THE DEVELOPMENT AND COMPARATIVE EVALUATION OF A NEW MEASURE OF YOUNG CHILDREN'S HOME ENVIRONMENTS AS A PREDICTOR OF TODDLERS' DEVELOPMENT

by

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Abstract

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The quality of a child's home environment is considered to be an important influence on various aspects of children's health and development. This relationship has now become so well established that at least some measure of the home environment is used in most research centering on children's development. Most measures of the home environment, however, have focused on assessing aspects of the social environment in the home rather than the physical environment, even though there is a considerable body of research suggesting that the physical environment has a substantial impact on children's development. This is in part a reflection of the continuing tendency in psychology to privilege social variables over physical variables.

The purpose of this study is to correlate parameters of the home environment with aspects of children development using a newly designed tool, "Measurement of Children's Home Environment "(MYCHE). Twenty-two parent-child dyads were sampled in this study, with children's ages between fourteen through twenty-four months. Measurement of the home environment included the MYCHE, the HOME scale and a parent questionnaire. Developmental evaluation of toddlers was assessed with the Bayley

Scales of Infant Development-II. Analyses indicate higher correlations between MYCHE scores and cognitive development scores than HOME scores and cognitive development scores. Using the MYCHE evaluation tool, the physical parameters most positively correlated with cognitive development were home resources, crowding, and noise. No significant relationships among physical parameters and gross motor development were found. Hierarchical regression analyses indicate that the physical parameters of the home environment mediated aspects of the parent-child interaction as measured during a teaching episode. The policy implications of the study and the concept of "housing as intervention" are discussed.

Foreword

The importance of housing in children's lives has only been given peripheral attention in the past few decades. This neglectful policy needs to be changed in order to truly make a lasting difference to the more than 2 million children subjected to poor housing and/or homelessness.

The purpose of this investigation is two fold. The first aim of this study was to develop and empirically test a measure developed specifically to evaluate those parameters of the home that might most impact interaction and development as currently, there is a dearth of easy to use, objective scales available. The second aim was to explore some of the ways in which substandard housing affects parent-child interaction and through a mediational process, children's development.

In this political climate of ever-increasing federal budget cuts, enriching our knowledge base regarding the transactional nature of housing and the effects that it exerts on families' lives and children's development is critical to designing effective intervention programs that can benefit children and their parents in a meaningful way.

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Introduction

The quality of a child's home environment has long been considered to be an important influence on various aspects of children's health and development. Over the past 30 years a significant amount of research has demonstrated that certain factors within the home environment may be predictive of children's cognitive, social, emotional, and physical development (Bradley & Caldwell, 1995; Clarke-Stewart, 1973; Evans, Saltzman, & Cooperman, 2001; Gottfried & Gottfried, 1984; Heft, 1979; Kelly & Barnard, 1997; Maxwell & Evans, 2000; Parke, 1978; Wachs, 1987, 1989, 1990). This relationship has now become so well established that at least some measure of the home environment is used in most research centering on children's development. Most of these measures of the home environment, however, have focused on measuring aspects of the social environment in the home rather than the physical environment. This finding, despite a large body of research suggesting that the physical environment has a substantial impact on children's development is most likely a reflection of a general tendency in many sub-fields of psychology to privilege social variables over physical variables.

The place of the physical environment in the development of a child's sense of self is not well developed in psychological theory. The physical setting has largely been viewed by psychologists as a backdrop or stage for social action to occur. This almost exclusive emphasis upon social relations is probably, in large part, a reflection of the methodological biases in the field of in psychology. Traditionally, the study of the impact of what is called "environmental" parameters on development has centered on the role of social environments, specifically interactions between child and

caregiver (Clarke-Stewart, 1973; Kelly & Barnard, 1997). The focus on purely psychosocial variables in problematic in two respects: First, children live in a social world that is set within a physical environment and each has documented effects on development. Secondly, the absence of the ecological perspective limits research findings because the multi-factorial process influencing development is not addressed.

In recent years the physical environment and the spatial organization of physical space have been found to be important in part because they are integrated into human social interactions and as such are mediators of those interactions (Heidmets, 1985). As children explore their physical surroundings they gain understanding of them and discover social and cultural norms and expectations about how to modify their behavior within them (Proshansky & Fabian 1987). While the social environment, as influenced by the physical environment is undeniably a driving force behind many aspects of young children's development and well being, unique parameters of the physical environment alone have been found to have a direct influence on development, in very specific ways (Wachs, 1989; Wachs & Chan, 1986; Gruen & Wachs, 1982).

The physical space and its' spatial arrangement, functions as a source of unique influence on development and well being in early childhood. Limited empirical research also suggests that the physical environment may mediate the social environment and not the converse (Wachs, 1989;Wachs & Chan, 1987). Parent-child interactions, for example, may suffer as a result of chronic exposure to substandard physical environments via decreased parental responsiveness. In addition, physical

objects and their spatial organization within the home can facilitate or hinder a child's developing competence and well being and be an important mediator of a child's developing independence (Proshansky & Fabian 1987). For example, a child may experiment with crayons on different surfaces, climb onto or under furniture, and explore closets and small spaces all of which may facilitate learning and development (Bartlett, 1997; Valsiner, 1987).

If the physical properties of the home are indeed important to children's development, then it is logical to expect that children who live in substandard housing are at risk for developmental difficulties as well as other health problems. Indeed the research to date does support this statement. Substandard housing has been associated with many indicators of ill health including stress, increased blood pressure, poor nutrition, low growth indicators and poor scores on measures of cognitive ability (Evans & Lepore, 1993; Evans, Saltzman, Cooperman, 2001; Evans, Lercher, Meis, Ising, Hartmut, Kofler, & Walter, 2001; Evans, Wells, Chan & Saltzman, 2000;. Hygge, Evans, & Bullinger, 2002; Maxwell & Evans,2000; Wachs ,1986). However, it has been difficult to disentangle the actual direction of these findings. Is poor housing a perpetuator of poverty, leading to inevitable increases in poor child and family outcomes? Or does poverty lead to the social issues that inevitably result in families forced to live in substandard housing conditions? In the end, this debate is probably not very important, rather, it may be more prudent to view housing as a potential target for intervention.

This study uses a newly developed scale, developed by the author, to examine the specific aspects of the physical environment of young children's homes as precursors

of early child developmental outcome. Specifically it is proposed here that certain aspects of the physical environment may have a stronger contribution to infant/toddler development than certain social aspects of the home environment and that the physical environment may mediate the relation between the social aspects of the parent-child interaction and its relation to infant/toddler developmental outcome.

This study has three specific goals: (a) to assess the capacity of the widely used HOME scale in comparison with a newly developed scale that measures physical parameters of the home in their ability to predict developmental outcome in infants and toddlers (b) to explore the associations among specific parameters of the physical environment of the home and infant/toddler development and (c) to assess the physical environment of the home as a mediator of the relation between the parent-child interaction and children's development.

In addition, this study explores these associations in a low-income sample. A preponderance of evidence suggests that more children from low-income families evidence developmental delays, particularly in cognitive areas, than their more affluent counterparts (Duncan, et. al, 1998; Kelly & Barnard, 1997; Klebanov, Brooks-Gunn, McCarton, & McCormick, 1998). Previous studies in psychology have most frequently explored these findings in the context of learned behavior and psychological stress. However, low-income families frequently experience increased stress as a result of insufficient resources and inadequate housing (Bartlett, 1997; Duncan, Yeung , Brooks-Gunn, & Smith ,1998; Saegert, 1976). These findings urge further investigation into how the physical aspects of inadequate housing may contribute to stressed parent-child interactions and which domains of family

interactions might be most vulnerable to substandard housing. Exploring this association within the context of the physical environment may enrich the relationship between parent-child interaction and childhood developmental delays. Inadequate housing is a national crisis and affects millions of families with young children socially and developmentally. The greater our understanding in this area, the greater the possibilities for developing effective interventions to address the needs of low-income families.

CHAPTER ONE:

Review of the Literature on the Influence of the Physical Environment on Children's Development

Classifying the Physical Environment of the Home

In considering the impact of the physical environment on child well being, an understanding of the defining parameters and components of this system is necessary. Previously, it may have been difficult to disentangle social environmental parameters from physical environmental parameters, particularly since certain social environmental phenomenon have been found to co-occur with certain aspects of the physical environment. For example high crowding and noise levels have been found to co-occur with parental non-responsiveness to children and negative parent-child interactions (Gottfired & Gottfried, 1986; Wachs, 1990) both of which have independently been associated with certain negative child development outcomes. Certain aspects of the physical environment may directly influence the child's development because they result in a direct impact on processes that affect the child such as parent-child interactions, while other more distal aspects of the environment indirectly influence the child by contributing to direct aspects of the environment (Wachs, 1989).

The physical environment has long been viewed as subject to the social environment in much of the psychological literature because individuals can design and modify their physical surroundings to some extent. However, theoretical and empirical research has suggested that social processes may be subject to aspects of the physical environment that are difficult or impossible to control (Barker, 1968; Bartlett, 1997; Saegert, 1976). Barker (1968), for example, suggested that individuals may be controlled by their environments, such as, a very small dwelling with little

space, loud noises from the neighborhood, or run down building exterior. A lack of personal physical space, which is often the case for those who are homeless, can control the degree to how one interacts with children and others living in close proximity. Any of these factors are difficult for inhabitants to control, and often impact directly on social interactions within the home (Wachs & Camilii, 1989). As a result, the physical environment needs to be given equal consideration with the social environment in the study of human development.

In classifying the physical environment of the home, one needs to include the physical structure of the home including layout and organization of available open and private space. Crowding and density in terms of physical objects (e.g. cluttered furniture) and number of people per space should also be included. Both focal and background noise are also included as physical environmental parameters, even though these may be socially produced. The nearby outdoor aspects of the environment, particularly resources such as parks and open space, also need to be considered. Furniture and objects within the home, particularly toys for infants, are also components of the physical environment. Finally, home health and safety factors, such as heating, adequate lighting, ventilation and necessary resources such as a refrigerator are all considered part of the physical environment.

Using the above delineation of the of the physical sphere of the home, a substantial amount of research on how these parameters impact the health and development of children has been done. In the following sections I will review the current state of understanding of how the home environment contributes to

development of self, attachment, development, health, parent-child dynamics and resiliency.

Home and the Development of Self and Identity

The process of identity formation is critical to a young child's development. This occurs through many different processes, including the context of the physical environment of the home. A home is an expression of, and a contributor to, a person's sense of self and identity. It is a reflection of personal status, cultural norms and values. Families who continually live in substandard housing internalize the visible dilapidations of their physical surroundings into their view of themselves.

> The presence of nonhuman threats conveys in devastating terms a sense that they [slum dwellers] live in an immoral and uncontrolled world. The physical evidence of trash, poor plumbing and the stink that goes with it, rats and other vermin, deepens their feeling of being moral outcasts. Their physical world is telling them that they are inferior just as effectively as do their human interactions. Their inability to control their environment of the depredations of rats, hot steam pipes, balky stoves and poorly fused electrical circuits tells them that they are failures as autonomous individuals (Rainwater, p29).

This quote, taken from sociologist Lee Rainwater's (1966) writings on the plight of slum dwellers, depicts the extent to which our physical surroundings inform our

idea of self and identity. Individuals surrounded by substandard living conditions may begin to feel worthless themselves and this imposed identify will often impede their efforts for improvement and may lead to feelings of chronic helplessness and lack of control. Czikszentmihalyi and Rochberg-Halton (1978), similarly note "people build their homes out of their essence ....but then these symbolic projections react onto their creators, in turn shaping the selves they are" (p. 138).

Likewise, Marcus Cooper's (1970) essay "The house as symbol of self" takes a psychoanalytic perspective on the meanings that a home holds in defining self and inter-personal relationships. Cooper writes that, like the individual, a home has an exterior which is readily seen by all, and via which relationships and judgements may be made, as well as a private interior which we may or may not choose to reveal to others. Just as one may not approach an unkempt, disheveled individual, one might make similar judgements about people who live in an unkempt or disheveled home.

Psychiatrist Melanie Fullilove (1996) points to three reasons for declining mental health in the homeless: excess mobility, the collapse of the inner city and the dearth of adequate low-income housing. According to Fullilove, within each of these issues the loss of place becomes a source of mental distress and diminished self-concept. This sense of diminished identity and lack of control over aspects of their surroundings may permeate relationships with others, specifically other family members. The lack of material expression of their value system may hinder their freedom to interact with their children as they desire. Furthermore, societal pressures about what the optimal home is, i.e. a single-family house, expose poverty stricken

and homeless children and their families to the harsh reality that their homes do not conform to societal norms.

Place Attachment and the Young Child's Home

The home environment not only contributes to the process of self-identity formation, but is also a critical factor in establishing and maintaining relationships with others through the process of attachment. The psychology of place posits that children need a "good enough" environment in which to live. According to Engle (1990) they are linked to their physical environment through three key psychological processes: attachment, familiarity, and identity. Through these processes, the relationship with the physical environment creates "sense of belonging" which is necessary for psychological wellbeing through bonding. This bonding is often referred to as "attachment". Place attachment, which parallels, but is distinct from, attachment to a person, is a mutual bond between a person and their physical environment. Familiarity refers to the processes by which people develop detailed cognitive knowledge of their environs. The issue of place identity is concerned with the extraction of a sense of self that is based on the places in which one lives or has lived.

First and foremost, people need the physical environment to provide a source of safety and security. Engel (1990) notes that in this regard, human survival depends on having a location that is "good enough" to support life. Consequently, it is a biological imperative that the physical living environment provides children with a safe shelter as well as promotes positive relationships with others. As discussed in

earlier sections, a "good enough" environment also transmits cultural messages of personal and social acceptance as well as respect.

John Bowlby (1988), in his seminal three-volume work on attachment, argued that each person occupies a unique personal environment that serves as an outer ring of life-sustaining systems complementary to the inner ring of systems that support psychological homeostasis. Although Bowlby's work centered on the long term ramifications of disturbed attachment to a caregiver, he did not completely neglect the milieu in which that relationship takes place. He noted that because a child's safety and security depend on this larger personal environment, and a threat to that environment may be interpreted as a threat to well-being. Attachment to place, like attachment to person, can best be conceptualized as a series of behaviors that modulate distance from, and seek contact with, the living environment, which is viewed by the child as a source of protection and security. According to Bowlby, an "insecure" attachment may affect a child's subsequent ability to form secure and trusting human relationships in the future. Using Bowlby's model, Bartlett (1998) argues that the childhood experience of insecurity and deprivation of the physical aspects of the home environment might likewise hinder the child's future capacity to establish a home that adequately fulfills the need for security, safety and comfort.

Louis Chawla has also argued that secure place attachments are imperative for a child's development of identity and security and further elaborated on the concept of place attachment extending it throughout childhood. During the early years of development, she notes, children explore the world from "safe" vantage points, for example, the caretakers' arms. Similarly to Bowlby's model of attachment to

caregiver, as the child matures, the diameter of the "safe" area expands. As the child ventures from the caregiver, the dependence and need for protection is consequently shifted onto the larger environment. An environment that provides a safe venue for the child's explorations is one that offers the most solid foundation for development and social affiliation. Thus, attachment to the physical environment develops in parallel, although in a different form as attachment to person. Consequently, because the home represents the accumulation of many relationships and a venue for attachment, the loss of a home can lead to disturbances in one's sense of security and identity (Fullilove, 1996). Families who are forced to relocate frequently or who are or were homeless for a period of time, exhibit this disturbed attachment. Fullilove and Fulliloves' (1996) study of displacement found that formerly homeless individuals were afraid to leave their new home for fear that it would be gone when they returned. Fullilove explains that this fear was based on their previous experiences with eviction and relocation and thus viewed the living space an impermanent object of attachment. In a dissertation by Lestrange (1998), the metaphor of home is described as a metaphor of life. Through her qualitative investigation of "person-place" images, she explains that the process of establishing a home shapes the process of individuation and development of self.

In sum, place can be understood as the accumulation of resources and human relationships in a given location. As such, it provides the physical structures within which human relationships are developed and is the external reality within which children shape their existence. While a "good enough" home environment can set the

stage for healthy development, a "toxic" environment can threaten health and survival.

Culture and the Physical Environment of the Home as an Instrument of Socialization

The home is the most proximal physical environment where very young children tend to spend the majority of their time (Brofenbrenner, 1979, 1986). The home environment is a set of physical realities that impose limitations, provide affordances and as a result have a direct effect on human development. As increasing numbers of children and families live in substandard homes, a greater understanding of the impact both short and long term in necessary. Much headway has been made in this area linking substandard environments to mental, physical and developmental illness as well as perpetuating the social conditions, such as poverty, which force many to live in such conditions.

The physical environment is one of the first means through which young children become socialized within a culture. A child first begins to explore, interact with, and control different physical areas and objects within the home (Heidmets, 1985).These exchanges between environment, parent, and child are reciprocal as described by Valsiner's (1987) transactional model. The transactional model portrays the developing child as embedded within a meaningful, organized physical environment that functions as a medium for the transmission of societal norms and values as well as providing a setting for which the child interacts and transforms the culture (Valsiner, 1987). He describes this process as occurring through a structured set of boundaries that influence the child's interaction with objects and the physical

environment. The boundaries of the environment are described as the "Zone of Free Movement" (ZFM), and the "Zone of Promoted Action". The ZFM describes the limits of the child's boundaries within the environment, which is organized by the caregiver. The caregiver structures the ZFM thus limiting or facilitating areas and objects of play, action and choice. These limitations and affordances channel the development of the child into the cultural mainstream. The ZPA is oriented to the development of new skills and occurs and is limited or facilitated by the ZFM. Within these spatial and material boundaries, socialization and internalization of cultural norms occurs.

Furthermore, physical objects in the home and their arrangement are a material expression of the caregivers' beliefs and values and well as the values of the larger societal and cultural systems and these expressions are communicated to a child through the child's attempts to interact with them (Bartlett, 1997). Csikszentmihalyi and Rochberg-Halton (1981) take the perspective that household objects are critical to the process of socialization. Children develop their sense of self by utilizing objects that are available and meaningful to them. This in turn socializes them to the social goals and expectations and relates them to the larger society.

Understanding the contribution of the physical environment to these settings is fundamental to a complete account of the contexts of child development, socialization and overall well being (Bartlett, 1997). Children also become socialized through the availability and the type of toys and objects available to them for their exploration. Toys are an important aspect of the physical environment and are discussed next.

Play Objects and Toys as Aspects of the Physical Environment

According to Chase (1993), infants spend approximately 80-90% of their waking hours exploring and manipulating objects. Piaget (1977) was one of the first psychologists to theorize how children's interaction with the physical environment was necessary for learning and development. According to Piaget, mental representation is developed during infancy in the course of interactions with objects in the physical world. Initially, the infant has no true representation of the physical world; but through a continuing maturation of the sensory and motor systems, the infant is able to engage in more complex interactions with the physical world, and thus build its representation. This representation is the basis for development of cognitive abilities.

Vygotsky (1962), although most interested in the role of social interactions in the development of higher mental functions, similarly suggested that during the pre-language period (early infancy), intelligence and socialization into the culture was in part determined by mastery of tools , which are defined as objects within the environment, such as toys.

Within this age group, exploration of the physical environment accounts for more waking hours than social interactions with the primary caregivers (Clarke-Stewart, 1973). Furthermore, the availability of quality toys during the first year of life has been found to be positively correlated with subsequent intellectual development (Clarke-Stewart, 1973; Pellegrini & Jones, 1994; Wachs, 1990). Similar results were found by Barnard, Bee & Hammond (1984) who observed that the

availability of play materials was modestly correlated with aspects of cognitive functioning as measured by the Bayley Scales of Infant Development.

The quantity of infants' vocabulary has also been positively correlated with the quantity of novel toys and room decorations (Wachs & Chan 1986) suggesting that exposure to novel stimulation may support a child's developing vocabulary and linguistic schemes. Wachs (1990) found that novel toys as well as the presence of audiovisual responsive toys, and novel room decorations were associated with higher levels of infant play and object mastery. While certain aspects of the social environment such as parental responsiveness to the child were also associated with certain types of productive infant play, Wachs (1990) found that aspects of the physical environment could influence play behavior even when social responsivity was low. For example object pre-mastery was higher for children who had a greater quantity of novel toys but uninvolved parents, than for children with only few novel toys and uninvolved parents.

Children's play behaviors and language may also be related to the specific themes that certain toys may convey (Pellegrini & Jones, 1994). These may be most salient for toddlers and older children who begin to use imaginative and symbolic components in play. Pellegrini and Jones (1994) suggest that certain types of toys such as costumes may elicit greater degrees of imaginative play and decontextualized language than more realistic toys such as kitchen sets.

Toys are also useful in understanding toddlers' social interactions with others. Mueller (1979), for example, noted that social structure among toddlers was most significantly related to attachment to and skill with particular toys. He suggests that

interest and skill in using toys may assist in forming social groups and developing necessary emotional skills among young children.

As such, toys are important aspects of the physical environment and contribute to children's development in many ways. Play is critical to development and occurs through access to toys as well as access to outdoors.

Access to Outdoors: Freedom to Explore and Play

Although, very young children spend the majority of their time within the home, the location of their dwelling can affect their development and well being in a number of ways (Bjorklind, 1982; Cohen, Glass & Singer, 1973; Huttenmoser, 1995; Oda, Taniguchi, Wen & Higurashi 1989). Hart (1986) specifically discusses the effect of access to outdoors on the attachment behavior between parent and child. According to Hart (1986) both children and parents prefer playing where it is easy to "check in" with each other through eye and voice contact. As such, it is crucial that housing accommodate this system, otherwise children may be forced to spend the majority of their playtime indoors.

Negative effects on child development and well being have been demonstrated for children living in hi-rise apartments, which limit access to the outdoors. Gifford (in press) found higher levels of social isolation for families with preschool aged children who resided on higher floor levels. Bjorklid (1982) noted that young children living on the higher floors in high-rise buildings in Stockholm were observed playing outside less frequently than children living on the lower floors. Similarly, Oda, Taniguchi, Wen and Higurashi (1989) investigated the impact of hi-rise apartment living in Tokyo on five-year old children's competency and behavioral development.

Their findings indicated that children living above the 14th floor were less independent, explorative and competent at performing routine tasks than children living below the 5th floor. Oda et al., (1989) suggest that children on the lower floors had more opportunity for play and exploration of novel environments than children living on the higher floors. Furthermore, the impact of living on the higher floors was detrimental to some aspects of children's social and emotional development. Children living on higher floors were found to be more "over-attached" to their mothers than children living on the lower floors (Oda et al., 1989).

Huttenmoser's (1995) work in Zurich also demonstrated that physical environments might hinder or facilitate various aspects of child development. He compared two groups of five-year old children, one group raised in an environment with living surroundings where it was possible for them to play unrestricted by traffic and unsupervised by adults, with a second group who were prohibited from outdoor play because of street traffic. Children who did not need to be accompanied by a parent in outdoor play spent at least 2 hours playing in their outdoor living surroundings. Conversely, those children who were restricted by supervision spent on average 1 hour less than the unrestricted group, playing in the outdoors. Huttenmoser suggests that when freedom of movement within the living surroundings is restricted, the opportunities for social contact with other children and the development of friendships and social and emotional development is likewise hindered. He notes that the children in the restricted group had only one half of the playmates as the children in the unrestricted group. Between group differences in motor development and emotional development were revealed showing that children in traffic-free living

surroundings exhibited more advanced motor development and greater numbers of friendships than their more restricted peers living in areas of high traffic volume (Huttenmoser, 1995).

Access to outdoors is crucial for healthy development, but for families living in poverty, the likelihood of dangerous conditions, difficult access to outside areas and unsafe or non-existent play areas increases dramatically.

Crowding, Space and Privacy

Within the home unit, the physical space can only fulfill psychological needs if it first meets a family's basic physical needs. Inadequate amounts of space and lack of private space may ultimately lead to "crowding", which has been documented to have negative effects on various aspects of child development. Continually having furniture, personal things, pets and children underfoot may become a source of uncontrollable stress for families living in crowded spaces. In the literature the term "crowding" often refers to the number of persons occupying a particular space or room. There is overwhelming evidence demonstrating that high household density is associated with decreased task performance, psychobiological consequences, social withdrawal, increased psychological distress, and poorer overall mental health (Evans, Saegert, & Harrid, 2002; Evans, Saltzman & Cooperman, 2002; Evans, Rhee, Enju, Camille, Karne, & Lepore; 2001). Evans, Lepore and Allen (2000) found increased psychological and physical distress in higher density residential areas. Evans et al. (2000) state that this distress, includes increased blood pressure and lower scores on standardized indexes of mental health. Furthermore, the effects of residential crowding are independent of ethnicity or culture (Evans et al., 2002). In a

related study Evans, Saegert & Harrid (2002) found a greater degree of learned helplessness in low-income children who resided in high-density crowded areas.

Similarly, Wachs and Camli (1991) empirically confirmed the effects of household crowding on the quality of the parent-child relationship. They found that higher levels of traffic and crowding within the home environment were associated with decreased levels of maternal responsivity, maternal involvement, verbal stimulation, and demonstrating objects to the infant. These findings held true even after controlling for demographic and social variables (Wachs & Camli, 1991). The social effects of residential crowding transcend to other environments as well. Evans and Lepore (1993) found that children exhibiting social withdrawal behaviors, a coping mechanism often used by those living in high-density homes, were less likely to seek social support during a stressful laboratory situation.

Given the detrimental effects of crowding, it is important that families have both accesses to space within the home for gatherings as well as space for privacy (Anthony, 1984; Gottfried & Gottfried, 1984). Gottfried and Gottfried (1984) have reported that higher levels of home crowding are positively correlated with higher levels of family conflict. Similarly, Anthony (1984) noted that lack of private space within the home environment contributed to an increase in the number of stressful family conflicts. Such conflicts can negatively affect the emotional health and well being of children. The absence of "private" space may be further detrimental to children by limiting opportunities for activities for parents' teaching and playing with children uninterrupted from other social and environmental stimuli (Bartlett, 1997). Lack of private space may result in distractions that cannot be avoided resulting in the

inability to entertain, teach, discipline and care for children optimally (Bartlett, 1997). Crowded conditions may increase the need for expedient discipline since controlling and subduing children to minimize family tension may often take priority over exploration and other developmental opportunities for children. Thus children often need to be quieted to avoid disturbing other family members or neighbors in very close proximity. This may mean, less playtime and the increased use of television to occupy children.

The home environment can be a place of high activity, often requiring areas of privacy where children and family members can escape excessive stimulation. This type of private space has been termed "stimulus shelter" by Wachs and Gruen (1982). The beneficial effects of these "stimulus" shelters on children's well being have been documented extensively (Iltus, 1994; Lowry, 1993; Wachs & Gruen, 1982). Wachs and Gruen (1982) found that the availability of "stimulus shelters", places where young children can escape noise and excessive stimuli, had a positive effect on sensorimotor development during the second year of life. Unavailability of such areas combined with high background noise levels was found to have a detrimental effect on various aspects of early child cognitive development. The availability of stimulus shelters may enhance other aspects of a child's emotional and social behavior. Lowry (1993) suggests that such shelters may provide children with needed time for relaxation or self-enhancement activities. Furthermore such spaces may afford children an opportunity to develop a sense of them as separate yet connected to others around them (Lowry, 1993).

Layout and Surveillance

In addition to crowding factors, the layout and spatial organization of the home space, may limit the degree of control that parents have thus contributing an additional factor of stress. The degree of visual openness, places for escape and privacy, and the spatial aspects of density and space have been found to influence children's development as well as parenting styles (Iltus, 1994; Matthews, 2000; Peterman, 1981). For example, parents who were prevented from having full visual tracking of their young children as a result of the layout of the home, relied on more rules and prohibitions and were more likely to be overly concerned with safety issues than parents' whose homes were spatially organized to allow visual tracking (Iltus, 1994). Such excessive rules and prohibitions may reduce the ability for exploration by toddlers as well as seeking contact with parents and caregivers (Bartlett, 1997, 1998; Iltus, 1994; Matthews, 2000).

The layout and physical design of a particular space may impact creative and emotional processes in children. Killeen et al (2003) found that permanently placed student artwork within a school setting positively impacted on students' sense of control, involvement and personalization. The organization of space including visual detail, colors, and use of natural materials was found to predict greater perceived creativity among children (McCoy, Mitchell, Evans, 2003).

Noise

The presence of uncontrollable noise has been associated with detrimental effects on children's development as well as the feeling that one has no control over the

environment. Research over the past three decades has consistently found that chronic exposure to ambient noise has been associated with impaired cognitive skills, deficits in language acquisition, decreased memory and impaired social relationships among children of all ages (Cohen, Glass, & Singer, 1973; Evans and Maxwell, 1997; Heft, 1979; Hygge, et. al.,2002; Lercher, Evans, & Meis, 2003; Maxwell, & Evans ,2000; Moch-Sibony,1984). Among the first to research this area, Cohen, Glass and Singer (1973) demonstrated the detrimental effects of living near noisy heavily trafficked areas. They studied children living in apartment buildings located adjacent to heavily trafficked and noisy freeways and found that children who lived in these conditions for more than four years evidenced lower reading scores and decreased auditory discrimination skills (Cohen et al., 1973) than children living in less noisy environments.

The effects of noise on cognition may be present as early as infancy. Wachs (1987) noted that infants living in very noisy households were less likely to engage in mastery-oriented activities than infants living in quieter homes. Beyond infancy, the negative effects of noise on children's attention and cognition have been documented by Heft (1979) who found that children in noisy homes took longer to correctly finish a psychometric task than children in less noisy environment. Likewise Mich-Sibony (1984) found decreased standardized scores of attention abilities among children living in noisy homes. Memory, speech perception and reading skills were found to be impaired in children living near airports (Hygge et al, 2002). Similarly, cognitive deficits including decreased recognition memory and decreased intentional

and incidental memory were found among school age children who were chronically exposed to noise in a recent study by Lecher, Evans and Meis (2003).

Background or ambient noise has also been associated with lower levels of social interaction, specifically parent involvement with the child, parent vocalizations patterns and object demonstration (Wachs, 1989). Similarly, the presence of higher levels of background noise was also found to be associated with higher levels of negative interaction patterns such as adult non-responsivity to the child and adult task interference (Wachs, 1989). Evans, Lercher, Meis, Ising, and Kofler (2001) elaborated on other health consequences of chronic noise exposure. Their community study of 14 fourth grade children found higher resting systolic blood pressure, increased cortisol levels (a hormone indicating stress), and elevated heart rate reactivity among those children living in significantly noisier environments than their counterparts.

The Influence of Physical Aspects of the Home Environment on Parenting Practices

Developmental Psychology has long been established that children's development and well being is influenced by their parents' behavior, practices and beliefs. Research on determinates of parental behavior is vast and breaks down most easily between two different lines: the evolutionary (Bowlby, 1988; Hinde, 1991) and learned behavior. Parental behavior and subsequent interaction with children have largely been discussed in terms of cultural, social and socio-economic norms . Much of the work done on parental behavior has focused on class lines, exploring these determinants in low-income populations (Bradley, & Caldwell,1995; Duncan &

Brooks-Gunn, J. 2000, Kelly, J. & Barnard, K, 1997; McLoyd, 1990). Factors affecting parenting behavior in this population often include parental stress, economic hardship, and social supports (Kelly, J. & Barnard, K, 1997; McLoyd, 1990). Jeanne Brooks-Gunn (1999) has conducted a multitude of studies that point at poverty as a major determinant in poor parent-child interactions. Likewise, McLoyd's (1990) comprehensive review of the impact of economic hardship on parenting practices explored the role of stress in parental behavior. Her model suggests that poverty diminishes the ability for consistent and involved parenting. In her analyses, psychological distress is the mediating link between economic hardship and punitive parenting. Burdened parents, she explains, are less likely to choose strategies such as reasoning and negotiating and engage in more restrictive and punitive parenting behaviors that take little time and effort.

Missing from these explorations of parenting behavior is how the physical realities and limitations of the home environment may contribute to child-rearing practices and the degree to which the physical surroundings facilitate or hinder certain types of parenting styles. Anthropologist LeVine (1980, 1988) concurs that the need exists for better understanding of parental behavior in response to environmental conditions. He notes that parenting behavior and practices are partially culturally determined and as such influenced by the specific physical environmental surroundings and realities of the home. As discussed previously, research has suggested that the physical environment may mediate the social environment by facilitating or hindering patterns of adult-child interaction. Leanne Rivlin (1992) for example, in her research with homeless families, explains that mothers of young

children living in homeless shelters are unwilling to allow their children time to play or crawl on the floor because the floors are often dirty. As a result, infants and toddlers were often confined to their cribs and carriages, limiting time for active play and exploration. Rivlin (1992) notes that the conditions of the shelters sorely constrained children's opportunities for play and learning opportunities. She explains that this is in part directly related to the inadequate physical space as well as the indirect socialization by which the rules of the shelter replaced parental authority.

The "home", according to Rakoff (1977), is not just a backdrop for social interaction, but the context within which relationships and interpersonal actions are able to take place. Both Gibson (1977) and Clancy (1984) use the term "affordance" to describe how aspects of the environment work to facilitate or hinder behavior. Bartlett (1997; 1998) also uses the term "affordance" to refer to the degree to which an environment enables or does not enable parents to manage their children as they would like to. It is precisely this level of control of the physical environment that allows, or does not allow parents to raise their children, as they would like.

If an optimal home environment provides affordances, then sub-optimal housing may certainly contribute to additional stressors in families' lives. As mentioned earlier, developmental psychologists have posited that supports and stressors significantly impact the quality of the parent-child relationship. This statement has been supported by decades of research, mostly focusing on families living in poverty. Parents and children who live in substandard housing may be faced with dangerous conditions such as the presence of lead, rodent/insect infestations, poor air quality and lack of general home resources. Other aspects of the physical environment such as

overcrowding, lack of space, and lack of opportunities for privacy have also been documented to negatively affect the parent-child interaction in two important ways: a). parental responsivity to the child is reduced (Wachs & Camli; 1991) and b). the need for greater discipline and less flexibility in parenting practices often emerges (Bartlett, 1997; 1998; Sharp, 1984; Peterman, 1981).

Crowded living conditions and lack of space may limit parenting practices in many ways. A parent's options for disciplining a child may be limited, for example, if there is not available private space for a "time out" (Bartlett, 1997). Children may need adequate space to play, but parents may also need access to space to withdraw and maintain a sense of control. Peterman (1981) in her work with abuse cases found that a parents' ability to physically separate themselves from a potentially explosive family dynamic was a critical variable in child abuse cases. Thus, the home environment mediates the parent-child interaction and consequent child well being directly through its effect on the range of behaviors that it can accommodate (Bartlett, 1997).

Specific characteristics of the physical and spatial organization of the home, may directly impact on a parent's encouragement of a child's exploratory behavior. McSwain (1981) noted that the safety of the physical environment influenced the severity of parental restrictions on infants' exploratory behavior. His research revealed that the presence of sharp, dangerous limestone formations on the lands in New Guinea resulted in more parental restrictions on infants' exploratory behavior. He noted that these severe parental restrictions were not typical in island cultures

where limestone formations did not pose a safety threat to young children (McSwain, 1981).

Similarly, Woodson and Woodson (1984) examined the impact of spatial and physical environment on infant –caregiver interactions and infants' exploratory behavior in the Chinese and Malay cultures. Differences in the caregiver-child interaction and infant exploratory behavior were found to be a result of both social organization and the physical environment. Woodson and Woodson (1984) suggest that novel exploration was most likely encouraged more in the Malay homes than in the Chinese homes because the child rearing space was a less furnished and safer physical environment (Woodson & Woodson, 1984).

An interview of a small group of families with children who had developmental delays indicated that poor housing was a predictor of using a baby walker, contrary to the advice of their health care providers (Matthews, 2000). Even though, baby walkers are associated with over 20 fatal injuries per year, many of the parents interviewed stated that their infants could not be placed on the floor because of rodent and/or insect infestations and that it was difficult to keep a watchful eye on their children when housework needed to be done. The parents interviewed felt that use of a baby walker kept their infants entertained and out of imminent danger. More recent research indicates however, that the use of baby walkers is associated with an increase in motor delays, motor impairments, and fatal accidents. In this instance it appears that the parents were making a choice between imminent injury and "potential" injury.

Parental responsiveness and involvement with young children has also been found to be decreased in the presence of high home traffic patterns and crowding (Wachs, 1989). Negative parent-child interactions have also found to co-occur with high levels of crowding in the home (Wachs, 1989).

The physical environment immediately surrounding the home also influences parenting behaviors in important ways. In addition to studying the effect of living surroundings on child development, Huttenmoser's (1995) study also looked at parents' behavior and parenting practices. He found that the quality of the parent-child relationship and parenting style was affected by the quality of the outdoor living surroundings (Huttenmoser, 1995). He noted that parents who had to accompany their children in outdoor play were less flexible and more anxious than parents who could safely allow their children to play unattended.

Housing and Resilience

The previous discussion has focused on the ways in which sub-optimal housing contributes to poor parent-child interactions, ineffective child rearing practices and lowered developmental attainment. Researchers are now beginning to explore the ways in which adequate physical surroundings can support healthy growth and development in children and promote responsive parenting.

Huttemoser (1995) noted in his study that children in traffic-free living surroundings were reported to have more advanced motor development, more friendships, a greater number of activities with friends and more alternatives for resolving conflicts than their restricted peers (Huttenmoser, 1995).

The restorative effects of reducing noise have also been documented. Maxwell and Evans (2000) found higher pre-reading skills and language skills were noted among children whose classroom underwent installation of sound absorbent panels. Similarly, Hygee et al., (2002) found that memory and attention were improved after children moved away from the chronic noise of living near an airport.

Living near a source of nature has been found to be linked to resilience in children. The "greenness" of the outdoor space has been found to promote beneficial effects in children's behavior. Wells (1999) demonstrated that relocation to a 'greener" environment decreased attention deficits and stress in children. The presence of "nature" has also been found to promote resilience and serve as a protective mechanism. In a more recent study, Wells and Evans (2003) found that those children with high levels of "nearby nature" were less negatively impacted by stressful events than those children who did not live near nature sources.

Cumulatively, the theoretical and empirical work reviewed thus far suggests that the physical environment of the home has substantial influence on young children's development. The physical environment may impact on children's development directly, affecting health, cognition or social/emotional well being, or indirectly by influencing parenting practices. Because of the substantial impact of the home environment, many scales and measures have been developed over the last three decades with the purpose of "rating" the adequacy of the young child's home. Many of these measures have been used repeatedly over the years in research been demonstrating the significant effects of the home on young children. However, little systematic, critical analyses of these instruments capacity to measure the physical

environment of the home has been done. In the next chapter, descriptions and critiques of the most commonly used measures of the home environment is provided, as well as my conceptualization for a more comprehensive assessment tool, which is used in this investigation.

CHAPTER TWO: A Critical Review of Measurements of Young Children's Home Environments

Introduction

Many evaluation tools have been designed over the past few decades to measure the "Home Environment". However, the most commonly used measures tend to focus primarily on evaluating the social aspects of the home and give the physical parameters little or no representation. The following section summarizes and critiques the most commonly used scales for measuring children's homes to date. Following a review of these existing scales, a conceptualization of a new measure is presented in Chapter Four as an attempt to design a comprehensive and flexible instrument to measure those physical parameters of the home which are most likely to have significant influence on young children's development.

Current Methods of Measuring the Home Environment of Young Children

In order to locate the most common evaluation instruments used to measure young children's homes, literature searches were conducted in Psych Info, ERIC and Medline data bases spanning 1970-2000 to identify studies in which a measurement of the young child's home environment was utilized. The key words "measurement of home environment, assessment of housing, home inventory and family environments, children's home environment and children's housing" were used to search these databases. This search resulted in 960 articles within these three databases. The abstracts from these articles were used to eliminate home measurements that were not centrally related to this study. For example, articles measuring "nursing home environments, environments for elderly individuals, environments of children's day

care, residential environments and scales designed to measure the homes of only disabled children" were eliminated.

From the remaining abstracts, instruments of home measurement that were cited in three or more studies, were selected for critique. This resulted in the identification of seven scales used to measure young children's home environment. These scales included: Home Observation for Measurement of the Environment (HOME), the Family Environment Scale (FES), Purdue Home Inventory Stimulation Scale (PHISS), Home Situations Questionnaire (HEQ), Home Screening Questionnaire (HSQ), Environmental Assessment Index (EAI) and the Pediatric Report and Observation of Children's Environment Stimulation Scale (PROCESS).

Each scale and manual for administration was obtained by either contacting the author of the instrument or the agency selling the instrument. Each scale and manual was then carefully reviewed for the measurement of elements of the physical environment as identified in the literature review presented in Chapter One. Those scales that measured social parameters exclusively were eliminated from further review. Those scales that incorporated at least one element of assessing the physical environment of the home were reviewed. Below is a synopsis of those instruments: the Home Observation for Measurement of the Environment (HOME), the Environmental Assessment Index, Home Screening Questionnaire, Pediatric Review of Children's Home Environment Support and Stimulation (PROCESS), and the Purdue Home Stimulation Inventory (PHSII).

HOME Scales

Caldwell and Bradley's (1984) Home Observation for the Measurement of the Environment (HOME) is probably the most widely used assessment of the living environment of young children. This scale was developed to measure both the quality and quantity of stimulation and support available to the young child within the context of the home environment.

The HOME Inventories were developed using standard scale construction procedures which included factor analyses, the results of which are described in the technical manual for administration (Caldwell & Bradley, 1984). The sample used was somewhat diverse by race and social class, however more recent studies have suggested that there is a positive correlation between HOME scores and SES. Lotas, Penticuff, Medoff-Cooper, Brooten and Brown (1992) found that SES accounted for 41% of the variance of HOME scores in their sample. Overall, however, the HOME has been accepted as a valid measure for assessment of families from diverse cultural backgrounds (Brown et al., 1989; Barnard, Bee & Hammond, 1984).

Research has demonstrated a positive correlation among HOME scores and children's cognitive and verbal abilities (Molfese, Dilalla, & Lovelance, 1996; Johnson et al., 1993; Barnard et al., 1984).

Presently three versions of this instrument are available: (a) the Infant Toddler (IT-HOME) version for use in homes with children up to age three (b) the Early Childhood (EC-HOME) version designed for use in homes with children aged three to six years and (c) the Middle Childhood (MC-HOME) for use in homes with children aged six to 10 years of age. Since the purpose of this study was to review

scales measuring the home environments of young children, only the IT-HOME and EC-HOME will be reviewed.

Administration and Scoring of the IT_HOME and EC_HOME

Both of the infant/ toddler and early childhood versions of the HOME are conducted with a home visit, which includes observation of the home environment, observation of the caregiver-child interaction and an interview with the caregiver. In order to conduct the interview the Interviewer must be trained in the administration and scoring of the HOME and the home visit must be conducted when the child and caregiver are present and when the child is awake. It is estimated that the typical HOME interview requires at least 60 minutes.

The items (which are discussed in the following sections) are scored "yes"/ "no". The number of "yes" answers is summed to provide a raw score for each subscale. Raw scores are then interpreted within a normed index of scores that provide information as to how the particular "home" ranks with the norm (e.g. lowest fourth, middle half, upper fourth).

Infant/Toddler (IT-HOME) Inventory

The IT-HOME contains 45 binary items that are organized into six subscales: Responsivity (responsivity of the caregiver); Acceptance (acceptance of the child's actions by the caregiver); Organization (the physical and temporal organization of the home environment); Learning Materials (provision of appropriate play materials); Involvement (caregiver involvement with the child); and Variety (variety in daily stimulation).

The items in the IT-HOME focus to a large extent on aspects of the social environment, particularly the mother-child interaction. The Responsivity subscale focuses exclusively on mother-child social interaction such as "Parent caresses or kisses child"; "Parent's voice conveys positive feeling toward the child". Within the items in this subscale no physical environment parameters that may affect responsivity are available.

The Acceptance Subscale similarly measures mother-child interaction, specifically whether the caregiver is accepting or punitive toward the child's behaviors. Most of the items center on punishment and restrictiveness (e.g. spanking, shouting, interference) with the exception of item #18 "At least 10 books are present and visible". This item is thought to reflect the caregiver's acceptance of the child's property being "out".

The Organization Subscale measures some elements of the physical environment such as "Child has special place for toys" and "Child's play environment is safe". Three items can be thought to measure access to outdoors, which can be considered part of the physical parameters of the environment. The remaining item refers to continuity of childcare in the home (i.e. regular babysitter).

The Learning Materials subscale centers on the quantity and quality of toys, which is an important aspect of a young child's physical environment. The items measure the developmental appropriateness of toys and learning materials, and availability of "soft" toys. Some of the toys items however are quite specific and may not be appropriate for some homes. For example item #28 s "walker, kiddie car, scooter or tricycle". These items may not be possible to store in a small apartment or

may be too expensive for economically disadvantaged families. However, other items are sufficiently broad such as "Cuddly or role-playing toys" which might include a child's tea set, or a homemade soft doll or costume for dress-up.

The Involvement Subscale primarily assesses the mother's involvement with her child's activities such as "parent talks to child"; "parent encourages developmental advance". Items that include a physical component include item #40 "provides toys that challenge child". Item #35 "Parent keeps child in visual range" most likely reflects social interaction, but may have a physical component. For example, is the home structured so that visual surveillance of the child is possible?

The Variety Subscale also concentrates on the social environment with the exception of item #45 "Child has three or more books".

The Early Childhood (EC-HOME) Inventory

The EC-HOME consists of fifty-five binary items divided into eight subscales which include: Learning Materials; Language Stimulation; Physical Environment; Responsivity; Academic Stimulation; Modeling; Variety; and Acceptance.

Similar to the IT-HOME subscale, the EC Learning Materials subscale centers on the availability of developmentally appropriate toys. Toy items are sufficiently broad to encompass a range of learning materials that may be available to a child.

The Language Stimulation Subscale primarily focuses on social interaction for language stimulation, but does include one item measuring the presence of toys, which may "help name animals". Other possible aspects of the physical environment that may assist in language learning such as audiovisual responsive toys and printed matter visible to the child around the house are not included.

The Physical Environment Subscale focuses exclusively on physical parameters of the home including safety, lighting, and crowding as well as one item regarding the "aesthetic quality" of the neighborhood.

The Responsivity, Academic Stimulation, Modeling and Acceptance subscales measure only aspects of the social interaction between mother and child.

The Variety subscale includes some items assessing access to outdoors and variety and availability of toys within the home.

Limitations

The primary limitation of the IT-HOME and EC-HOME is the heavy reliance on social environmental parameters at the expense of the physical parameters of the home. The EC Inventory provides more information on the physical environment, but the majority of items center on social parameters. The items, which directly focus on physical environment such as the availability of toys, are quite specific and may not be sensitive to families in low SES groups who may provide a different type of toy environment for their children (e.g. homemade toys vs. store bought). Accordingly, some previous research has suggested that HOME scores may be lower for economically disadvantage families. These measures do provide a thorough assessment of the social interaction and responsivity of the caregiver to the child; however it does not provide enough items to gather information on the physical parameters of the home, which may influence social interaction and responsivity.

The Environmental Assessment Index (EAI)

The EAI was developed as an extension of the HOME Inventories to be used in measuring the home environments of young children (ages three-eleven) in rural areas. The primary focus of this measure is to assess the educational and developmental quality of the child's home environment (Poresky, 1987). This measure is conducted using a home observation visit and interview with the primary caregiver.

The EAI has been found to be predictive of concurrent and future intellectual (verbal) functioning (Poresky, 1984).

This measure consists of forty-four binary items, eighteen of which must be directly observed by the interviewer. The remaining items may be either directly observed or answered in the interview. The majority of items in the EAI measure aspects of the child's physical environment. The first eleven items deal exclusively with the quality and quantity of developmentally appropriate toys available to the child such as "Toys requiring visual discrimination"; "opportunity to learn about animals"; and "building toys". Four of the items assess the child's access to outdoors and four of the items measure aspects of the home such as lighting and crowding. The remaining items assess aspects of the social environment such as maternal responsivity, involvement and acceptance.

Although this measure pays considerable attention to a very important aspect of the young child's physical environment it does not fully assess the layout, space or organization of the home. It also does not consider noise levels or surrounding neighborhood influences.

Home Screening Questionnaire

The Home Screening Questionnaire (HSQ), developed by Frakenburg and Coons (1985) was adapted for the HOME Inventory for the purpose of providing pediatricians information about children's home environments. This measure consists of two forms one for children birth to three years of age and another for children three to six years of age. These measures are completed by the parent and then scored by a professional. The birth through three years old questionnaire consists of thirty questions and the older child measure consists of thirty-four questions. Both of these tools are constructed at a third to sixth grade reading level. The estimated time needed to complete the questionnaire is fifteen- twenty minutes.

On both versions of the HSQ, the majority of items assess the social environment, such as "When your child gets a new toy do you usually....?. There is however a separate "toy inventory" which assesses the quality and quantity of developmentally appropriate toys available to the child.

The primary limitation of the HSQ is that it does not include a direct observation of the home environment in either the social or physical sense. There is also no direct observation of the child within the home environment, manipulating materials or interacting with the caregiver. Obtaining valid information from the caregiver may present another potential problem. For example, one may not be aware of one's behavior and as a result, may under or over report it. Additionally, misinterpretation of the questionnaire items may occur.

Another limitation of the HSQ is that it results in a single "summary" score of the items, which may limit its usefulness to identify particular housing problems or to correlate particular measures of housing to aspects of children's development.

Pediatric Review of Children's Home Environment Support and Stimulation Inventory (PROCESS)

The PROCESS was developed by Casey, & Bradley (1988) to evaluate physical and social environmental support and stimulation for infants between the ages of two months and eighteen months. The PROCESS was designed to be used by pediatricians or other health care providers during the well child visit. This measure was adapted from several pre-existing home environment measures such as the HOME (Casey, Bradley, Nelson, & Waley, 1988). Validity of the PROCESS was established with the HOME inventory (Casey et al., 1988).

The PROCESS inventory consists of twenty four-item questionnaire that is completed by the parent prior to the office visit. This section assesses many aspects of the psychosocial environment such as time spent with child, feelings about the child, sleeping/eating schedule, and disciplinary practices. Measures of the physical environment are also included such as area where child plays, level of crowding, noise level, and sleeping areas. In addition to the questionnaire, a toy inventory checklist is provided in which the parent is to mark which toys the child has at home. The toy list is quite comprehensive, but is not sorted by developmental level/age, with the majority of listed toys being appropriate only for older infants. Thus a very young infant will have fewer items checked than an older infant.

The second portion of the PROCESS Inventory consists of twenty items that are designed to be completed by the health care provider during the visit. These items assess mother-child interaction, parental responsiveness, and emotional responses toward the child.

Each section is independently scored using a system designed by the authors and the section scores can then be totaled for an overall PROCESS score. The scores are not based on a normed sample, but are to be used as deemed necessary by the health care provider. The PROCESS has been used in research and has been found to be a reliable predictor of both concurrent and future (when child is thirty six months age) mother-child interaction (Casey, Barrett, Bradley, & Spiker, 1993).

The adequacy of this scale for measuring the home environment is limited by several factors. Primarily the scale measures social components of the environment, particularly the mother-child interaction. This interaction however, is "observed" not only outside of the home, but also during a child's health care visit, which may be a stressful situation and not be an accurate reflection of the typical interaction. Some aspects of the physical environment are assessed such as toys, noise, and crowding, however, these are measured by parent report and may not be an accurate reflection of the home environment. Finally, the PROCESS is specifically designed for health care providers of young children, and as such, it is not available to researchers and other clinicians who may need to assess the child's home.

Purdue Home Stimulation Inventory (PHSII) . The PHSII, designed by Wachs (1979), is probably to date, the most comprehensive assessment of the physical environment of the home. Aspects evaluated include noise, layout, surveillance, objects, and

density. In addition to the physical environmental parameters, the second part of the scale includes social environmental parameters. The PHSII has been used widely to relate interaction with the physical environment to early cognitive development in infants.

Limitations:

The PHSSI does not address issues of the physical environment of the home such as access to outdoors, home resources and safety issues. While it does include a significant section on toys, the range of toys recognized is limited and does not take into account common household objects that may be used as play materials. [See Table 1]

The measures reviewed above are presently the most widely used instruments used to assess young children's home environments; however each measure is limited in the degree in which the physical environment of the home can be accurately assessed. None of these measures included an assessment of the availability of home resources such as running water, washer and/or dryer. Although the empirical evidence of the availability of the convenience of home resources is limited, there is some theoretical justification for including some assessment of this parameter (Bartlett, 1999). With the exception of the PHSSI, none of the measures included an assessment of the space and layout of the home and/or the spatial organization of the home. The literature in these areas does indicate the strong need for an acknowledgment of these parameters as they are associated with parenting style, rules and restrictions (Iltus, 1994), and promoting creative processes in children (Killeen et

al., 2000). Another significant limitation in all of the scales, with the exception of the PHSSI, is the neglect of assessing noise in the home environment. As reviewed in Chapter One, chronic noise levels have been found to adversely affect children in many developmental domains such as attention (Evans et al., 2003), literacy (Glass, Cohen & Singer, 1973; Evans et al., 2000), and stress (Evans & Saegert, 1976). Finally, almost all of these measures incorporate both social and physical parameters, often times, within the same subscale. Initially, this may seem to address the multiple dimensions of the home, however, by doing so, the relationships among the physical and social parameters of the home become muddled.

The limitations of these scales suggest a need for an observer-administered, thorough, accurate instrument to evaluate the home of the young child. While no single measure can address every empirical and theoretical conceptual area of the physical environment of the home, a measure can be designed that includes broad based categories of all of the physical parameters that have been found to be highly associated with children's health and development. Those conceptual areas include:

- The availability of space and physical layout. This area should include crowding of people and/or furniture, density, availability of space, private space, and availability of stimulus shelters (Wachs, 1990).
  - Spatial Layout/ Organization. Circulation patterns of the home and degree of chaos and organization need to be assessed.
  - Availability of Toys and other Play objects. This area would include broadly based categories such as "Toys available for cognitive, gross motor, and language, and would include household objects that are used as toys.

- Noise. Assessments of both focal and background noise need to be measured.
- Health & Safety. This category would include items measuring health, safety and resources of the home environment. This may include assessment of heating, lighting, water, and overall safety.
- Home Resources. Convenient access to important resources such as a refrigerator/stove, bathroom facilities and to a washer/dryer.

Using these parameters of the home environment, a new scale for measurement of children's home environments was conceptualized and applied in this study. The indicators of the new scale and its development are discussed extensively in Chapter Four.

CHAPTER THREE: Focus of the Investigation

Statement of the Problem

Housing is critical to young children's growth and development in a multitude of ways. A review of the literature in the previous chapters has demonstrated that physical environments can directly affect children's language, hearing, health, safety, mental health and socialization. A less straightforward issue is how the physical environment indirectly affects children through parenting behavior. It has been proposed that unsafe, substandard homes may increase the likelihood of more restrictive and/or punitive parenting practices, and decrease opportunities for exploration and growth.

Although progress has been made in recent years, there is recognition within the field that there is a need for further exploration into how the physical environment affects and mediates development, attachment, sense of self and parenting practices. There is, however, a dearth of widely used, easily utilized measures to assess and compare the physical environment of young children's homes. As discussed in Chapter Two, the majority of instruments that are currently used on a large-scale basis do not measure the physical environment of the home, but measure social aspects of the home that may be correlated with or mediated by substandard housing.

The importance of developing an understanding of the effects of housing poverty are in part due to increasing research demonstrating that poverty exerts the greatest effect in early childhood, precisely the time, when the majority of their time is spent at home. Data from the Children's Defense Fund (2002) and the Department

of Housing and Urban Development (2002) indicate that with each passing year increasing numbers of families with young children are living in inadequate housing. As welfare benefits and jobs continue to disappear, and urban centers continue to become gentrified, the ability of families to find adequate and affordable housing decreases.

The consequence of these structural and social inadequacies is that more families will be living in low-quality housing; often preventing parents from managing their home and their children as they would like to, and thus inevitably contributing to negative patterns of behavior which may ultimately perpetuate poverty. Housing, however, is a difficult issue to study. Poor housing often occurs among a host of other issues and it is difficult to argue a cause and effect relationship. The assessment of housing is also difficult, primarily because of the lack of easily utilized objective instruments designed to measure the physical parameters of the home space. This study attempts to address part of this problem by evaluating a newly developed instrument to measure the home and by comparing its use with the most widely used existing scale, the HOME scale, in a study of the ways that substandard housing affects children's development and how it mediates parent's interactions with their children.

Summary, Conclusions, and Foci of the Investigation

A significant body of research investigating the contribution of the physical environment to early child development has been centered on the home environment (Gottfried & Gottfried, 1984; Parke, 1978; Wachs & Chan, 1987; Weinstein & David,

1987). The home is often the primary environment for the infant and young child and as such exerts a unique influence on child development and well being in many ways. Certain aspects of the physical environment have been found to contribute to early child development and well being (Evans & Lepore1993; Gottfried & Gottfried, 1986; Wachs, 1989). These include ambient noise (Cohen, Glass, & Singer, 1973; Heft, 1979; Wachs, 1982), the availability of toys, and the degree of potential visual and motor exploration and traffic patterns, crowding/space and access to the outdoor environment (Huttenmoser, 1995).

The importance of the home environment for children's well being has also been conceptualized in terms of concepts of place identity and place attachment. The significance of the concept of home has been previously discussed in the literature in terms of psychological fulfillment and a source of security for children. (Rivlin,1992; Proshanksy, & Fabian, 1987).

The role of the home in children's lives is also important in terms of the resilience and restorative capabilities that it may play in children's lives. Wells' (1999) study of the restorative effects of greenness on children's attention and Bradley's (1994) study of the protective factors of the physical environment, such as privacy and space, indicate that there is a range of ways in which the home environment can provide positive support to children. This study will attempt to build on and extend the current research on the relationship between the physical environment of the home and various aspects of infant/toddler development by examining several issues. First, as previous research has suggested, particular parameters of the physical environment may be more potent predictors of specific domains of children's development.

However, the research in this area has been limited by the lack of an easy to administer assessment that focuses specifically on aspects of the physical environment of the home. In order to address this issue a thorough instrument for the evaluation of young children's home environments was developed that will help address the limitations of measures that are currently being used and provide a more accurate depiction of the home environment than is presently possible. The conceptualization and indicators for this scale are thoroughly discussed in Chapter Four. This measure, entitled the Measurement of Young Children's Home Environments (MYCHE), was created to assess the following physical indicators of young children's home environments:

- The availability of space and physical layout.
- Spatial Layout/ Organization.
- Availability of Toys and other Play objects.
- Noise.
- Ease of Safe Access to Outdoors.
- Health & Safety.
- Other Home Resources.

The MYCHE was developed to more thoroughly elucidate the specific physical parameters that may be most predictive of certain infant/toddler developmental outcomes. In order to determine the capacity with which the MYCHE is correlated with the outcome measures of parent-child interaction and child development, this newly developed measure was compared with Caldwell and Bradley's (1984) Home

Observation for Measurement of the Environment (HOME) scale. As mentioned previously the HOME scale is the most widely used measure to date that assesses the quality of young children's homes. The HOME scale was developed to measure both the quality and quantity of stimulation and support available to the young child within the context of the home environment; however it is primarily a measure of the quality of the parent-child interaction within the home environment.

Hypotheses

This study will assess the extent to which the MYCHE Scale and the HOME scale are able to assess the quality of home environments as predictors of infant/toddler developmental outcomes. Using these two scales the study will investigate the physical parameters of the home as a mediator on the relation between the parent-child interaction and developmental outcomes in a low-income sample. The following specific research hypotheses were investigated:

1. The associations between specific physical parameters of the home environment (as measured by the MYCHE) and developmental outcomes will be more robust than the parameters as measured by the HOME scale.
2. We hypothesize that the MYCHE scale is a more comprehensive instrument for describing the qualities of the physical environment of a home that are relevant to young children's' development than other widely used existing scales. Specifically, that more relations with different aspects of the physical environment of homes with children's' development will be found than with the HOME scale.

a). The physical variables measured by the MYCHE scale will show higher correlation with developmental outcomes than the physical variables measured by the HOME scale. More specifically, we hypothesize that the MYCHE scale will enable new relationships to be revealed that cannot be found with the HOME scale as a measure of young children's home environments.

b). The physical parameters that will be most associated with overall favorable infant/toddler developmental outcomes include low noise level, decreased crowding/stimulus space, the presence of play objects and the presence of basic home resources.

c). The presence of stimulus space and decreased noise will be positively correlated with emotional/social development.

d). Less crowding and adequate spatial organization will be associated with gross motor development.

3). Physical parameters, specifically space, noise and crowding will be highly correlated with negative social interactions and that these physical parameters may be a mediator of the association between social interactions within the home and infant/toddler developmental outcomes.

CHAPTER FOUR: RESEARCH DESIGN AND METHODOLOGY

The research methodology for this investigation was conducted in two phases. The first phase involved the development of a new scale for the measurement of the physical parameters of young children's homes. The second phase focused on comparing the newly developed scale by utilizing it in 22 low-income young children's homes and evaluating its capacity to measure the physical parameters of homes, correlate it with aspects of parent-child interaction and child development, and explore the relationships between parent-child interaction , home environment and children's developmental outcomes.

Phase I: The Development of a New Scale for the Measurement of the Home Environments of Young Children

Conceptualization of a New Measure to Assess the Home Environment

There are many difficulties inherent in the development of a scale to measure the home environment and as suggested by the review of current methods, it is difficult for any one measure to be applied to all homes with young children. Cultural beliefs, practices and differing beliefs about child development may affect how families arrange, use and experience their physical environment.

Important Factors to Consider in Redesigning a Scale

In order for a scale to be used widely to measure the home environments of young children, it must be easily and efficiently administered and evaluated. Ideally, the entire home observation, including specific questions to the parent should not exceed one hour. This should be a reasonable amount of time for the observer to collect the

necessary data without becoming obtrusive or interfering with the typical flow of the household.

Although it is important to address, at a minimum, all of the conceptual areas reviewed, the number of questions and areas addressed should be kept within a reasonable limit. A fifty-page questionnaire would not only likely exceed an administration time of one hour, but might be confusing and difficult to administer and evaluate.

Much attention has been paid to the subjective qualities of the home. The experience of crowding for example may be different depending on culture and belief systems. If this measure were to be used to promote greater understanding of the advantages and disadvantages of the living situation, some interaction between participant and observer would be ideal. Bartlett (1995) suggests the development of a measure that incorporates a family's assessment of the significance of the parameters of the physical environment of the home in addition to the observer ratings. This interaction would enrich the understanding of how the physical aspects of the home truly operate on family functioning. Incorporating such "weighting" might be difficult to achieve due to unrealistic participant attitudes regarding their home environment.

The validation of a newly developed instrument is also an important factor to consider. Concurrent and predictive validity of such a measure could be achieved by utilizing comparisons with one or more of the most commonly used instruments for measurement of young children's environments.

Nevertheless, some indicators for describing the physical environment of the home need to be developed to enable comparisons to be made. Specific aspects of the physical environment have been shown to have a significant influence on certain aspects of young children's development, specifically in the cognitive domain. These indicators were extrapolated from the current literature and used to generate the item bank for the new measure of the home environment, which is called the Measurement of Young Children's Home Environments (MYCHE)..

Indicators For the MYCHE Item Bank

The availability of space and physical layout. Inadequate space has been associated with increased family conflict (Anthony, 1984). If the physical layout of the home is overly obtrusive, this may also limit visual surveillance and may increase parental restrictions on children's exploration (Iltus, 1994). Crowding of furniture and people as well as a lack of private space (i.e. stimulus shelters) has also been associated with negative developmental outcomes (Evans & Saegert, 1976). This category should also include the availability of private space for children and/or parents, or "stimulus shelters", areas where children can escape household activities. The presence of stimulus shelters has been positively associated with cognitive development (Wachs & Gruen, 1982) and emotional/social behavior (Lowry, 1993).

Spatial Layout/ Organization. The physical layout is concerned with density and crowding, however, the spatial layout, specifically the circulation patterns of the home and degree of chaos and organization need to be evaluated in homes as poor

spatial organization has been shown to adversely affect exploratory play behavior (Woodson & Woodson, 1984) and may encourage excessive prohibitions on children's activities (Iltus, 1994).

Availability of Toys and other Play objects. Toys are an important part of children's environments and quality play objects are associated with better developmental outcomes in almost all domains (Clarke-Stewart, 1973; Pelligrini & Jones, 1994; Wachs, 1990; Wachs & Chan, 1986). Most of the scales reviewed in the previous chapter, which measured toys in the home, did so by including toy inventories. Such inventories might not be useful for the measurement of toys as object stimulation. Toys and objects used as toys should be measured in terms of their developmental appropriateness for the child. For example, more broadly based categories such as "Toys available for cognitive, gross motor, and language stimulation" will provide the observer with more options for finding such objects within a given home than a "checklist". By using a broadly based categorization system, objects such as real pots and pans that the child plays with, may be counted, even though these objects are not officially "toys".

Noise. Many of the home measurements reviewed in Chapter Two, failed to consider noise in their item inventory. Assessments of both focal and background noise need to be measured as they have been consistently linked to children's developmental and health outcomes (Cohen, Glass & Singer, 1973; Evans et al., 2000; Heft, 1979; Mich-Sibony, 1984). This includes not only noises produced in the home, for example, a household TV and /or radio, but also street and neighborhood noise. The actual level of noise and constancy of noise must also be measured, as it is

the chronicity of the situation which research has shown is most detrimental to children (Evans et al., 2000).

Ease of Safe Access to Outdoors. Safe and easy access to the outdoors needs to be measured as an aspect of the physical environment as difficulty in gaining outdoor access is associated with less socialization in children and attachment issues (Hart, 1986; Huttenmoser, 1995). Top floor walk-ups and high-rise apartments without consistently working elevators may pose obstacles for allowing children access to outdoors. To a large extent, this may be related to the quality and quantity of safe play resources near the home.

Health and Safety. This category would include items measuring health, safety and resources of the home environment. This may include assessment of adequate heating, lighting, water, and overall safety (e.g. presence of lead).

Home Resources. Access to important resources such as a refrigerator/stove, bathroom facilities and washer/dryer must also be considered as the lack of these basic resources may contribute to parental stress. While the empirical evidence is lacking in this area, Bartlett (1995) does propose a theoretical link between convenience of home resources and parenting stress.

The MYCHE is an observer administered assessment tool, which is designed to accurately, thoroughly and efficiently measure the physical parameters of the home. This measurement tool contains seven subscales based on the indicators mentioned above and is scored "yes" or "no" for the presence of absence of each indicator. The MYCHE is also designed to be used efficiently with a low paper-work burden on the observer and a minimal burden on participants whose homes are being assessed.

This evaluation tool is limited to two respects. This measure would most likely be most applicable for use with homes with children under the age of five. The indicators for toys, access to outdoors, health/safety and home resources vary in the influence that they exert on older children, thus the scale might not be useful for those families. Secondly, the MYCHE does not contain a subjective or participant component at this time, and this is one of the major limitations of this scale. As discussed previously, a qualitative assessment of the young child's home would be invaluable in enriching the knowledge base of how physical environments contribute to family interaction and children's development. The application of the MYCHE scale for this investigation is discussed further in the following sections.

Phase II: Application and Comparative Evaluation of the New Scale and Investigation of Research Aims

The second phase of the investigation involved the comparative evaluation of the Measurement of Young Children's Home Environment (MYCHE) scale with the Home Observation for Measurement of the Environment. As discussed in Chapter Three, the first research aim involves comparing the two scales in order to determine the capacity with which the MYCHE is correlated with developmental outcomes in young children. The second aim involves using the parameters of the MYCHE to determine those physical aspects of the home that are most strongly correlated with toddlers' developmental outcome. The third aim, explores whether the home environment is a mediator of the relationship between social environment, as measured by parent-child interaction, and toddler's developmental outcome.

The families who participated in the study were recruited from the Washington Heights area of New York and were from a low-income socio-economic status. The target child was healthy and between the ages of fourteen –twenty four months. This age range was selected because the developmental trajectories less than twelve months tend to be highly canalized, thus any environmental effects whether social or physical might not be apparent. The methodology of the study and results are discussed next.

Method

Participants

Twenty-two parent-child participant dyads were recruited for participation in this research study. Participants were recruited with fliers/posters at outpatient pediatric clinics affiliated with the New York Presbyterian Hospital located in the Washington Heights, NYC neighborhood.

In order to participate, all participants had to meet the following criteria: 1) be from a low-income group defined as an annual gross household income under $22,000/year for a family of four (National Center for Health Statistics, 1998) with appropriate mathematical adjustment made for families of varying sizes, 2). be proficient in English and speak English in the home to their children.

The infants and toddlers who participated were in overall good health with no history of neurological, sensory or genetic abnormalities as these medical problems have been highly predictive of developmental delays. Children were between the ages

of fourteen through twenty-four (X= 17.4 months) months age and lived with the participant parent. In the case where the parent has more than one child within the fourteen through twenty-four month age range, the oldest child, within this range was the target child.

All participants were treated in accordance within the ethical guidelines established by both the American Psychological Association and the National Institute of Health.

Procedures

All data were obtained during the course of a single visit to the participants' homes. These home-based assessments were conducted by the Principal Investigator and one trained undergraduate student. Parents were instructed to schedule the visit for when their child was most likely to be well rested and alert. Participants were informed that no special cleaning or other arrangements needed to be done prior to the visit.

Participants were given a consent form to be signed giving permission for the home assessment and the developmental assessment of the target child. The data collection procedures were explained and the parent was reminded that participation was both confidential and voluntary and could be stopped at any time.

Each home visit lasted approximately two hours and consisted of four segments: the assessment of the home, the developmental assessment of the child, parent-child teaching interaction and a brief demographic questionnaire.

The first segment lasted sixty minutes and consisted of two measurements of the home environment: the Home Observation for Measurement of the Environment (HOME) and the Measurement of Young Children's Home Environments (MYCHE).

The second segment lasted approximately thirty minutes and consisted of a developmental assessment of the child using the Bayley Scales of Infant Development-II (BSID-II). The BSID-II measures cognitive, language, gross motor, fine motor, functional and emotional development of children birth to forty-two months age.

The third segment consisted of administration of the NCAST, a brief three minute episode in which the parent is asked to teach their child to perform a task: either sorting blocks by color or pointing to clothing in a book. In accordance with NCAST protocol, parents were asked to choose the item that was more difficult for their child.

The fourth segment lasted approximately fifteen minutes and consisted of administering a brief demographic questionnaire to the parent.

Measures

Home Observation for Measurement of the Environment (HOME)

Caldwell and Bradley's (1984) Home Observation for the Measurement of the Environment (HOME) is probably the most widely used assessment of the home environment of young children. Evidence of validity comes from almost two decades of research and over 125 studies demonstrating that HOME scores assess the quality and quantity of socio-physical stimulation and support available to the young child

within the context of the home environment (Kelly & Barnard, 1997; Sumner & Spietz, 1994).

Since the children in this study were infants and toddlers, the Infant-Toddler version of the HOME scale was used (see appendix). The IT-HOME contains forty-five binary items that are organized into six subscales: Responsivity (responsivity of the caregiver); Acceptance (acceptance of the child's actions by the caregiver); Organization (the physical and temporal organization of the home environment); Learning Materials (provision of appropriate play materials); Involvement (caregiver involvement with the child); and Variety (variety in daily stimulation) [see Appendix].

The items in the IT-HOME focus largely on aspects of the social environment, particularly the mother-child interaction. The number of "yes" answers is summed to provide a raw score for each subscale. Raw scores are then interpreted within a normed index of scores that provide information as to how the particular "home" ranks with the norm (e.g. lowest fourth, middle half, upper fourth).

Measurement of the Physical Environment of Young Children's Homes (MYCHE)

The measure was developed by the Principal Investigator after extensive review of research on both the physical environment's contribution to children's development and research on the existing scales that are currently being used to measure the home environment (Matthews, 2000). [See Appendix]

The conceptual framework for the measure was developed following a comprehensive review and critique of all of the scales for measuring the home environment, which have been used over the last three decades (Matthews, 2001).

This measure evaluates the following physical parameters of the home:

1. Physical layout and available space
2. Spatial layout (organization of space)
3. Availability of Play Objects
4. Noise
5. Ease of Outdoor Access
6. Home Resources (e.g. refrigerator, washer/dryer etc..)
7. Crowding/Stimulus shelters

This scale contains seven categories with binary indicators that are scored either "positive" or "negative" (present or not present). The scores can be totaled for a single overall, but multifaceted indicator of the physical aspects of the home environment, or categories can be subtotaled to indicate specific parameters of the physical environment of the home (see Appendix). This measure took 30 minutes to administer.

N- Child Assessment Teaching Scale

The NCAST Teaching Scale is designed to measure parent-child interactions during an observed, standardized teaching episode. Parent is asked to "teach" their child to either sort six blocks by color or to point to items of clothing in a book, "whichever task is harder for your child". The scale consists of seventy-three items scored as 1 (*observed*) or 0 (*not observed)* across four parent/caregiver behavior subscales

(Sensitivity to Cues, Response to Distress, Social-Emotional Growth Fostering, and Cognitive Growth Fostering) and two child behavior subscales (Clarity of Cues and Responsiveness to Caregivers). The number of observed behaviors is summated for each subscale and for the total scales, which include parent, child, and dyadic total scales (Sumner & Spietz, 1994).

Bayley Scales of Infant Development-II (BSID-II)

The Bayley Scales is one of the most well known and widely used tools to assess the developmental status of young children from birth to forty two months and has been used for approximately three decades in both research and clinical settings. Evidence of validity includes research that has demonstrated that the BSID-II discriminates between children with age-appropriate development as well as those with developmental delays (Kelly & Barnard, 1997).

The scale includes the Mental and Motor subscales [see Appendix]. The mental subscale measures cognitive ability, language, functional and social/emotional development. The Motor subscale evaluates gross and fine motor development and functional skill. The number of items to be administered within each subscale varies according to the actual age (in months) of the child and the number of items correctly completed. The child's responses to the test objects are recorded by the evaluator as "Correct", "Not Correct" or "Omitted". The subscale raw scores are converted to index scores. Index scores are then interpreted into four ranges: Accelerated Development, Normal Development, Mildly Delayed Development and Significantly Delayed Development (Bayley 1997).

The Bayley Scales test objects include toys such as blocks, picture books, doll, cubes with lids, non-toxic crayons and lightweight pull toys. The toys for the fourteen through twenty-four month subset were all age-appropriate and safe.

Demographic Survey

Demographic information was collected with a brief survey to gather information regarding the developmental/health history of the child, information concerning the education level and developmental history of the mother, languages spoken in the home, family's ethnicity, household income and other general information [see Appendix]. This was done to identify specific co-variates that may have needed to be controlled for in the statistical analyses of the data.

Results

Descriptive Statistics

In this cohort, the mean age of the parents was 27.5 years. The children's ages ranged from fourteen months through twenty-four months with a mean age of 17.8 months. Within the sample, sixty percent of the parents reported having a high school diploma or GED. Ten percent of those parents without a high school diploma had finished the tenth grade. Twenty percent of parents reported some college education. Eight percent reported a college degree, with three percent reporting post-graduate education.

Of this sample, one hundred percent of parents spoke English fluently. Eighty-five percent also used another language at home with their children. Ninety percent of

the parents described themselves as "stay at home parent". Five percent were pursuing education outside of the home or going to work outside of the home.

Most of the participants in this study described themselves as having strongly negative feelings about their current housing situation. The most commonly reported aspects were (in order of frequency of report) 1) no elevator (60%), 2) lack of space (52%), 3). no washer/dryer on premises (43%), 4). Not enough bedrooms (22%). 100% of parents stated that they would relocate if they could. [See Table 2]

Pearson Correlations: Relationships Between the Physical Environment as measured by the HOME and MYCHE Scales and the Measurement of Toddler's Developmental Outcomes

The first research question examines the relationships between the home environment (presence of toys, printed material, space), as measured by the MYCHE scale, and cognitive and motor performance on the Bayley Scales of Infant Development. Higher scores in the mental development index (MDI) of the Bayley Scales were significantly correlated with the presence of audio- responsive toys (.70 $p>.05$), availability of indoor play space (.45), the presence of printed material (.45) and the availability of a washer dryer (.66). Parameters of the home environment not significantly correlated with higher MDI scores included adequate furniture, crowding and availability of outdoor space.

Higher scores on the psychomotor index of the Bayley Scales of Infant Development were correlated with the availability of indoor play space (.52) and presence of stimulus shelters (.64) .

Pearson correlations conducted using the total Home Observation for Measurement of the Environment scale (HOME), showed weaker correlations between the Bayley mental development (MDI) scores (.35, $p>.05$) than those found with the MYCHE scale. Furthermore there was no significant correlation between the physical environment subscale and MDI scores (. 17). Finally, there was no significant relationship between any subscale of the HOME scale and the psychomotor scale of the Bayley (PDI) (.04). [See Table 3]

Analyses of Covariance (ANCOVA)

Pearson correlations were also computed among demographic variables (i.e. mother's education and child-birth order) and the predictors (i.e. may be either individual physical parameters or collapsed HOME and MYCHE scores). Some previous research has documented a positive relationship between mother's educational level and childbirth order on developmental outcomes in young children (Barnard et al., 1989). This positive association is believed to be a reflection of the mother's developing experience and better understanding of how to foster it. No significant correlations were detected among the demographic variables of maternal education and MYCHE scores (.20), however moderate (.40) positive correlations between maternal education and HOME scores were found. Since some correlations had been detected among the demographic and predictor variables with the MYCHE subscale,

an analysis of covariance (ANCOVA) of mother's educational level was explored in the Stepwise Regressions, which are discussed further in a later section.

Relationship between Parent-Child Interaction and Physical Environment

Pearson Correlations

Pearson correlations were conducted among MYCHE subscales and NCAST subscales to determine whether a higher quality physical environment was positively correlated with better parent-child interactions, maternal sensitivity, and cognitive stimulation. Moderate to significant positive correlations were documented among all MYCHE subscales and all subscales of the NCAST (see Table 4), with the highest correlations occurring among the crowding subscale and cognitive stimulation (. 38), crowding and maternal sensitivity, home resources and maternal sensitivity (.65) and cognitive stimulation (.60) and noise and maternal sensitivity (.75). Moderate correlations were also found between HOME scale scores and NCAST scores among all subscales, although the correlations were lower for all scales except the Maternal sensitivity scale (.66). [See Table 4]

Stepwise (Multiple) Regression Analyses- Physical Environment as Mediator of Social Environment

Further analyses were done to explore whether or not the physical environment mediated the relationship between parent child interaction and child's developmental outcomes. In order to determine how the physical environment contributed to this relationship. Two separate stepwise regression analyses were conducted.

In the first set of stepwise regressions, total NCAST scores were entered as the first dependent variable and demographics (mother's education), HOME scores, and total MYCHE scores were entered as the independent variables. In this equation, total MYCHE scores was the strongest predictor of mother-child interaction (total NCAST scores); predicting 42% of the variance: R2=. 42. HOME scores predicted .48% of the variance followed by mother's education (R2= .61).

In the second set the following variables were entered. Developmental outcome was the dependent variable, using the cognitive scale (MDI) as the measure of development and Total MYCHE scores and NCAST scores were entered as the independent variables. NCAST scores were forced in Step 1 followed by MYCHE scores in Step 2. Again, total MYCHE scores was the strongest predictor of developmental outcome. Mother-child interaction variables were found to predict 47% of the variance with MYCHE scores predicting an addition twenty five percent of the variance with a cumulative R2= .67. The direction of these analyses is consistent with the hypothesis that the physical environment is a mediator of the

relationship between parent-child interaction and developmental outcome. [See Table 5]

CHAPTER FIVE: DISCUSSION OF FINDINGS

Discussion

This study has examined (a) the comparison between the HOME scale scores and MYCHE scores in their ability to correlate with infant/toddler developmental outcomes (b) the associations among aspects of the physical environment of young children's homes on infant/toddler developmental outcomes and c). the role of the physical home as a mediator of the relationship between social environment and developmental outcome.

The first research aim was to compare the newly developed MYCHE scale with the widely used HOME scale. As discussed in previous sections, the MYCHE is a more comprehensive and detailed scale for describing the physical parameters of the young child's home than Caldwell's HOME scale. Although historically, moderate and high correlations have been found between HOME scores and children's developmental outcomes; because the social and physical aspects of the home have been scored together, it has been difficult to identify which parameters of the home are most significantly associated with developmental outcomes. Because the MYCHE scores more fully describe the child's physical environment, it was hypothesized that the MYCHE would show a higher degree of correlation between parameters of the home environment with developmental outcome than the HOME scale. As expected, analysis of the data for the first research question demonstrated higher correlations between the total MYCHE scores and cognitive scores than for the total HOME scores and cognitive scores. As discussed previously, the HOME scale measures few parameters of the physical environment and is more a measure of parent-child interaction within the home, than of the actual physical environment of the home. As

stated earlier, because children in their early infant/toddler years spend the majority of their time within the home, a greater understanding of the most influential parameters of the physical environment may assist in providing additional insight into how the home affects the developmental process in young children.

The second research question addresses the contribution of the physical environment of the home to young children's developmental outcomes. It was hypothesized that certain aspects of the physical environment, specifically noise, crowding and availability of play objects will show stronger correlation with developmental outcomes than other aspects of the physical environment. Data analyses in this study demonstrate that the highest correlations were found between having a washer/dryer on the premises, adequate indoor space, and the presence of stimulus shelters and better cognitive scores on the Bayley Scales of Infant Development. These findings, with the exception of the washer/dryer item, are consistent with previous research findings. The presence of a stimulus shelter was also associated with higher language subscale scores in the MDI. This specific finding has not been presented in previous research. It is hypothesized that the presence of stimulus shelters in the home may be beneficial to language development allowing a child to have uninterrupted private time to play and learn.

Perhaps one of the more interesting findings was the correlation between having an accessible washer/dryer and higher cognitive scores on the MDI of the Bayley Scales. It is hypothesized that parents might encourage and tolerate more play activity with their children if they are able to easily clean play clothes on a regular basis. Having a washer/dryer present in the home, or at a minimum convenient to the home,

may allow parents' to engage in a play activity with their children without the stress and concern about cleaning clothes. Perhaps in addition to allowing parents more freedom to teach and to play with their children, the quality of the parent-child interaction may benefit from the presence of home resources, since children may be allowed to follow their natural impulses. Children may be allowed, for example, to engage in messy play, without additionally taxing their parents' current stress load.

Interestingly, specific correlations between types of toys and higher cognitive scores were not elucidated in this study. Previous research has found higher correlation with audio-visual responsive toys and higher language/cognitive scores. It is not known why this finding was not demonstrated in this study. This finding perhaps, may speak to the belief that expensive /high tech toys are not a requirement for cognitive stimulation, rather, when children are presented with a variety of objects that they can use for play, they may be able to draw upon their imaginations and skills to learn.

The contribution of environmental variables to gross motor development has not been extensively studied, most likely because gross motor skills are generally believed to be primarily a function of biologic maturity and are thus highly canalized. The data analyzed here suggests that a modest contribution of the physical environment to gross motor skills in toddlers exists. The availability of indoor space and the presence of stimulus shelters were positively correlated with higher PDI scores on the Bayley. One explanation is that the availability of indoor space may assist children with practicing their gross motor skills, rather than being confined to cribs and/or carriages for prolonged periods of time. It is not yet known how the

presence of stimulus shelters may affect gross motor milestones, but it may be that opportunities for periods of retreat are necessary for enabling children to extend themselves physically.

The final research aim was centered on exploring whether or not parameters of the physical environment of the home mediate parent-child interactions, which are often the target of most developmental research. The initial data analyses utilized Pearson correlations among MYCHE subscales and subscales of the NCAST. As hypothesized, significant correlations were found among aspects of the physical environment and parent-child interaction. Specifically, the higher quality the home environment, the higher quality the parent-child interaction. The most robust correlations were found among the crowding subscales and cognitive stimulation and maternal sensitivity and noise and maternal sensitivity. The relationship among these variables was further elucidated with hierarchical regressions, which confirmed the hypothesized direction and that the physical environment mediates the social environment and not vice-versa. Since parent-child interaction was measured during a teaching episode, the relationship between poor housing and decreased maternal sensitivity and poorer teaching skills begins to unfold, especially when viewed in light of the moderate to highly positive correlations among crowding, noise and home resources and measurements of parent-child interaction. The NCAST scores measure in part the degree of parental sensitivity and responsiveness that is present in a teaching interaction. The data here indicate that the poorer the physical surrounding of the home, the less responsive the parent is to their child and this contributes to a negative parent-child interaction. The ability to teach requires scaffolding strategies,

which are defined as a set of behaviors that include contingent and appropriate responding to a child during a teaching task (Bruner, 1983). Thus, if scaffolding behaviors are dependent on parental sensitivity, those parents who are chronically stressed due to inadequate surroundings may be less likely to engage in scaffolding and teaching behaviors with their children. This is another conclusion to add to our understanding of how chronically substandard physical living environment affects how family members interact with each other and how children are socialized and educated within the home. A better understanding of this complex relationship may help shed light on how poor parent-child interaction is associated with less optimal child related outcomes and how intervention geared toward improving the physical environment may improve child developmental outcomes.

Also of interest is that certain demographic variables, particularly the level of maternal education, were not found to be positively correlated with parameters of physical environment as measured by the MYCHE. However, moderate correlations were found among maternal education and collapsed HOME scores. The most likely explanation for this finding is that the HOME scale is primarily an evaluation of social variable of the home, while the MYCHE measures physical parameters. While a high level of maternal education may positively influence the qualities that a parent may bring to their social interaction with a child, it may not enable them to mitigate or change the substandard physical surroundings that they live in. Further research is needed in this important area. For example, it would be helpful to investigate alongside research of the type presented here, what consciousness parents have of the

physical environment of their homes and if so, whether or not they would be inclined to change it if they could afford to do so.

Policy Implications

Housing inequality is one of the most extreme forms of social inequality in the United States. According to recent government research, the United States currently faces a housing crisis. The cost of adequate housing has consistently and dramatically outpaced family income for many decades, costing most families over 30% of their income (CDF, 2002; NLIHC, 2002). Often, the consequences of the high cost of inadequate housing, mean that many families, especially those with children, are forced to live in substandard environments which predispose them to a myriad of health risks, social problems, and as discussed in this study, family interaction difficulties and developmental delays (CDF, 2002).

According to the most recent data available from the American Housing Survey (1999), 2.5 million households with children live in substandard housing. A significant amount of research to date has focused on the health risks of living in such conditions including lead poisoning, asthma, aggression and anti-social behavior. Most recently, other studies have begun to investigate a direct link between substandard physical space and developmental disorders (Evans & Lepore, 1993; Matthews, 2004; Maxwell & Evans, 2000; Molfese et al., 1997). Additionally, my investigation of the effects of the physical environment has found that poor housing mediates the relationship between parent-child interaction and child cognitive outcomes. As discussed in the results sections, dimensions of poor housing such as

uncontrollable noise, crowding and insufficient home resources are positively correlated with sub-optimal parent-child interactions as well as children's cognitive skills.

Given these findings and the data indicating a current housing crisis for families, it is concerning that this issue is not a top priority on the national agenda. In fact, existing federal commitments to affordable housing are in great jeopardy. The current administration has proposed severe cuts in almost all housing programs. According to the Children's Defense Fund (2004), the Administration's proposed budget cuts in Housing and Urban Development's (HUD) Section 8 housing program could mean as many as 150,000 families with children will be denied housing vouchers in the next few years.

The Family Self-Sufficiency Program, established in 1990, has also been targeted for budgets cuts of $1 billion by 2005 according to a recent report by the Center for Budget and Policy Priorities (2004). At this time, this program provides rental assistance to 75,000 people and allows participants to build savings and focus spending on other critical household needs.

The Housing Choice Voucher Program is another popular housing assistance program that has been funded with $45 million annually in appropriations and Section 8 subsidies. This program provides vouchers that help cover the cost of obtaining housing on the private market, thus allowing families some choice as to where they live. To date this program has provided assistance to 2 million families, many of which have young children (NLIHC, 2002). However, this program will soon suffer

drastic funding cuts and by 2009 it is estimated that expenditures would be $4.6 billion lower than the amount needed to continue serving the current number of families enrolled (Center for Budget and Policy Priorities, 2004). Broadly speaking this translates into cutting over 600,000 families from the program.

These proposed budget reductions will disproportionately affect children. Fifty-nine percent of the 2 million households that receive housing assistance are families with children (CDF, 2002). The consequences of these policies will mean that in future years even greater numbers children will be affected by housing poverty and will not benefit from the protective factors that good housing provides for health, growth, social skills and cognitive development. While much of the research that has been generated over the past few years has tended to focus on medical health outcomes of poor housing, more recent research has explored the protective effects of adequate housing, for instance in reducing attention deficit disorders. These proposed budget cuts ignore the research demonstrating the many proven and acknowledged benefits for families and for society of supporting the right to adequate housing.

Given the aims of the No Child Left Behind Act, this neglect of the housing crisis is contradictory if not counterproductive. Even if the educational setting is optimal, full academic potential will be difficult to attain if children are living in homes where there is uncontrollable noise, crowding, lack of space, and health risks. Education does not occur in a vacuum and it is unrealistic to expect that school systems can bear the full brunt of responsibility for educating children, when there is no guarantee that each child will have a quiet, safe home to complete their homework or that they will

have parents available to assist them with meeting educational objectives who are not consumed by the stresses of their poverty.

Furthermore, the findings of my study on home environments can be applied to the physical environments present often present in school in low-income areas. It is likely that the inadequate physical environment of schools in low-income areas contributes to lower scholastic achievement in poor children. According to the National Center for Education Statistics (2000), the quality of the school buildings is correlated with the income profile of the students. Accordingly, children enrolled in low income schools are more likely to experience environmental problems such as heating and ventilation difficulties, poor lighting, overcrowding and acoustical deficiencies (NCES, 2000). Mitigation of these physical factors may translate to improved educational achievement for children. As discussed in the previous section, research by Maxwell and Evans (2000) has pointed in that direction, by demonstrating that the control of noise in the classroom by buffering the walls leads to increases in literacy skills.

The goal of "leaving no child behind" has to mean breaking the cycle of poverty and promoting children's capacity to achieve both educationally and personally. Without addressing the impact of housing, that goal cannot be realized. Education is just one component of breaking out of the cycle of poverty; learned behavior, self-efficacy, emotional development and the development of secure attachments which are in part formed through access to safe homes and neighborhoods are also critical factors. Areas of housing poverty are often synonymous with economic segregation. Social disorganization theory posits that neighborhood structural factors such as

poverty and residential instability are of prime importance in explaining behavior vis a vis their ability to promote neighborhood organization (Shaw & McKay, 1942). Bartlett (1998) suggests in her ethnographic study, that substandard housing may perpetuate poverty in families and clarifies the many connections between housing, parenting practices and children's psychological health and development. Evans, Saltzman, and Cooperman (2002) likewise support this connection in their study of poor housing quality and children's increased sense of learned helplessness, which is important for overall motivation.

The findings of my study similarly suggest that a genuine commitment to the objective of "leaving no child behind" must focus on the physical environment of housing in addition to the educational system. If policies are created with the goal of promoting children's capacity to achieve competitively, it is unrealistic to think that this can be tackled without attention to the issue of lack of adequate housing. Policy choices need to be made that will reduce the scale of housing inequality, create more affordable housing, and ensure that every family has a safe and adequate home that promotes and protects the development of the children living there.

Limitations

It is important to recognize the limitations of this study, specifically, that any findings may be only applicable to the population evaluated. These families were from a low-income background and the age range of the children was restricted to 14-24 months; and for these reasons, generalizations of these findings should not be made to other populations and age groups.

The research involved a small sample size (N=22). The small number of participant dyads limited the type and quantity of analyses that could be conducted. In some instances individual items were collapsed into larger subscales to reduce the number of variables because of insufficient power. It is possible that additional significant correlations may have been found had the sample size been larger and been able to allow for a greater number of variables to be explored.

Another methodological issue was that the participants were evaluated during one visit. This was done in part to minimize disruption to the participants' family routines but also because of financial constraints of the research team. As a result, we do not fully understand whether the observations and measurement of the families' homes, parent-child interactions and children's development were typical and thus accurate.

In assessing the outcomes, the developmental skills were measured by the Bayley Scales of Infant Development-II. Although this measure has been used widely and has excellent validity, only the large categories of "Mental" development and "Motor development" were examined in the analyses again in part due to power issues secondary to the small sample size. Given these broad categories, it was not possible in this study to determine which aspects of cognitive development (i.e. expressive or receptive language) were most affected by the independent variables in this study.

Finally it should be noted that the MYCHE fails to take into account the role that culture, community standards and family/personal values play in mediating the physical realities of the home. While Evans et al., (2000), have demonstrated that crowding contributes to symptoms of physiologic stress irregardless of cultural norms, there is not much empirical evidence suggesting that the other parameters

investigated here are likewise unaffected by cultural expectations. The MYCHE also does not take into account the family input into how the home meets or fails to meet their individual family needs. This is important because given the specific situation of any single family; certain physical parameters may have more of an impact on family function than others.

Finally, this investigation was primarily quantitative, and thus could be criticized for being "reduction-ist" and failing to account for the multi-factorial nature of the effects of poor housing quality on parent-child interaction and children's development. An additional and thorough qualitative account of parents' experiences within their homes may have been helpful in enriching the objective data.

Directions for Further Research

This study has demonstrated the important impact of the physical environment of the home on parent-child interaction and young children's development. Further work in this area is necessary in order to continue to understand this phenomenon more fully. The first issue in expanding research in this area concerns assessment measures of homes. The MYCHE scale was developed as part of this investigation in order to allow a more thorough assessment of the physical parameters of the home than is currently available. However, as discussed in the previous sub-section, this scale is limited in certain ways. It is difficult to create a complete set of absolute physical standards for living that can be applied to all family homes across all communities and cultures. Improvements for future "home" scales might include a way to adjust the scale to reflect the cultural preferences and value systems of a

particular community as these may influence the acceptable standards of living. Another improvement to future scale development would be allowing for some measure of family input into how well the home environment meets their needs. This could be done by interviewing the family on each of the subscales or with a likert scale type assessment to be completed by the family during the home assessment.

Housing research poses unique challenges as there are many inherent methodological difficulties in assessing the effects of different types of living conditions. Poor housing conditions often exist alongside other forms of deprivation, and it can be difficult to separate other factors that may covary with poverty. Investigating and assembling such evidence requires a holistic approach, combining quantitative and qualitative methods and taking into account a range of possible cofactors and mechanisms. A large sample size and a quasi-experimental design would be beneficial in exploring the impact of substandard housing, as would a longitudinal design for understanding the long-term sequelae of substandard housing beyond early childhood.

Additionally, attention to developmental outcomes beyond health and cognitive skills would provide further insight, and might include measures to assess emotional well being, adaptive functioning, social behavior, and language development.

Future research directed toward these goals would have numerous benefits and would help inform broader social policies that aim to support a national agenda to increase the availability of affordable housing. It should be acknowledged, though, that broad generalizations concerning the link between housing deprivation and negative child outcomes can have only a limited role in informing specific policy

decisions. Thus, evidence of the effectiveness and cost effectiveness of positive housing interventions to families should also be a future research priority.

Conclusions

The findings of this study have provided additional insight into the influence of the physical environment on parent-child interactions and early childhood development. More specifically the data have indicated the value of a scale, which can measure a range of specific qualities of the physical environment of the home. This research has confirmed previous research findings and demonstrated new findings: those aspects of the physical environment of young children's homes are highly positively correlated with parent-child interaction and aspects of infant/toddler developmental outcomes and that these parameters uniquely, jointly and conditionally contribute to both family interaction and children's developmental skills. Research on young children's experience with housing poverty is critical as research models indicate that the poverty exerts the greatest impact during the early childhood years (Duncan et al, 1998).

Housing inadequacies can have severe consequences both directly, by negatively affecting developmental skills and indirectly, by affecting parent-child interactions. The sequelae of living in a substandard physical environment may be long lasting, perhaps even perpetuating a cycle of poverty and developmental and social disadvantage and this finding indicates the critical need for adequate methods to measure, research, understand and intervene in poor housing situations. Federal policies to minimize housing inequality need to be implemented in order to truly

"Leave No Child Behind". The reported findings in this study and further research using this scale (or similar scales) can improve our ability to develop effective intervention strategies for children and their families during this pivotal stage in their development.

Table 1. Matrix of Current Measures of the Home Environment.

	IT-HOME	EC-HOME	EAI	HSQ	PROCESS	PHSSI
Scale requires direct observation of home	Yes	Yes	Yes	No	No	Yes
Space/Layout	No	No	No	No	No	Yes
Spatial organization/ Chaos	No	No	No	No	No	Yes
Crowding/Density	Yes	Yes	Yes	No	Yes	Yes
Privacy/Child "owned" space	Yes	No	No	No	No	Yes
Toys	Yes	Yes	Yes	Yes	Yes	Yes
Home made objects recognized as toys	No	No	Yes	No	No	No
Noise	No	No	No	No	No	Yes
Access to Outdoors	Yes	Yes	Yes	No	No	No
Home Resources	No	No	No	No	No	No
Safety	Yes	Yes	No	No	Yes	No

Table 2

Participant Demographics

Variable	Participant Data (dyad N= 22)
Age	
Parent	X=27.5
Child	X=17.8
Education	
< HS	10%
HS	60 %
College	20 %
College Degree	8 %
Post Graduate	3 %
Income (Mean)	$11,000 %
Occupation	
Stay at Home	90 %
Work outside Home	
Education	5 %
Relationship Status	
Married	25 %
Separated	25 %
Single	10 %
Divorced	
Widow (er)	
Feelings About Home Environment	
Adequate	37 %
Not Adequate	63 %
Would Relocate	100 %
Reasons for Negative Feelings	
Not enough space	60 %
Not enough rooms	22 %
No elevator	52 %
No washer/dryer	43 %
Unsafe	8%

Table 3

Correlations Among Dependant and Predictor Variables

Variable	Bayley MDI	Bayley PDI
1. Noise	.51	.09
2. Crowding	.44	-.08
3. Stimulus Shelter	.64	.48
4. Outdoor Space	---	.29
5. Home Resource	.66	.20
6. Play Space Indoor	.38	.52
7. Printed Material	.45	---
8. Toys	.70	-.10
9. Total MYCHE	.64	.25
10. Total HOME	.35	.04

*p< .05

Table 4

Correlations among Parent-Child Interaction , Home Scores and MYCHE scores

Variable	1	2	3	4	5	6	7	8
1. NCAST (Total)								
2. NCAST- Maternal Sens.								
3. NCAST- Cognitive Stimulation								
4. MYCHE (Total)	.52	.54	.38	.--	--	--	--	--
5. MYCHE-Crowding		.48	.38					
6. MYCHE- Noise			.70					
7. MYCHE- Home Resources		.60	.65					
8. HOME (total)	.66	.54	.25	--	--	--	--	--

- $P < .05$

Table 5

Stepwise Regressions for Mediational Model

Predictor	. R2
Model	67
NCAST	
MDI	
HOME	42
MYCHE	+25

APPENDIX

MYCHE Item Scoring Guideline Instructions

By Elizabeth Matthews

Item Number Guideline

1. Common Space: This item refers to space within the home that is/can be used for family gatherings. This may be a living room/den/dining room.
2. Separate sleep space: This item refers to the availability of separate sleep space for the child or children. This space can be shared with parent/siblings. The space must be separate from common gathering space.
3. Stimulus shelters: a separate area that is physically closed off from areas of high activity in the home. This does not need to be a separate room, but should be an area "separated" either by books/furniture/toys, etc..
4. Space for family meals: area available for family meals that contains a place to sit and a table or other structure for food/drinks. Children under one year of age must have a high chair or car seat for mealtimes. A "child sized" meal area should be available. Must meet criteria for adults and child in order to score a + in this category.
5. More than two rooms: exclusive of bathroom
6. Adequate room for number of residents: 50 sq foot/person
7. Adequate furniture: subjective evaluation of amount of furniture in the home
9. Lack of furniture: relates to lack of age appropriate furniture for child such as bed/crib/high chair/. In order to score a +, there must be two items of furniture appropriate for child.
10. Books/printed material: At least 3 items consisting of books appropriate for child and /or printed material available /on display for child. Printed material can include artwork with words, magazines that are colorful and appealing to child, blocks that have letters on them.
11. Soft toys: at least 1 "soft" item such as a stuffed animal, doll , or an item of furniture such as a soft chair.

14. Cognitive Stimulation: toys or objects in the home that are appropriate for cognitive stimulation such as books, blocks, doll house, pots/pans for symbolic play

15. Fine motor stimulation: toys available for fine motor development such as crayons, pencils, toys with snaps/zippers, stackers, blocks

16. Gross motor stimulation: bike, push toy, ball

20. Excessive indoor noise: noise in the home that requires one to raise voice in order to be heard or interferes with concentration

21. Excessive outdoor noise: noise from outside that can be heard with windows closed indoors. Guideline is more than 4 instances of noise per hour.

22. Chronic Noise: noise that is heard chronically over a period of 1 month or more

24. Clear traffic pattern: pathways to rooms and access to doors that is free of furniture

Measurement of Young Children's Home Environments (MYCHE)

ID _____

Type of Home: Single Family Multiple Family Apt (walkup) Apt (Elevator)

Shelter Other (specify) _____

Number of people who reside in the home _____

Number of children _____ Ages: _____/_____/_____/_____

Number of rooms _____

Category	+/-	Subscale Score	Comments
Space 1.Common space 2.Separate sleeping space 3.Areas for Play (indoor) 4.Stimulus shelters 5.Space for family meals 6. >2 rooms			
Crowding 6.adequate room for number of family members 7.adequate furniture 8.crowded furniture (-1) 9.too little furniture (-1)			

Category	+/-	Subscale Score	Comments
Toys/Objects 10.Books/printed material 11.Soft toys 12.Crayons/chalk 13.Responsive toys 14.Cognitive 15.Fine motor 16.Gross motor 17.Age appropriate toys 18.Unsafe objects used as toys (-1)			
Noise 19.Adequate sound proofing between units 20.Excessive indoor noise (-1) Reason: TV ___ Radio___ Other ____ 21.Excessive outdoor noise (-1) 22.Noise is chronic (-1)			
Spatial Layout 23.Visual Surveillance For Parent (+1) For Child (+1) 24.Clear traffic pattern			

Category	+/-	Subscale	Comments
Home Resources 25. refrigerator 26. Stove 27. W/D on premises 28. Sink 29. Bathroom 30. Heating 31. A/C 32. Electric 33. phone			
Health & Safety 34. Lead pt (-1) 35. Structures in adequate condition (general) 36. CO alarm 37. Fire alarm 38. Fire extinguisher 39. First aid kit 40. Home is "child proofed" 41. Lock on front door			
Access to Outdoors 42. Elevator 43. Walk Up Fl 1 or 2 (+1) Fl > 3 (-1) 44. Near busy street (-1) 45. Safe play area in front of home 46. Safe play area near home < ½ mi 47. Neighborhood in general is safe			

Research Study Number _____

Demographic Questionnaire

How many people live in your house? ____
How many are children < 10 yrs old? _____

Marital Status: ___

Ethnicity: ____

How long have you lived in this home? _____

What languages are spoken in the home? ____

Highest educational level attained? ____

Current occupation: _____

Total Household income: ____

Target child's birthweight: _____

Is child in a day care /preschool setting? _____

If no, who takes care of child during the day? _____

Developmental Questionnaire:

At what age did the child reach the following milestones?

Smiling	crawling
Cooing	walking
First word	two words together
Rolling over	
Sitting	
Waving "hi"	

What do you love most about your home?

What do you dislike most about your home?

If you had the option to move out of this home, would you?

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