (Scannapieco & Connell-Carrick, 2002; 2005).

Children who experience maltreatment have also shown delayed and atypical development in the area of social-emotional skills. Studies have found overall difficulty with emotional regulation and higher rates of internalized and externalized behaviors in these young children (Egeland, Sroufe, & Erickson 1983; Freeman, 2014; Hildyard & Wolfe, 2002; Naughton et al., 2013; Scannapieco & Connell-Carrick, 2005). The risk of experiencing negative internalizing behaviors is almost quadrupled in populations of young children who experienced maltreatment (Freeman, 2014). In their 2005 review of the

developmental trends of infants and toddlers who experienced maltreatment, Scannapieco and Connell-Carrick (2005) noted that these children typically demonstrate higher levels of depression and anxiety as compared to non-maltreated peers the same age. Internal motivation was also described to be lower in these children, negatively impacting the way in which they interact with people in their environment and ability to engage with peers. Similarly, Hildyard and Wolfe (2002) note in their review that these children are more frequently observed as being withdrawn and introverted. Children who experienced maltreatment have been found to be at a significantly higher risk than those who did not experience maltreatment of externalized behaviors such as verbal and physical aggression, impulsivity, hyperactivity, anger, and noncompliance (Egeland, Sroufe, & Erickson 1983; Freeman, 2014; Hildyard & Wolfe, 2002; Scannapieco & Connell-Carrick 2005). As a result of this negative behavior children have more difficulty with positive interactions between other children and adults (Hildyard & Wolfe, 2002; Scannapieco & Connell-Carrick 2005).

Limitations

Existing research about the early development of children who experienced maltreatment has shown a presence of delays in cognition, language, motor, and particularly social-emotional skills. Research in this age range has primarily focused on children who were housed. The author did not find any studies that explored the developmental status of children birth to 5 years who experienced homelessness and maltreatment. The current study aimed to address this limitation and to further understand the additional impact of maltreatment on developmental skills in a sample of children experiencing homelessness.

The Development of Children Birth to 5 Years and Early Health Risks

Early health risks influence the physiological foundations children bring to their socio-cultural environments. Early health risks as a result of premature birth and medical needs are related to delays in cognitive, linguistic, motor, and social-emotional skills (Boulet, Schieve, & Boyle, 2011; Cohen, Parmelee, Beckwith, & Sigman, 1986; McGowan, Alderdice, Holmes, & Johnston, 2011; Smith & Boyce, 1995). While the term *early health risk* can represent a variety of experiences, for the purpose of the current study, early health risk is defined as any of the following: preterm birth, a stay in the Neonatal Intensive Care Unit (NICU), additional hospitalization, and any type of medical diagnosis or illness prior to age 5.

Premature Birth

A wealth of information is available about the developmental outcomes of children born preterm (prior to 35 weeks). The experience of premature birth typically correlates with low birth weight and health needs, which is acknowledged throughout the review. The work of the Infant Health and Development Program has addressed the risk of preterm birth and developmental outcomes (Bhutta, Cleves, Casey, Cradock, & Anand, 2002; Brooks-Gunn, McCarton, Casey, McCormick, Bauer, Bernbaum, Tyson, et al., 1994; Spiker, Ferguson, & Brooks-Gunn, 1993). Through this and continuing studies it has been observed that infants born preterm have delays in cognition, language, and social-emotional development.

Bhutta and colleagues (2002) conducted a meta-analysis of 15 studies comparing the cognitive outcomes of over 1,500 children born prematurely and of low birth weight, to

1,700 controls at their fifth birthday. Findings showed that mean cognitive test scores were significantly and positively correlated with birth weight and time of gestation, such that as length of gestation and birth weight increased, so did cognitive scores. Children who were carried full term and over 3,500 grams tended to perform higher on cognitive testing than those who were born preterm and of low birth weight.

One of the most prominent areas of delay in these children is language development. Findings have shown that children born preterm have delayed expressive and receptive language skills through age 5 (Brooks-Gunn et al., 1994; Schirmer, Portuguese, & Nunes, 2006). Researchers Brooks-Gunn and colleagues (1994) examined the early language development of preterm, low birth weight children at 3 and 5 years of age. Findings indicated that at 3 years old children born preterm had language skills in the below average range, but as they aged, their skills approached the average range. Similar findings were observed by Schirmer, Portuguese, and Nunes (2006) in a three-year longitudinal study of 69 born prematurely. The investigators measured language development at 12, 24, and 36 months of age and found receptive and expressive language delays were at each time point, and significantly related to performance in the below average range on measures of cognitive and psychomotor skills.

Children born prematurely are also at risk for a variety of physical health difficulties associated with early gross and fine motor delays (Cabral, da Silva, Tudella, & Martinez, 2015; Datar & Jacknowitz, 2009; Evensen, Skranes, Brubakk, & Vik, 2009; Formiga & Linhares, 2010). In a study examining motor development conducted by Cabral and

colleagues (2005), almost 50% of preterm infants were below the 5th percentile of functioning. Similarly, Formiga and Linhares (2010) found that within the first 12 months of life these children presented with difficulty maintaining posture, low muscle tone, low muscle control, and delays in foundational skills that are key for future gross and fine motor skill development.

The social-emotional development from birth to age 5 of children who were preterm has also been evaluated. It is observed that these children are at an increased risk for internalizing and externalizing behaviors (Bhutta, et al., 2002; Brooks-Gunn et al., 1994; Gray, Indurkha, & McCormick, 2004). In their meta-analysis of studies evaluating the cognitive and behavioral outcomes, Bhutta and colleagues (2002) observed that in 13 out of 16 studies, children had increased levels of internalizing and externalizing behavioral risk. Similarly, these children have been shown to have significantly higher levels of overall behavioral risk as compared to children carried to term (Brooks-Gunn et al., 1994).

Early Illness or Medical Diagnoses

Medical fragility experienced by children early in life may stand independently or be intertwined/a result of an experience of premature birth. Children born prematurely are at a higher risk for medical complications and diagnoses, and in reverse, children with prenatal medical risk factors such as Trisomy 21, congenital heart defects, or respiratory syndromes are at risk of being born prematurely (Minde, 1993; Smith & Boyce, 1995). Additionally, these medical conditions at birth and resulting complications throughout early development result in an increase in frequency of hospitalizations (Minde, 1993; Smith & Boyce, 1995).

Minde (1993) captures the complex multiplicative nature of children born in a state of health risk. The author explains that the experience of premature birth may supersede or be the underlying factor for health risks while in the NICU and beyond.

The developmental abilities of children who experience early medical fragility have been examined. Smith and Boyce (1995) evaluated the developmental outcomes of medically fragile children birth to 5 to highlight the severe needs of this population in regards to intervention services. Their findings showed that the number of days spent in the NICU and degree of neurological damage due to early hemorrhaging were more highly correlated with developmental delays than premature birth alone (Smith & Boyce, 1995). Researchers encouraged further studies to expand the definition of early health risk to include neonatal medical variables such as time spent in the NICU as indicators of developmental vulnerability, as these variables may explain more variance in early developmental outcomes (Smith & Boyce, 1995).

As shown in the work done by Smith and Boyce (1995), type of medical experience has a link to developmental outcomes. Additional research has also explored the correlation between specific diagnoses and developmental outcomes of children (Mussatto, Hoffmann, Hoffman, Tweddell, Bear, & Cao et al., 2015; Painter, Sun, Scher, Janosky, & Alvin, 2012). For example, Mussatto and colleagues (2015) found that children with congenital heart defects, resulting in multiple surgeries and hospitalizations, had delayed cognitive and language abilities through age 3. Similar results were found in a population of children who experienced severe seizures (Painter, Sun, Scher, Janosky, & Alvin, 2012).

Limitations

Many reasons have been proposed as to why associations might exist among medical diagnoses, hospital stays, and negative developmental outcomes. Researchers have suggested variables such as disrupted attachment between child and caregiver, limited educational or learning opportunities while hospitalized, or resulting biological implications of treatments as mediators of this relationship, to note a few (Minde, 1993; Mussatto et al., 2015). What is clear throughout the existing literature is a need for a better understanding of the link between young children's hospitalizations and medical experiences and their early developmental outcomes. Furthermore, the multiplicative nature of early health risk along with the experience of homelessness has yet to be examined.

The Development of Children Birth to 5 Years Experiencing Multiple Risk Factors

The experiences of homelessness, maltreatment, and health needs have shown to contribute greatly to the early developmental experiences of children birth to 5, and these experiences often co-occur. The concept of co-occurring biological and psychosocial risk factors continues to gain attention in the literature (Bendersky & Lewis, 1994; Cheng, Poehlmann-Tynam, Mullahy, & Witt, 2013; Laucht, Esser, & Schmidt, 1997; Ozkan, Senel, Arslan, & Karacan, 2012; Potijk, Kerstjens, Bos, Reijneveld, & DeWinter, 2013). Studies indicate that children who experience homelessness and those that were born prematurely are at a higher risk of being maltreated (U.S. Department of Health and Human Services, 2004). In addition, research has shown that homelessness also puts children at a greater risk of early illnesses such as respiratory infection, ear infections, obesity, asthma, and gastrointestinal disorders (Grant, Shapiro, Joseph, Goldsmith, Rigual-Lynch & Redlener, 2007; National

Center on Children on Family Homelessness, 2011; Schwarz, Garrett, Hampsey, & Thompson, 2007). Furthermore, mothers who experience homelessness have a higher percentage of children born prematurely than non-homeless mothers, and their infants spend more time in the NICU (Perlman & Shaw, 2015).

Of particular interest has been the interplay and lasting effects of social risk factors, particularly low socioeconomic status, versus early medical risk. Across studies, findings have shown that early medical risk may be associated with early developmental outcomes, but the effects begin to decrease as children grow; in contrast, psychosocial risks such as poverty and maltreatment have continuous and stable relations with developmental outcomes (Laucht, et al., 1997; Ozkan, et al., 2012). Furthermore, research has noted differential impacts between biological and psychosocial risk factors on early cognition, motor, and social-emotional skills. Laucht, Esser, and Schmidt (1997) observed that biological risk factors impacted early development across areas, but as children approached age 5 the only developmental outcomes biological risk accounted for were motor skills. Given these findings, it is possible that homelessness may have a more lasting effect on early development than medical risk alone.

The research on biological and psychosocial risk factors consistently shows that facing multiple risk factors is multiplicative to risk for negative outcomes (Laucht, et al., 1997; Potijk, et al., 2013). To illustrate, Potijk and colleagues (2013) found that separate risk factors such as prematurity and low socioeconomic status independently significantly predicted early development but when experienced together, effects were multiplied and

significantly higher. Findings such as these encourage models of cumulative risk when examining early developmental functioning.

Cumulative Risk Models

Cumulative risk models have been applied to the understanding of functioning of young children birth to 5 experiencing a variety of risk factors (Appleyard, Egeland, van Dulmen, & Sroufe, 2005; Hooper, Burchinal, Roberts, Zeisel, & Neebe, 1998; Laucht, et al., 1997). Aside from observing additive properties of biological and psychosocial risk, findings have shown that the number of individual risk factors experienced was a significant predictor of maladaptive behaviors and developmental delay. Additionally, it has been observed that as the number of risk factors increases, children's general cognitive functioning decreases (Laucht, et al., 1997; Liaw & Brooks-Gunn, 1994).

Studies have used cumulative risk indices to explore the influence of risk on early cognitive and language development. Hooper and colleagues (1998) applied a cumulative risk model to the prediction of cognitive and language outcomes of infants experiencing social and familial risk factors. An exploration of risks including poverty status, stressful life events, and poor quality of the home environment were evaluated along with performance on developmental outcome measures. Findings showed that the cumulative risk index was significantly correlated with language outcomes and social skills. Furthermore, as the number of children's risk factors increased, so did the negative outcomes on language and performance on early developmental inventories (Hooper, et al., 1998).

Similarly, researchers have examined the relation between number of risks and social-emotional development. Researchers Appleyard, Egeland, van Dolman, & Sroufe (2005) applied the use of a cumulative risk model to understand the relations between young children's behavioral functioning and multiple risk factors including maltreatment and socioeconomic status. Unique to this study, researchers not only explored the impact of multiple risk factors during early development, but the degree to which cumulative risk predicted outcomes through adolescence. Findings showed that children with a higher cumulative risk index score had more internalizing and externalizing atypical behaviors in early childhood; the risk index score also significantly predicted delays in behavior through adolescence.

Across these studies, the number of risk factors included in analyses ranged from two to 12. These risks are measured in a variety of ways. Some studies determined risk by degree of severity (e.g. scores are below average, average, above average, or elevated) or presence (did the child experience the risk—yes or no?) (Appleyard, et al., 2005; Hooper et al., 1998; Laucht, et al., 1997; Liaw & Brooks-Gunn, 1994). Similar across studies is the presence of biological and psychosocial risk factors as well as covariate considerations such as gender or race. The analyses executed in these studies were centered on associations and the predictive nature of risk factors. Preliminary correlational analyses were executed, as were series of ANOVAs and regression models (Appleyard, et al., 2005; Hooper et al., 1998; Laucht, Esser, & Schmidt, 1997; Liaw & Brooks-Gunn, 1994). Authors noted that regression models have been used throughout prior studies to understand the association between each specific risk

factor and outcomes; while ANOVA models are used within cumulative risk analyses to understand outcome as it varies by the relations between cumulative risk scores (number of risks experienced) and outcomes (Appleyard, et al., 2005; Hooper et al., 1998; Laucht, Esser, & Schmidt, 1997).

Limitations

Exploration of cumulative risk models shows the significance and importance in understanding the effects of multiple risks on children's early developmental outcomes. Missing in the literature is an evaluation of cognitive, linguistic, motor, and social-emotional skills in children birth to 5 experiencing homelessness who experience additional risk in regards to maltreatment or health factors. This study was designed to build from current research to better explain the experiences of these understudied, fragile children, and the degree to which cumulative risks are associated with the developmental status of these children. It was expected that findings from this investigation—combined with the growing research in this emerging field – would inform development of services and policies to support these children and families.

The Current Study

Children birth to 5 years experiencing homelessness are at a high risk for developmental delays in the areas of cognition, language, motor skills, and social-emotional functioning. In addition to the experience of homelessness, these young children are typically faced with other risk factors that may affect their developmental status. Specifically, many children without homes have a history of maltreatment and early health problems. The

current study was designed to add to this body of literature and expand upon it. The aim was to provide insight into the development of children birth to 5 years experiencing homelessness and additional risk by calculating a cumulative risk index score and determining the degree to which that score predicted children's current developmental status. Prior research has examined risk factors in isolation for children birth to 5 experiencing homelessness, however, a cumulative risk model had not yet been applied to the exploration of development of children who are homeless. This study also was designed to add to the existing knowledge about co-occurrences of developmental and social-emotional delays in these populations, two constructs that have typically been examined independently (Haskett, Armstrong, & Tisdale, 2015).

Research Questions and Hypotheses

The primary research question addressed was whether the number of risk factors a child experienced was associated with developmental status in the areas of language and motor skills, overall cognition, and social-emotional functioning. The following hypotheses were tested:

1. The primary research hypothesis was that the cumulative risk index score would be a significant predictor of developmental outcomes. A higher cumulative risk index score would predict negative developmental and social-emotional outcomes, such that:

- a. Children who experienced more early risk as indicated by the cumulative risk score would have lower scores in the areas of overall cognition, language, and motor skills.
- b. Children who experienced more early risks, as indicated by the cumulative risk score, would be more likely to have scores on a measure of social-emotional development that were elevated and indicated need for referral for mental health services.

A secondary goal of the proposed study was to describe the overall functioning of this sample of children. It was hypothesized that:

2. The mean language, motor, and overall developmental scores for this sample would be below average and significantly lower than the mean for the norming sample (100).
3. In accordance with prior studies of children experiencing homelessness, approximately 25% of the children would obtain scores from a social-emotional questionnaire indicative of mental health needs.

Methods

Participants

The sample consisted of 109 children birth to age 5 screened by the Community Action Targeting Children who are Homeless (Project CATCH), a community-based program aimed at meeting the mental health needs of children experiencing homelessness in central North Carolina (Donlon, Lake, Pope, Shaw, & Haskett, 2014). All participants had

experienced homelessness in one of 11 shelters at the time of screening. Of these participants 50 were male (46%) and 43 were female (39%), with gender information unavailable for 16 participants (15%). The ages of participants ranged from 2 month to 69 months ($M=32.63$, $SD=17.54$). Race and ethnicity were not available in the data set, but nationally and locally, the majority of families residing in shelters include children of color (National Center on Family Homelessness, 2011).

Procedures

Project CATCH aims to assess children's functioning to facilitate appropriate referral for outside support services (Donlon, Lake, Pope, Shaw, & Haskett, 2014). With parental permission, shelter workers contact a CATCH case manager to arrange screenings for all children in the family as soon as the family arrives at the shelter. Screenings are conducted with each family in a private space in the shelter. The first step in screening includes completion of the Psychosocial Questionnaire (see Appendix A). This questionnaire is structured as a one-on-one interview with parents. It provides information about child demographics and early life experiences. Children birth to 5 are then administered the Brigance Early Childhood Screen, Second Edition and parents complete the Ages and Stages Questionnaire: Social-Emotional. These tools were selected by CATCH to identify developmental delays and challenges in social-emotional functioning to identify needs and provide appropriate referrals and interventions for children and families (Haskett, Armstrong, & Tisdale, 2015).

Upon confirmation that screenings had been completed, the investigator entered screening data into a larger extant set used by Project CATCH. Once all information from the database had been de-identified, applicable data for the current study was extracted and analyzed. The university institutional review board at North Carolina State University granted approval for the use of this extant data.

Measures

Cumulative risk index. A cumulative risk score ranging from 1-6 was calculated based on the presence of homelessness and the following five risk factors as indicated by parent report on the psychosocial questionnaire: (1) familial involvement with Child Protective Services, (2) child birth prior to 35 weeks, (3) any time spent in the Neonatal Intensive Care Unit (NICU), (4) additional hospitalizations beyond the NICU, and (5) any medical diagnoses/health problems experienced per parent report from the following: asthma, allergies, stomach problems, ear infections, dental problems and/or sleep problems. While information on obesity, chronic pain, and chronic illness was collected, the incidence of parents reporting their child experiencing these health conditions was very low (two or fewer participants), and was therefore not included in the cumulative risk scores. An illness variable was created to indicate if a child had experienced any of the prior (e.g., risk 5). An early health risk variable was also created based on whether the child had experienced illness, preterm birth, time in the NICU, and any additional hospitalizations.

Ages and Stages Questionnaire: Social-Emotional. The Ages and Stages Questionnaire: Social-Emotional (ASQ:SE) is a parent-report rating scale used to examine

the social-emotional development of children from ages 3 to 63 months. The ASQ:SE is used as a screening tool to identify possible social-emotional delays as measured by questions addressing the areas of self-regulation, compliance, communication, adaptive behaviors, autonomy, affect, and social interaction (Squires, Bricker, Heo, & Twombly, 2001). Items are worded to examine areas of competence and difficulty, and parents respond based on the frequency of the observed behavior “Most of the Time,” “Sometimes,” “Never or Rarely.” The number of questions varies based on the form used; there are eight forms based on age. For example, the 6-month form has only 19 items but the 48- and 60-month questionnaires have 33 items. Point values are assigned for each response for every question, with corresponding values differing based on the question. Points are then totaled to receive an overall score. Scores obtained on the ASQ:SE are compared to cutoff scores by child age indicating whether a need for further evaluation is warranted. For purposes of this investigation, the mental health variable was dichotomized as either Elevated or Not Elevated. The ASQ:SE is available in English and Spanish, however; only the English version is administered during screenings (Ringwalt, 2008). ASQ:SE scores were available for 105 children in this sample.

Test developers Squires, Bricker, Heo and Twombly (2001) examined the internal consistency, test-retest reliability, sensitivity, and specificity of the ASQ:SE in a population of over 3,000 parents. Results showed internal consistency alphas ranging from 0.67 to 0.91 across forms with an overall alpha score of 0.82. The examination of test-retest reliability over 1-3 weeks showed a significant rate of 94% agreement between Time 1 and Time 2

parent ratings of behavior (Squires, Bricker, Heo & Twombly, 2001). Sensitivity of the ASQ:SE ranged from 0.75 to 0.89 with an overall sensitivity of determining at-risk behaviors at 0.82. Specificity scores ranged from 0.82 to 0.96 with an overall specificity of 0.92.

The ASQ:SE has been used in samples of at-risk children (Jee, Conn, Szilagy, Blumkin, Baldwin, & Szilagy, 2010; Haskett, et al., 2015). Jee and colleagues (2010) used the ASQ:SE to measure social-emotional adjustment of children between 6 and 66 months in foster care to determine if the systematic use of a social-emotional screening tool improved detection rate of social-emotional difficulties as compared to clinical judgment alone. Findings showed that the use of the ASQ:SE increased the detection of possible social-emotional problems more frequently and more accurately than clinical judgment and the original ASQ developmental screener. Furthermore, the authors found that the ASQ:SE was easy to use as a screening tool.

Brigance Early Childhood Screen, Second Edition. The Brigance Early Childhood Screen, Second Edition (Brigance) is a standardized developmental screening measure for children birth to 90 months old (Squires, Nickel, & Eisert, 1996). The Brigance has seven forms that correspond to a child's age. An extension of the Brigance has also been created and validated with the goal of measuring the early developmental abilities of children birth to 24 months (Glascoe, 2002). The extension includes an infant form and toddler form. The Brigance forms assess emerging cognitive, speech, and motor skills based on screeners' observation of the child. Children receive credit for an item if the behavior or skill is observed either through direct assessment to elicit the behavior (e.g. asking them for the

name of a color) or observation during screening (e.g. stacking while playing in the room). A child also receives credit if the parent reports the child can complete a skill. Raw scores are then transferred into a standard quotient score by age, with a Mean of 100 and Standard Deviation of 15. Brigance scores were available for 62 children in this sample.

Standardization and validity studies have revealed that the Brigance shows sensitivity and specificity between 0.73 and 1.00 (Glascoe & Dworkin, 1995). In an update published in 2006, developers reported sensitivity of 70% and specificity of 82% for the detection of developmental delays (Brigance, 2010). In a recent study, Brigance (2010) reported high levels of internal consistency, test-retest reliability, and inter-rater reliability ranging from 0.81 to 0.99. Across studies, scores on the Brigance screening tool highly correlate with well-established early developmental measures such as the Bayley Scales of Infant and Toddler Development (Hamilton, 2005). On the Infant and Toddler Brigance, sensitivity and specificity range from 70 to 80% and scores are highly correlated with scores on the Developmental Indicators for Assessment of Learning (Glascoe, 2002). Both screenings have shown to provide reliable and valid measures of children's developmental progress in an efficient and easy-to-use model for a range of practitioners (Ringwalt, 2008).

Prior investigators have used the Brigance to examine the developmental functioning of children birth to kindergarten with or at risk for developing disabilities due to biological and/or psychosocial risk factors (Haskett, et al., 2015; Macy, 2012). In a 2012 research synthesis, Macy examined the use, accuracy, and/or effectiveness of common developmental screenings of this population. Findings showed that the Brigance was one of the top four

most commonly used developmental screenings; since 1988 it has been used in published studies with over 3,400 children. This synthesis also revealed that the Brigance has demonstrated utility and construct, concurrent, and predictive validity. One study by Mantzicopoulos (1999) revealed strong inter-rater (0.97) and test-retest reliability (0.82) in a sample of Head Start children.

Results

Preparation of the data and preliminary analyses. The first step in analyses included a review of missing data. The sample was composed of data on 109 children birth to 5 years who had a cumulative risk score and a score on the ASQ:SE ($n=105$; 96%) and/or the Brigance ($n= 62$; 57%). Only 43 participants (39%) had a score on the motor subscale of the Brigance, which was not a result of missing data, but rather that motor functioning is not measured on the Infant and Toddler versions of the Brigance. Power analyses were conducted to determine if appropriate sample size was available for each statistical test with a set moderate effect size of 0.5 and power of .05. The sample sizes were sufficient to continue with planned analyses to address the hypotheses.

Following this, analyses were conducted to gather descriptive understanding of the sample (see Table 1). First, frequency scores were attained about medical diagnoses and health issues. Information was available on whether the child had been diagnosed with or experienced any of the following: asthma, allergies, obesity, stomach problems, ear infections, chronic pain, chronic illnesses, dental issues and sleep problems. The highest incidence of medical need experienced by the sample included allergies (17%) and ear

infections (17%), with the lowest incidences in chronic pain, chronic illness, and obesity (<1%). Approximately 20% of the sample was born preterm, 11% spent time in the NICU, and 17% had been hospitalized. Overall, 59% of the sample experienced some form of early health risk. Experience of maltreatment, conceptualized through parent report of involvement with CPS, was indicated in 12% of the sample. The next step in analyses included calculation of cumulative risk and assignment of risk group. The distribution of cumulative risk was positively skewed as the majority of participants experienced only homelessness (39%) or homelessness and one additional risk (34%). The highest group membership was in homelessness and early health risk (50%) with the lowest membership in homelessness and maltreatment (3%). Additional preliminary analyses showed normal distributions across remaining variables with no outlier variables of concern.

Correlations were calculated to assess the relations among cumulative risk index scores, mean scores on the motor and language Brigance scales, mean overall Brigance quotient score, the dichotomized ASQ: SE variable and the degree to which these dependent variables were related to child gender and age. As would be expected given overlap in items, there were significant positive correlations between the overall Brigance quotient score and motor subscale scores, $r(43) = .54, p < .001$ and language subscale scores $r(62) = .84, p < .001$. A negative correlation was present between Brigance quotient scores and scores on the ASQ: SE, $r(58) = -.36, p = .006$. Age and gender were significantly correlated with mean scores on the Brigance motor, language, and overall quotient score, as well as the

dichotomized score from the ASQ:SE. As such, age and gender were controlled when appropriate in subsequent regression equations to test the proposed hypotheses (see Table 2).

Test of hypotheses. To address the first hypothesis (1a) and explore the predictive nature of cumulative risk score on overall cognition (as measured by the Brigance quotient) and motor and language skills, a hierarchical multiple regression model was executed to control for the effects of age and gender. The data met assumptions of linearity and homoscedasticity as determined by a review of a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by Durbin-Watson statistics of 1.63 (Brigance quotient), 2.08 (language), and 1.98 (motor) respectively. There was no evidence of multicollinearity as assessed by tolerance values greater than 0.1. There were no studentized deleted residuals greater or less than 3 standard deviations, no leverage values greater than 0.2, and values for Cook's distance above one. Assumption of normality was met as assessed by Q-Q plot. Contrary to hypotheses, results showed a nonsignificant correlation between cumulative risk scores and scores on the motor, language, and overall quotient score of the Brigance. While skewness of the cumulative risk variable was identified, analyses were still completed to address proposed hypotheses.

Three hierarchical multiple regressions were run, with the first to determine if the addition of cumulative risk improved the prediction of Brigance quotient scores over and above age and gender. The baseline model with age and gender was statistically significant, $R^2 = .36$, $F(2, 51) = 14.37$, $p < .001$; adjusted $R^2 = .34$. The addition of cumulative risk resulted in a statistically non-significant R^2 change, $F(1,50) = .47$, $p = .50$, $R^2 = .006$ (see

Table 3). The baseline model with age and gender predicting language scores was also statistically significant, $R^2 = .22$, $F(2, 51) = 7.17$, $p = .002$; adjusted $R^2 = .19$. Similar to the model for overall quotient, the addition of cumulative risk to the prediction of language scores resulted in a non-significant change in R^2 , $F(1,50) = .11$, $p = .74$, $R^2 = .002$ (see Table 4). In the final regression model, the base model of age and gender predicting motor scores was statistically significant, $R^2 = .29$, $F(2, 34) = 6.94$, $p = .003$; adjusted $R^2 = .25$; with a significant change in R^2 , $F(1,33) = 5.14$, $p = .03$, $R^2 = .10$, upon the addition of cumulative risk (see Table 5). Overall, the addition of cumulative risk did not result in a significant change from the foundational predictive strength of gender and/or age on Brigance quotient, language, but did for motor scores.

To address hypothesis 1b, exploring the predictive nature of cumulative risk score on ASQ:SE outcome, a binomial logistic regression was used. A positive correlation was observed between cumulative risk and ASQ:SE scores, $r(105) = .37$, $p < .001$. The logistic regression model was statistically significant, $\chi^2(3) = 19.09$, $p < .001$, with the Homer and Lemeshow test showing it to be a good fit ($p > .05$). The model explained 26% (Nagelkerke R^2) of the variance in scores on the ASQ:SE and correctly classified 74% of the cases. Sensitivity (accurate prediction of an elevated score) was 43% and specificity (accurate prediction of a non-elevated score) was 89%. Of the three predictive variables, gender and cumulative risk were statistically significant (See Table 6).

To better understand the developmental abilities of these children, and to address hypothesis 2, one-sample t -tests were used to compare sample mean scores on the Brigance

scales (language, motor, overall quotient) to the normative mean of 100. Opposite from what was predicted, mean motor ($M = 100.56$, $SD = 18.38$), language ($M = 101.92$, $SD = 17.53$), scores were not statistically significantly different from the population mean of 100. The mean overall quotient score ($M = 104.65$, $SD = 16.02$) was significantly higher than the standardized Brigance mean of 100, $t(61) = 2.28$ $p = .026$.

To address hypothesis 3, the percentage of children receiving elevated scores on the ASQ: SE was obtained. This rate was 31%, which was higher than the predicted 25%.

Exploratory analyses. To address possible weakness as a result of skew in the cumulative risk variable, the sample was divided into two groups based on cumulative risk scores that were indicative of relatively high risk (e.g., cumulative risk = 2-6; $n = 67$) and low risk (e.g., cumulative risk = 1; $n = 42$). Three one-way ANCOVAs were then run to determine whether mean Brigance scores differed for high or low risk groups after controlling for age and gender. After adjustment for age and gender, a statistically significant difference was not observed in mean Brigance scale scores between risk groups.

Additionally, a chi-square test was conducted to determine whether the proportion of children in high and low risk groups differed in ASQ:SE outcome. There was a statistically significant association between group membership and ASQ:SE outcome, $\chi^2(1) = 14.78$, $p < .001$, with a moderately strong association between risk group and ASQ:SE outcome, ($\phi = 0.38$, $p < .001$) observed.

Discussion

The time between birth and age 5 is one of most rousing and crucial developmental timespans across language, motor, cognitive and behavioral areas. For some children traumatic events occur within this period, potentially compromising their developmental trajectory (Center on the Developing Child, 2007). Prior research has found the experiences of homelessness, early health risk, and maltreatment independently influence developmental skills (McGowan, et al., 2011; Park, et al., 2011; Scarborough, et al., 2009). While cumulative risk models have been examined as predictors of cognitive abilities and social-emotional skills in young children, there has yet to be an examination of the outcomes in both areas in samples of children birth to 5 years experiencing homelessness. The current study aimed to explore the developmental status of these children to better understand the compounding nature of risk including homelessness, early poor health, and maltreatment. Additionally, the investigator set out to further explore the life experiences of homeless children to gain a better insight into the frequency and nature of cumulative risks faced, to inform future practice.

Children Birth to 5 Experiencing Homelessness

To describe the type of risk faced by the sample, a review of their early health risk and child maltreatment experience was conducted. Homelessness and early health risk was the most common area of risk, with 50% of the sample experiencing this combination of risk factors. The experience of premature birth occurred for 20% of the sample, which is higher than that of the Center for Disease Control's estimated 10% of all children born (Center for

Disease Control, 2015). As with the general population of children birth to 5, hospitalization experiences of homeless children can vary. Anecdotally, a review of the current data indicated that all hospitalizations reported were based on health care emergencies (e.g., broken bones, high fevers), and did not result from chronic health issues or needs for routine medical care. The highest incidence of health need was allergies followed by ear infections and asthma, trends consistent with observed rates of respiratory problems and reoccurring ear infections in populations of children experiencing homelessness (McLean, Bowen & Drezner, 2004; Weinreb, Goldberg, Bassuk & Perloff, 1999). In summary, the types and frequencies of health risks experienced by children in the current sample were consistent with those observed in other samples.

Parents were also asked to report if their child had been involved with Child Protective Services (CPS) as a measurement of maltreatment. In the current sample approximately 12% had in some capacity interacted with CPS. This statistic is below prior findings of CPS involvement within the first five years of life of children experiencing homelessness, which has been found to approach 40% (Culhane, Webb, Grim, Metraux, & Culhane, 2003). Reasoning behind the difference could be due to perceived stigma about reporting CPS involvement or for fear of future repercussions among parents in this current sample.

Descriptive results demonstrated that children in this sample experienced a variety of adverse experiences above and beyond homelessness, with the average number of risk factors being two. Almost 75% of the sample experienced homelessness only or homelessness and

one additional risk. Approximately 11% of the sample experienced four, five, or six risk factors indicating that while not as frequent, there is a subsample of children experiencing homelessness with a high level of need and additional risk beyond their living circumstance.

Cumulative Risk and Developmental Skills

The first goal of the study was to determine if cumulative risk would be predictive of developmental skills in the areas of language, motor, and cognition. It was hypothesized that children who experienced more risk as indicated by a higher cumulative risk score would have lower scores on these scales. Preliminary correlations showed that cumulative risk was not correlated to scores on Brigance scales. Furthermore, contrary to hypothesized outcomes, only age and gender were significant unique predictors of screening scores. When cumulative risk was added to the model, significance was maintained, however, cumulative risk did not significantly increase the amount of variance in developmental scores accounted for, with the exception of motor skills. The follow-up ANCOVAs produced a similar pattern of results. These findings contradict the existing literature that has found the number of risks experienced to be a significant predictor of developmental status, particularly language skills (Hooper, et al., 1998).

The majority of children (73%) in the sample experienced only homelessness or homelessness and one additional risk, with an average cumulative risk score of 2 and a standard deviation of 1.13. This restriction in range on the cumulative risk score may have impacted the ability to detect a relationship between these variables. A larger sample size might have reduced the impact of this restriction in range.

A secondary goal of the study was to better understand the early functioning of this sample of children experiencing homelessness. As such, the sample mean scores obtained on language, motor, and cognitive scales were compared to the mean of the norming sample for the standardized measure. Contrary to the hypotheses and results of a study based on a very similar sample (Haskett, et al., 2015), results revealed that language and motor mean scores were not significantly different from the norming group and that overall cognitive scores were significantly higher. Another unexpected finding was that age was a significant predictor of developmental functioning. Post-hoc analyses showed that by group comparison (e.g., birth-11 months, 12-23 months, 24-35 months, 36-47 months, 48-59 months, 60-71 months) children birth-11 months had a mean Brigance quotient score of 122, which was 18 to 27 points higher than the older age group mean scores. The trend for scores to be lower for older children who are homeless has also been observed in a prior study with a similar sample (Haskett, et al., 2015). Reasoning behind this trend may be a result of the earliest indicators of differences between innate and learned skills. For example, to receive credit across areas of language skills on the Brigance Infant form, children need to simply demonstrate an ability to turn their head in reaction to a sound or vocalize at others, while a 4 year old would be required to identify pictures, say their name, or identify colors, all skills that are learned.

It is also important to consider staffing and institutional pressures that may have impacted the validity of Brigance scores obtained across ages. Over the course of data collection there was turnover in Project CATCH staff. As part of this turnover, training for

case managers on the Brigance was limited to exposure and demonstration rather than full training on the tool or in assessment practices and standardization in general. Based on grant demand there was systemic pressure to complete all screenings in a timely manner, which may have compromised screening administration fidelity and validity. For example, parent report was frequently used to give credit for skills not observed or not elicited when screening the child.

Cumulative Risk and Mental Health

In accordance with the primary goal of the study, the second hypothesis was that cumulative risk would act as a predictor for scores above the clinical cutoff on the parent-report measure of children's mental health. Findings showed that cumulative risk did emerge as an independent predictor of elevations on the measure of mental health needs, concurrent with existing literature that demonstrates a strong link between cumulative risk and children's social-emotional functioning (Appleyard, et al., 2005). As cumulative risk scores increased so did the potential for a child to have a score above the cutoff on the ASQ:SE. This finding was consistent across analytic approaches and suggests that the number of risks experienced by children birth-5 who are homeless is closely associated with parents' perceptions of their young children's internalized and externalized behaviors.

Also included in the second goal of this study was to better understand the mental health needs of this sample. It was predicted, based on prior research of a similar sample, that approximately 25% of the children would have a mental health need. In the current sample, 33% of these children had scores above the cutoff on the ASQ:SE, indicative of mental

health concerns. Although the rate was somewhat higher than the rate observed in some prior studies (Bassuk, et al., 2015; Haskett, et al., 2015), Conrad (1998) identified behavioral challenges in samples of preschool children experiencing homelessness around 30%. Taken together, these results indicate that while these children had typical developmental functioning as measured by the Brigance, many were at-risk for mental health challenges.

Limitations and Future Directions

The greatest limitation to the current study was the proportion of missing data resulting in a smaller than expected sample size. Even though preliminary analyses indicated significant power for hierarchical linear and logistic regressions, there was missing screening data across participants, which decreased sample sizes and resulting power for each Brigance scale analysis. There was also restriction in range on the cumulative risk variable and a larger sample might have reduced the impact of this restriction in range. Indeed, there was less missing data for the ASQ:SE than for the Brigance, and the cumulative risk score was associated with ASQ:SE outcomes but not Brigance scores. Ideally the sample size would have met or exceeded 120 with complete information on each participant, and this should be the goal for future studies.

The reasoning for the high incidence of missing data may be a result of general difficulties in shelter screening practices. There are a number of factors that make it very difficult to complete screenings. Challenges include the transient nature of this population, limited funds leading to insufficient staffing, and complex family schedules, factors that appeared to impact the ability to screen all children coming into the local shelters (Lynch et

al., 2015). In their study of the Medical Home for Homeless Children Program, Lynch and colleagues observed that shelter staff were only able to screen approximately 24% of individuals who came through the shelter and were eligible for screening. In the current study, the psychosocial questionnaire was completed at time of referral for 194 children, while only 71 had full Brigance and ASQ:SE screenings completed, a 37% screening completion rate.

Per consultation with Project CATCH staff, difficulties in attaining full screening data were also attributable to the limited access to children. Project staff work during the day so they were able to schedule interviews with parents but the children were typically enrolled in child care or preschool and were therefore not available for daytime screening. Indeed, almost all children in the sample had complete ASQ:SE screenings because that measure is completed via parent report. It was much more difficult to schedule sessions to administer the Brigance directly to children. Future screening procedures may be adapted to address this need by utilizing standardized parent-report forms to measure developmental skills, such as the Ages and Stages Questionnaire, which is designed to measure similar areas as the Brigance for children birth to 60 months.

The amount of missing data directly impacted the ability to explore additional research questions, which may be addressed in future studies with larger sample sizes. Comparisons between risk groups (e.g., homeless only, homeless and early health, homeless and maltreatment, homeless early health risk, and maltreatment) could not be examined, as there was not enough data available for each subgroup. Future research questions to be

examined include: How do the developmental outcomes differ between groups of children who have experienced homelessness and one other risk factor? Concurrent with the prior literature suggesting that the impacts of psychosocial risk factors are more lasting and wide ranging than medical risk factors (Laucht, et al., 1997; Ozkan, et al., 2012), do children experiencing maltreatment as their secondary risk to homelessness have significantly lower scores in cognition, language, motor as compared to those who experienced early health risk (but not maltreatment) secondary to homelessness? Additionally, which subgroups of children are at a greater risk in regards to mental health needs and referrals?

The current measure of maltreatment was based on an assumed correlation between CPS involvement and an experience of maltreatment. It did not involve any exploration into confirmed cases of maltreatment (e.g., abuse, neglect), and relied solely on parent report for this information. A more valid measure of maltreatment might allow for more meaningful conclusions to be drawn about the relationship between maltreatment and cumulative risk; however, this is difficult based on regulations around confidentiality and access to information about minors.

The scope of risks examined in this study was somewhat limited. Additional risks that could be examined in future studies include parental depression and parent/child separation. Research indicates that maternal mental health, particularly the experience of depression, has an impact on the cognitive and socio-emotional development of children (Canadian Pediatric Society, 2004 Cummings & Davies, 1994; Kiernan & Mensah, 2009; Petterson & Albers, 2001). In addition, the research in child maltreatment shows that experiences of early parent-

child separation have negative impacts on social-emotional development (Howard, Martin, Berlin, & Brooks-Gunn, 2011).

Finally, this study focused exclusively on adverse experiences as risks for developmental challenges. A broader model including protective factors would provide beneficial information for intervention planning. Factors such as strong familial and social support, child engagement in stable childcare or school, parent employment, and positive parental mental health have all been identified as protective factors for positive child development and resilient functioning in high-risk populations (Masten, Cutuli, Herbers, & Reed, 2009) and could be explored in samples of young children experiencing homelessness.

Concluding Thoughts

Some of the findings in the current study contradicted prior evidence of the need of young children experiencing homelessness in regards to motor, language, and overall early cognitive skills. It is important to note that these findings do not discount the need for continued screening; rather they point to variance in the population and the need for further exploration of developmental functioning among these children. Mental health needs were quite high but there were many children whose parents did not report significant concerns about their children's social-emotional functioning, which also speaks to sample variances within the population and a need for continued screening of these young children. While some of the hypotheses put forth in this study were not supported, it was encouraging that findings indicated more positive development among these young homeless children than was anticipated. Specifically, these children had language, motor and cognitive skills similar

to those of the standardized population and over 65% of the children in this sample did not have mental health needs, findings to be celebrated. Ultimately, the current study provides more information about the youngest in the homeless population, speaks to a range of strengths and needs, and raises questions and ideas for next steps in research.

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Table 1

Sample Frequencies of Risk Experience

	<i>N</i>	%
Early Health Risk	64	59
Preterm	22	20
Time in NICU	12	11
Hospitalized	19	17
Medical Dx/Diff.	48	44
Asthma	12	11
Allergies	19	17
Stomach Prob.	7	6
Ear Infect	18	17
Dental Prob.	3	3
Sleep Prob.	8	7
Maltreatment	13	12
Homelessness Only	42	39
Home. + Early Health Risk	54	50
Home. + Maltreatment	3	3
Early Health Risk + Maltreat.	10	9

Table 1 continued

Sample Frequencies of Risk Experiences

	<i>N</i>	%
Cumulative Risk = 1	42	39
Cumulative Risk = 2	37	34
Cumulative Risk = 3	19	17
Cumulative Risk = 4	6	6
Cumulative Risk = 5	4	4
Cumulative Risk = 6	1	1

Note. Cumulative Risk $M = 2.05$; $SD = 1.13$

Table 2

Correlations among Study Variables

	1	2	3	4	5	6	7
1. Age (mo)		-.11	.10	-.45**	-.42**	-.46**	.23*
2. Gender			-.19	.38*	.31*	.44**	-.28**
3. Cumulative Risk Score				-.36*	-.13	-.13	.37**
4. Brigance Motor Scale Score					.15	.54**	-.26
5. Brigance Language Scale Score						.84**	-.39**
6. Brigance Quotient Score							-.36**
7. ASQ:SE							

Note. ASQ:SE = Ages and Stages Questionnaire: Social Emotional Score

* $p < .05$ two-tailed; ** $p < .01$ two-tailed

Table 3

Hierarchical Multiple Regression Predicting Brigance Quotient Scores from Age, Gender and Cumulative Risk

Predictors	Brigance Quotient Scores			
	Model 1		Model 2	
	B	β	B	β
Constant	100.43**		102.31**	
Age (mo)	-.39**	-.42**	-.38**	-.41**
Gender	11.67**	.37**	11.56**	.37**
Cumulative Risk			-1.05	-.08
R^2	.36		.37	
F	14.37**		9.64**	
ΔR^2	.36		.006	
ΔF	14.37**		.47	

Note. $N = 54$; * $p < .05$; ** $p < .01$

Table 4

Hierarchical Multiple Regression Predicting Brigance Language Scores from Age, Gender and Cumulative Risk

Predictors	Brigance Language Scores			
	Model 1		Model 2	
	B	β	B	β
Constant	101.05**		102.19**	
Age (mo)	-.38**	-.36**	-.37**	-.35**
Gender	8.76	.25	8.69	.25
Cumulative Risk			-.64	-.04
R^2	.22		.22	
F	7.17**		4.74**	
ΔR^2	.22		.002	
ΔF	7.17**		.11	

Note. $N = 54$; * $p < .05$; ** $p < .01$

Table 5

Hierarchical Multiple Regression Predicting Brigrance Motor Scores from Age, Gender and Cumulative Risk

Predictors	Brigrance Motor Scores			
	Model 1		Model 2	
	B	β	B	β
Constant	116.18**		129.58**	
Age (mo)	-.72**	-.39**	-.75**	-.40**
Gender	12.57*	.34*	10.68*	.29*
Cumulative Risk			-4.55*	-.31*
R^2	.29		.39	
F	6.94**		6.90**	
ΔR^2	.29		.10	
ΔF	6.94**		5.14*	

Note. $N = 37$; * $p < .05$; ** $p < .01$

Table 6

Logistic Regression Predicting ASQ:SE Scores from Age, Gender and Cumulative Risk (N=92)

	<i>B</i>	SE	Wald (<i>df</i> =1)	<i>p</i>	Odds Ratio	95% CI for OR
Age (mo)	.03	.02	2.91	.09	1.03	1.00 - 1.06
Gender	-1.01	.52	3.83	.05	.37	0.13 - 1.00
Cumulative Risk	.62	.24	6.92	.01	1.86	1.17 – 2.97
Constant	-2.49	.83	9.06	.00	.08	

APPENDICES

Appendix A

Psychosocial Questionnaire

Parent Name

Date of Birth ___/___/___

Child Name

Date of Birth ___/___/___ M or F

Other Household Members

Name	Relationship to Child	Age

Early Life Experiences

Were there any problems or complications with pregnancy or birth?

___ Yes ___ No

If yes, please describe: _____

Was your child born preterm? _____ Yes _____ No

If so, were they less than 35 weeks gestation? _____ Yes _____ No

What was your child's birth weight? _____ lbs _____ oz

Did your child spend time in the NICU? _____ Yes _____ No

Has your child ever been diagnosed with any developmental delays? ___ Yes ___ No

If yes, what delays and if applicable what services are being provided?

Delays	Services

Was your child adopted? Yes No

Date of Adoption ____/____/____

Have you always had custody of your child? Yes No

Has CPS ever been involved with your family? Yes No

Have you ever sought counseling? Yes No

Has your child ever witnessed fighting between adults? Yes No

Education

Daycare/Preschool Services-Children 0-5

Is your child currently in a daycare or preschool program? Yes No

If yes, where: _____

If no, would you like help obtaining care? Yes No

Does your child have an IFSP or an IEP? Yes No Don't Know

Primary Education-Children 5 and Older

Did your child previously attend preschool? Yes No

Where does your child go to school? _____

Grade: _____ Teacher: _____

Does your child have an IEP? Yes No Don't Know

Is your child in any special classes or programs? Yes No Don't Know

If yes, what classes/programs? _____

Is your child performing on grade level? Yes No Don't Know

Has your child ever experienced any of the following problems at school?

Detention, suspension or expulsion: Yes No Don't Know

Incomplete Homework: Yes No Don't Know

Learning Difficulties: Yes No Don't Know

Low Grades: Yes No Don't Know

Would you like help with school issues related to learning or behavior? Yes No

Health Information

Does your child have medical insurance? Yes No

If yes, Private (name of company _____)

_____ Medicaid _____ HealthChoice

Does your child have a pediatrician? _____ Yes _____ No

If yes, who? _____

Do they see any other doctors? _____ Yes _____ No

If yes, who? _____

If no to any of the above, would you like help obtaining care for your child?

_____ Yes _____ No

Is your child up to date on immunizations? _____ Yes _____ No _____ Don't Know

Has your child ever had a hearing screening? _____ Yes _____ No _____ Don't Know

If yes, what were the results? _____ Pass _____ Fail _____ Don't Know

Has your child ever had a vision screening? _____ Yes _____ No _____ Don't Know

If yes, what were the results? _____ Pass _____ Fail _____ Don't Know

If no to any of the above, would you like help arranging immunizations/screenings?

_____ Yes _____ No

Does your child experience any of the following?

Asthma: _____ Yes _____ No _____ Don't Know

Allergies: _____ Yes _____ No _____ Don't Know

Obesity: _____ Yes _____ No _____ Don't Know

Stomach Problems: _____ Yes _____ No _____ Don't Know

Ear Infections: _____ Yes _____ No _____ Don't Know

Chronic Pain: _____ Yes _____ No _____ Don't Know

Chronic Illnesses: _____ Yes _____ No _____ Don't Know

Dental Issues: _____ Yes _____ No _____ Don't Know

Sleeping Problems _____ Yes _____ No _____ Don't Know

Do you have any concerns about your child's health? _____ Yes _____ No

If yes, please explain: _____

Is your child taking any medications? _____ Yes _____ No

If yes, what? _____

Has your child ever been admitted to the hospital? _____ Yes _____ No

If yes, at what age and why? _____

Additional Information

What else do you think would be helpful for us to know about your child?

How can we help you best care for your child?

