

HOUSEHOLD CHAOS, THE HOME LEARNING ENVIRONMENT, AND
PRESCHOOLERS' LANGUAGE AND LITERACY DEVELOPMENT

By

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ABSTRACT

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This dissertation considers home influences on preschool children's early development in language and literacy, core competencies in the transition to formal schooling, within an ecological systems framework. In Study One, I examine associations between the contextual feature of household chaos and children's outcomes, testing for direct links, as well as indirect links through the learning activities parents provide via the home learning environment (HLE). In Study Two, I make specific practical recommendations for families and those who work with families based on my findings from Study One, also drawing from the broader field of research and theory on household chaos and children's development.

In Study One, I examine household chaos in the lives of preschoolers and their families. Household chaos has been negatively associated with a variety of parenting behaviors and children's developmental outcomes, but little is known about how it relates to the home learning environment (HLE) or to children's language and literacy outcomes once the HLE is accounted for. Using a diverse sample of 342 preschoolers ranging in age from 34 months to 67 months and their parents, I test whether parent reported household chaos is related to children's early language and literacy outcomes both directly, and indirectly through its influence on parental provision of the HLE. Results using mediation analysis within a structural equation modeling (SEM) format indicate that household chaos is indirectly related to children's language and literacy outcomes through the HLE. Additionally, there is a direct effect of household chaos on children's language skills for those families not in poverty. Future directions for research on

household chaos are discussed, along with practical implications for working with children and families, which are expanded upon in Study Two.

In Study Two, I underscore the importance of creating environments that promote children's learning and engagement, with a discussion about practical ways that families can reduce overall levels of household chaos. Specifically, this paper reviews findings from Study One, and, together with the larger body of work on environmental chaos, makes practical recommendations for ways that practitioners can support families in increasing the degree of order and organization in the home while limiting noise and instability. Consistent with other work, Study One suggests that specific elements of household chaos, such as the presence of the television and participation in family routines may be particularly important for family functioning. Basing recommendations for practitioners on the current study findings along with the field at large, this paper focuses on three areas known to be important indicators of household chaos as they relate to child and family functioning: the presence of the television in the home, the occurrence of family routines, and the degree of order and organization in the home.

Study One helps to provide insight into the ways that household chaos contributes to parent-child interactions around learning, and to children's language and literacy development in particular. Building on these findings, Study Two delves deeper into the literature on specific elements of household chaos, providing practical strategies that families can employ to reduce the harmful effects of television usage, and capitalize on the positive influences of family routines and orderly learning spaces.

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Gerde. Thank you, Hope, for the many opportunities you have provided me to develop my skills as a scholar in a variety of areas, and for always being available to share your insights on everything - from a recent book you read, to your thoughts on a new coding system, to how to ask killer questions in an interview. I have enjoyed our many and varied discussions, and I look forward to continuing them in the future.

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CHAPTER 1: INTRODUCTION

Overview

This study takes an ecological systems approach in examining family and home contributions to children's language and literacy development in preschool. Specifically, I explore the associations between the home learning environment (HLE) and the contextual factor of household chaos, while examining how these variables work together to contribute to children's development. I examine the possible direct influences of chaos on children, as well as the potential for indirect links between chaos and children's development as it operates through the HLE. The potential moderating roles of child gender and age on influence of chaos are also explored. All of these are examined in a framework that takes into account the importance of the environment in family and child wellbeing, with a focus on how practitioners can support families in creating environments that set the stage for positive interactions and growth.

Rationale

Children's early language and literacy skills are a core part of preschool competencies, with early skills in these areas predicting children's early academic success (NELP, 2008) through high school (Cunningham & Stanovich, 1997) and beyond (Entwisle, Alexander, & Olson, 2005). Children arrive in kindergarten with widely varying skill sets in these areas (Lee & Burkam, 2002). Not only are differences in language and literacy established before formal schooling begins (Lee & Burkam, 2002), they tend to persist throughout schooling (Cunningham & Stanovich, 1997) and are resistant to change (Catts, Bridges, Little, & Tomblin, 2008). As such, numerous initiatives have aimed at bolstering children's early language and literacy skills, with a particular focus on children's early experiences in the home, especially those from a wide variety of backgrounds (Shonkoff & Phillips, 2000).

The home learning environment, defined as the activities and opportunities that parents engage in with their children to provide them with knowledge about critical content (Hindman & Morrison, 2012), is a well-established support to the development of language and literacy skills. Whether formal or informal, the learning activities that parents engage in with their children remain one of the strongest predictors of children's later language and literacy skills over time, even when considering other important factors such as parental sensitivity, responsivity, or maternal education (Bradley, Corwyn, Burchinal, McAdoo, & Garcia Coll, 2001; Morrison & Cooney, 2002).

Inquiries into children's language and literacy skills largely examine the influence of parent-child interactions, while failing to take into account the setting in which these interactions take place; it is likely important to consider not only the interactions that occur between parents and children, but also the context within which these interactions take place. Thus, an ecological systems approach may provide a more comprehensive view of the nature of children's early language and literacy skills by highlighting the importance of contextual factors in children's development. Recent work in child development has turned an eye toward these settings, suggesting that context, in terms of noise, crowding, and overall organization, has important implications for parents' and children's well-being (Evans, 2006). Specifically, this study looks at household chaos and its associations with children's language and literacy, as well as with the HLE that parents are providing to their children.

Chaotic environments can be characterized as being noisy and crowded, with high levels of confusion and low levels of organization and stability (Evans & Wachs, 2010; Bronfenbrenner & Evans, 2000). Chaos in the home is increasingly being recognized as an important contextual factor to consider in the well-being of families and children, contributing both to parenting

behaviors (Coldwell, Pike, & Dunn, 2006; Matheny, Wachs, Ludwig, & Phillips, 1995) as well as numerous child outcomes, such as language (Petrill, Pike, Price, & Plomin, 2004), effortful control (Valiente, Lemery-Chalfant, & Reiser, 2007), and cognitive ability (Deater-Deckard, Mullineaux, Beekman, Petrill, & Schatschneider, 2009). While there is moderate support for the link between home chaos and language skills (Petrill et al., 2004), very few studies have examined the relationship between home chaos and early literacy skills or the HLE (for an exception, see Johnson, Martin, Brooks-Gunn, & Petrill, 2008). Further, many of the studies that explore chaos and child outcomes utilize samples with early elementary age children or families who are above average in terms of socioeconomic status (Johnson et al., 2008; Deater-Deckard et al., 2009). There is a dearth of studies that examine how these processes might unfold in preschool age children from families who are representative of the general population in terms of socioeconomic status; low-income families are underrepresented in social science research in general, and in research on home chaos specifically (Evans, Eckenrode, & Marcynszyn, 2010). In the chaos literature, there are also unanswered questions as to whether or not the influence of chaos differs depending on the gender or age of the child (Evans & Wachs, 2010; Pike, Iervolino, Eley, Price, & Plomin, 2006).

This study adds to the extant literature by extending our understanding of the home and contextual contributions to children's early language and literacy development. It addresses numerous gaps in the literature on chaos by examining the relatively unexplored topic of the relationship between chaos in the home and the formal and informal HLE activities that parents engage in with their children. Further, this study seeks to answer whether or not home chaos contributes uniquely to preschoolers' language and literacy skills, once the influence of the HLE is accounted for. By examining household chaos and HLE together, this study investigates two

unanswered questions: 1) Does household chaos predict children's outcomes in language and literacy directly, and indirectly, through its influence on the HLE?, and 2) Does household chaos influence children differently depending on their gender and age? In addition, by answering the above questions using a more representative sample than in previous studies, the current work provides valuable information about an understudied group in the chaos literature – preschoolers from a wide range of socioeconomic backgrounds.

Theoretical Framework: Bioecological Systems Model

The environment in which children develop has clear implications for their developmental outcomes. The bioecological model (Bronfenbrenner & Evans, 2000; Bronfenbrenner & Morris, 1998) provides a theoretical backdrop for understanding how the child develops within an interactive framework of process, person, context, and time. At the center of the model lies the person, who experiences various processes within multiple levels of context, all of which unfold over time in an interactive manner (Bronfenbrenner & Morris, 1998). Context, one of the most well-known and distinctive features of the model (Evans & Wachs, 2010), signifies the multiple spheres of the environment in which a person lives and develops. The microsystem is the contextual sphere which is comprised of a child's immediate environment (i.e., the home); moving outward, the microsystem contributes to the mesosystem, where microsystems interact (as when a home setting influences the classroom setting). The outermost contextual layer is the macrosystem, which includes cultural, political, and economic influences on the other systems. All levels of context can influence the proximal processes unfolding in the microsystem (Evans & Wachs, 2010).

It is these proximal processes, the reciprocal interactions between an individual and the people, objects, or symbols in their immediate environment that serve as the drivers of

development; essentially, development arises from interactions between persons and their contexts over time (Bronfenbrenner & Morris, 1998). High-quality exchanges between children and their parents provide the foundation for the development of knowledge, skills, and behavioral competence (Bronfenbrenner & Evans, 2000). Parents and children engaging in home learning environment activities are one such example of proximal processes that occur in the home.

The nature of proximal processes that children experience is an important determinant in whether children develop competence or dysfunction in a particular developmental domain (Bronfenbrenner & Evans, 2000). In order for proximal processes to engender competence, they must occur on a regular and predictable basis, for extended periods of time, and they must grow in complexity over time (Bronfenbrenner & Evans, 2000; Evans & Wachs, 2010).

Of course, these proximal processes must unfold within a context. Various contextual features, across multiple levels, have the potential to influence these processes. Chaos, one such contextual feature that has been found to have important influences across a variety of settings, can interfere with the quality or effectiveness of quality positive proximal processes that children experience, as well as create dysfunction in children (Bronfenbrenner & Evans, 2000). In essence, chaos can disrupt the “good” exchanges that the child has with his or her environment, and, alternatively, it can create “bad” exchanges with the environment; the nature of these exchanges will portend whether the child develops competence or dysfunction (Bronfenbrenner & Evans, 2000). Drawing from this theoretical backdrop, it is not surprising that chaos has been found to have a negative influence on children both directly (Pike et al., 2006; Johnson et al., 2008) as well as by disrupting the proximal processes that children take part in, such as responsiveness from the parent toward the child (Evans, Maxwell, & Hart, 1999).

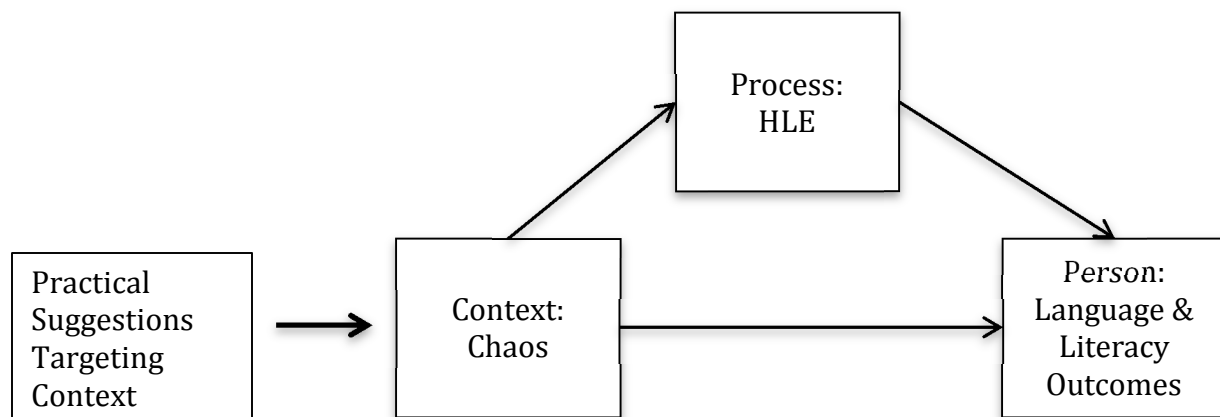


FIGURE 1.1 Conceptual Model of Current Dissertation Study One and Study Two

Chaos in the home setting is part of the context in which some children and families live their daily lives. Examining the relationship between chaos and the proximal processes that occur between parents and children, especially those that involve learning activities, may help to further illuminate the links between chaos in the home, parents, and their children (Bronfenbrenner & Evans, 2000; Evans & Wachs, 2010).

Understanding how household chaos may contribute to child, parent, and overall family functioning will also help to inform approaches to early intervention with families. Recommendations for best practice in early intervention are built around the premise that care should be integrated into the family's home settings (DEC, 2014), weaved into family routines (McWilliam & Scott, 2001), and with an understanding that the home environment itself provides certain opportunities and avenues for growth (Bronfenbrenner & Evans, 2000). Ecological approaches to working with families expand the scope of care beyond targeting only the child (person), to also addressing the caregiver-child interactions (process) within the home environment itself (context), modifying and adapting the environment when necessary to allow

for more optimal development (Bronfenbrenner, 1974; Dunn, 2011). Currently, efforts have concentrated on understanding the nature and impact of chaos on families, rather than on intervention or prevention in this area (Brooks-Gunn, Johnson, & Leventhanl, 2010); however, there is some promise in interventions that target specific indicators of chaos such as television usage (Gorin, Raynor, Chula-Maguire, & Wing, 2006) and noise levels (Maxwell & Evans, 2000). Combining current research and theory, we can begin to make practical recommendations to families for creating positive home environments that that are low in chaos; targeted intervention studies will be necessary in the future to determine if intervening at the level of household chaos results in more optimal outcomes for children and families.

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CHAPTER 2: STUDY ONE

Household Chaos, the Home Learning Environment, and Preschool Children's Language and Literacy Outcomes

ABSTRACT

Using ecological systems theory as a guide, this study examines children's development not only as a function of the direct exchanges between children and their parents, but also with consideration for the environment in which these interactions take place. Specifically, this study examines household chaos in the lives of preschoolers and their families. Household chaos has been negatively associated with a variety of parenting behaviors and children's developmental outcomes, but little is known about how it relates to the home learning environment (HLE) or to children's language and literacy outcomes once the HLE is accounted for. Using a diverse sample of 342 preschoolers ranging in age from 34 months to 67 months and their parents, the current study tests whether parent reported household chaos is related to children's early language and literacy outcomes both directly, and indirectly through its influence on parental provision of the HLE. Additionally, the potential moderating effects of child age and gender were explored. Results using multivariate analysis within a structural equation modeling (SEM) format indicate that household chaos is indirectly related to children's language and literacy outcomes through the HLE. Additionally, there is a direct effect of household chaos on children's language skills for those families not in poverty. This study provides no evidence that the influence of chaos varies depending on the age of gender of the child. Future directions for research on household chaos are discussed, along with practical implications for working with children and families.

Introduction

Theoretical framework

Children's development occurs as a function of the multiple systems of influence that surround them, with their home environment serving as the crux of this process in their early years (Bronfenbrenner & Evans, 2000). The proximal processes that children engage in, defined as the reciprocal interactions between a child and the people, objects, and symbols in their immediate environment, are considered the drivers of development as they unfold over time (Bronfenbrenner & Morris, 1998). High-quality exchanges between children and their parents provide the foundation for the development of knowledge, skills, and behavioral competence (Bronfenbrenner & Evans, 2000). Parents and children engaging in home learning environment (HLE) activities are one such example of proximal processes that occur in the home.

The nature of proximal processes that children experience is an important determinant in whether children develop competence or dysfunction in a particular developmental domain, but the context in which these parent-child exchanges occur is also relevant to development (Bronfenbrenner & Evans, 2000). In order for proximal processes to engender competence, they must occur on a regular and predictable basis, for extended periods of time, and they must grow in complexity over time (Bronfenbrenner & Evans, 2000; Evans & Wachs, 2010). Household chaos, contexts that can be considered to be disorganized, unstructured, and with high levels of background noise and distraction (Evans & Wachs, 2010), can disrupt the positive exchanges that the child has within his or her environment, resulting in less than optimal development (Bronfenbrenner & Evans, 2000). Drawing from this theoretical backdrop, it is not surprising that household chaos has been found to have a negative influence on children both directly (Pike, Iervolino, Eley, Price, & Plomin, 2006; Johnson, Martin, Brooks-Gunn, & Pettrill, 2008) as well

as by disrupting the proximal processes that children take part in, such as responsiveness from the parent toward the child (Evans, Maxwell, & Hart, 1999).

Chaos in the home setting is part of the context in which some children and families live their daily lives. Examining the relationship between chaos and the proximal processes that occur between parents and children, especially those that involve learning activities, may help to further illuminate the links between chaos in the home, parents, and their children (Bronfenbrenner & Evans, 2000; Evans & Wachs, 2010). This study considers the possibility that a specific aspect of context, household chaos, has important implications for preschool children's language and literacy development, both directly, and indirectly through its influence on the home learning activities that parents provide.

Language and Literacy Development in the Early Years

Early language and literacy skills are considered key indicators of children's school readiness (NELP, 2008). Early language skills facilitate children's social-emotional adjustment and ability to meet the demands of the school setting (Catts, Fey, Zhang, & Tomblin, 1999), and they also support and mutually reinforce the acquisition of early and later literacy skills (Dickinson, Anastasopoulous, McCabe, Peisner-Feinberg, & Poe, 2003; Snow, Burns, & Griffin, 1998).

Even before conventional literacy skills are apparent, children are developing emergent literacy skills; reading skills operate on a continuum, and these early capabilities serve as the precursors to later formal reading (Whitehurst & Lonigan, 1998). Of particular importance in these early stages of literacy development are alphabet knowledge, including knowledge of letter names and their corresponding sounds, and decoding, all of which are highly predictive of later reading skills (Lonigan, Burgess, & Anthony, 2000; NELP, 2008). Children's understanding of

the rules and concepts of print is another important component of early literacy development, and contributes to later literacy skills as well (Storch & Whitehurst, 2002). Early literacy skills are predictive of later literacy skills in elementary and even high school (Cunningham & Stanovich, 1997), and even forecast later college enrollment (Entwistle, Alexander, & Olson, 2005) and economic potential into adulthood (Storch & Whitehurst, 2002). Given the significance of early language and literacy skills to children's concurrent development and future learning, numerous initiatives have aimed at bolstering children's early language and literacy skills, with a particular focus on children's early experiences in the home, especially those from a wide variety of backgrounds (Shonkoff & Phillips, 2000).

The Home Learning Environment

Parents who believe that they have an active role in their children's early learning, and thus provide opportunities to learn along with direct teaching, have children with better language and literacy skills than children from families with different parenting profiles (Bennett, Weigel, & Martin, 2002). Preschoolers whose parents afford them more learning oriented activities in the home setting gain distinct advantages in developing early academic competencies (Hindman & Morrison, 2012; Hood, Conlon, & Andrews, 2008).

These activities can be conceptualized as the home learning environment (HLE): the resources available in the home, whether material or interpersonal, that children have access to that can foster their learning about critical content (Hindman & Morrison, 2012). Parents can support their children's learning through activities such as teaching letter names and sounds, engaging in joint writing, and reading books together (Aram & Biron, 2004; Hindman & Morrison, 2012; Sénéchal & LeFevre, 2002). The more frequently children experience these opportunities for learning at home, the more skilled they are in the areas of language and literacy

development later on (Christian, Morrison, & Bryant, 1998; Hindman & Morrison, 2012; Hood et al., 2008).

The home environment is the primary setting where children's early learning and development takes place, with direct parent-child interactions driving development (Bronfenbrenner & Evans, 2000). However, it is possible that the context in which these HLE activities take place also has implications for children's development; some aspects of the home, such as household chaos, the focus of this study, may be important for "setting the stage" for learning. And, even though they may not be a direct component of the parent-child HLE activities taking place in the home, they may nonetheless make important contributions to young children's learning and development (Bronfenbrenner & Morris, 1998; Johnson et al., 2008).

Household Chaos

The majority of studies on chaotic environments utilize measures of chaos in composite form (Matheny, Wachs, Ludwig, & Phillips, 1995), typically considering how the combined effects of noise, crowding, organization, and stability influence parents and children. The growing literature on household chaos suggests that this contextual feature may influence a variety of parenting behaviors, including the provision of the HLE (Deater-Deckard, Mullineaux, Beekman, Petrill, Schatschneider, & Thompson, 2009; Johnson et al., 2008) and child outcomes, such as language (Petrill, Pike, Price, & Plomin, 2004; Pike et al., 2006) and literacy (Johnson et al., 2008). Household chaos is being increasingly recognized as an important environmental determinant in family and child wellbeing, especially when development is viewed through an ecological systems lens (Bronfenbrenner & Evans, 2000; Evans & Wachs, 2010). Chaos and its correlates have been examined in a variety of environments on multiple levels, including microsystems such as the home (Matheny et al., 1995; Corapci & Wachs, 2002) and school

(Maxwell, 2010; Ponitz, Rimm-Kaufman, Brock, & Nathanson, 2009). Generally speaking, across these settings, higher levels of environmental chaos are negatively associated with numerous caregiver and child-level outcomes, including parental warmth (Coldwell, Pike, & Dunn, 2006), responsiveness, self-efficacy (Corapci & Wachs, 2002) discipline (Dumas, Nissley, Nordstrom, Smith, Prinz, & Levine, 2005), and the home learning environment (Johnson et al., 2008; Deater-Deckard et al., 2009), as well as child behavior problems and attention skills (Dumas et al., 2005; Valiente, Lemery-Chalfant, & Reiser, 2007) and cognitive outcomes (Johnson et al., 2008; Petrill et al., 2004; Pike et al., 2006).

Chaos and SES. Socioeconomic status (SES) is also negatively related to levels of chaos in the home environment; this relationship is evident both with the individual constituent parts of chaos (i.e., noise, crowding, instability), as well as when we look at chaos as a composite variable (Matheny et al., 1995). For instance, lower SES is linked with higher chronic noise (Evans & Hygge, 2007) and crowding (Evans, 2006) in the home environment, as well as with higher levels of overall chaos as measured in a composite index (Dumas et al., 2005; Matheny et al., 1995; Pike et al., 2006). Numerous studies have found unique contributions of chaos to parenting and child outcomes, even when accounting for the effects of SES (Matheny et al., 1995; Deater-Deckard et al., 2009; Petrill et al., 2004). It is important to note that, although SES and household chaos are moderately correlated, chaos, along with its negative consequences, is also present in families who are not disadvantaged in terms of SES (Deater-Deckard et al., 2009; Johnson et al., 2008).

Measuring Chaos. The recognition of chaos as a construct of social significance is relatively recent (Evans & Wachs, 2010), which is evident in the varying ways that chaos is measured at present. Current studies of chaos have built upon an earlier body of literature that

suggests that the constituent parts of chaos, such as noise and crowding, have negative effects on child and family functioning (Evans & Lepore, 1997; Evans, 2006). More recent studies examine chaos more broadly and define chaos as those environments that can be characterized by high degrees of noise, crowding, disorder, and low levels of stability and order (Bronfenbrenner & Evans, 2000; Evans & Wachs, 2010). Individual elements of chaos do not occur in isolation and may work together in a cumulative ways. The sense of a chaotic environment is largely an overall “summary judgment emerging from the disruptive effects of multiple variables” (Ackerman & Brown, 2010, p. 37), and thus, the experience of chaos may be better represented by considering it in aggregate form. The present body of work on household chaos overwhelmingly uses a composite score of multiple indicators of chaos that are found to be most detrimental to children’s development (Deater-Deckard et al., 2009; Johnson et al., 2008; Matheny et al., 1995; Petrill et al., 2004), typically using an average score of household chaos for analysis and interpretation of findings, which is the way that chaos is operationalized in this study. Throughout this paper, use of the term chaos refers to a composite score of chaos; when referencing a study that examines a particular indicator of chaos, (i.e., noise), it is noted as such.

The Mechanism of Chaos. Though the mechanism through which chaotic homes exert their influence on children’s language and other cognitive skills is relatively unexplored, some explanatory hypotheses have been put forth to understand both the direct and the indirect relationship between chaos and children’s development. Petrill and colleagues (2004) offered an explanation for their findings that chaos was a direct and negative influence on children’s language skills, suggesting that children growing up in chaotic homes may be less able to explore and interact with their immediate environment in ways that stimulate cognitive development. A potential explanation for the negative relationship between noisy environments and children’s

language skills may be that children, in an effort to filter out extraneous environmental stimuli, also filter out beneficial information from their environment, including language input from adults (Evans, Bullinger, & Hugge, 1998). And, noisy environments can make it difficult for children to pay attention to and subsequently learn complex material (Evans and Lepore, 1993; Maxwell & Evans, 2000).

In addition to having negative, direct influences on children's development, household chaos may also influence children indirectly as it operates through the caregivers in their environment. Belsky's (1984) model of parenting, situated under a bioecological systems framework, posits that parenting behaviors are influenced by multiple, interacting systems, and can be threatened by external sources of environmental stress, one of which could take the form of household chaos. Stress incurred from chaotic home environments could jeopardize the quality and quantity of positive parent-child engagements, which is evident in studies that show that parents in chaotic homes are less responsive to their young children (Corapci & Wachs, 2002), are less cognitively stimulating (Evans et al., 1999), and engage in literacy activities less frequently (Johnson et al., 2008). Household chaos is related to increased externalizing behaviors in children, an association that is partially mediated by parents' positivity with their children (Valiente et al., 2007). Thus, it seems likely that the pathways of influence from chaos to children may operate both directly and indirectly, through parenting behaviors.

Chaos and Language Skills

Across these multiple settings and systems, homes higher in chaos have been linked with lower language skills in early childhood. Household chaos and SES were the strongest predictors of three and four-year-olds' verbal and nonverbal cognitive skills, even in the presence of other important risk factors such as maternal depression, parental discipline behaviors, and

minority status (Pike et al., 2006) or genetic contributions (Petrill et al., 2004). Household order, one element of chaos, has been found to be moderately correlated with kindergarteners' expressive vocabulary, even when accounting for HLE's influence (Johnson et al., 2008). For preschool children, lack of routine (Martin, Razza, & Brooks-Gunn, 2012), and household chaos (Pike et al., 2006) have been found to be associated with lower vocabulary skills. Home chaos dimensions of disorganization and instability both predicted three-year-olds receptive and expressive language skills in a large sample of low-income families residing in rural areas (Vernon-Feagans, Garrett-Peters, De Marco, & Bratsch-Hines, 2012).

Chaos and Literacy Skills

The relationship between home chaos and literacy is less clear. Most of what is known about the influence of chaos on children's literacy skills comes from studies of the school environment and one specific element of chaotic environments: background noise, either from the immediate classroom environment, or more distal sources of background noise, such as living near an airport (Hygge, Evans, & Bullinger, 2002). Studies of noisy school environments and neighborhoods implicate a possible direct link between noise and depressed literacy skills in children, even when the levels of noise were well below those considered damaging to hearing (Evans & Hygge, 2007; Maxwell & Evans, 2000). Maxwell and Evans (2000) compared the emergent literacy skills of 90 preschoolers across two classrooms: one classroom fitted with noise-dampening materials, and one classroom without. At the end of the year, children in the quieter classroom had better emergent literacy skills in the areas of letter name and sound knowledge, but there was no difference between the two classrooms in their phonological awareness abilities. The bulk of this work only examines the specific effects of noise, but Ponitz and colleagues conceptualized a broader definition of classroom chaos and order, and their

subsequent relations with children's literacy skills. Assuming that chaotic classrooms contained many of the same features of chaotic homes, they utilized an adapted version of the widely used CHAOS scale (Matheny et al., 1995), to examine teacher ratings of such things as crowding, rushing, and organization in the classroom setting (see Wachs, Gurkas, & Kontos, 2004). They found that first-graders who were in classrooms with lower chaos and higher organization had more gains in literacy skills across the school year than their classmates in classrooms with higher chaos and less organization (Ponitz et al., 2009).

While there is empirical support for a link between environmental noise and chaos in the school setting, and children's literacy skills, only one study to date has examined whether this same relationship exists when we examine chaos in the home setting (Johnson et al., 2008). In that study, household order, but not quiet, predicted literacy skills in children in kindergarten and first grade, even when considering maternal education and home literacy activities (Johnson et al., 2008). However, while this study, taken together with other studies examining the school environment, provides a starting point to understanding how home chaos might influence early literacy skills, no studies to date have addressed home chaos and how it influences literacy skills of preschool age children from a wide range of backgrounds. School environments are very different than home environments in terms of numbers of children with whom adults are interacting, and the degree to which structure and routine are built into their everyday schedules; thus, the influence of disorder and disorganization may be different across these two settings. Pike and colleagues (2006), commenting on their findings suggesting a link between chaos and children's cognitive skills, recommended future studies that include parenting behaviors that are more germane to children's cognitive development, such as engaging in literacy and learning

activities at home, in order to better understand how and why chaos operates on children's development of cognitive skills.

Chaos and the HLE

In addition to their direct impact on children, contextual features in the environment are likely to also influence parents and the parent-child exchanges occurring in the home (Bronfenbrenner & Morris, 1998; Wachs & Evans, 2010). Chaos in the home is negatively related to a variety of parenting behaviors that are known to be supportive of early learning, including being warm and responsive to child's cues (Corapci & Wachs, 2002; Matheny et al., 1995) and stimulating child's language through such things as spontaneously vocalizing or showing the child objects and toys (Corapci & Wachs, 2002). Parents in chaotic homes are less likely to explain how something works, use advanced vocabulary, and engage in object play with their young children (Corapci & Wachs, 2002; Evans et al., 1999).

Few studies have examined associations between chaos and the home learning environment in particular, but there is some empirical support for this association. Within their study of household chaos and early literacy, Johnson and colleagues (2008) explored the association together with the relative contribution of the home literacy environment; a higher level of chaos in the home was negatively related to the HLE, and both uniquely predicted early literacy skills (Johnson et al., 2008). Similarly, Deater-Deckard and colleagues (2009) found that higher household chaos was associated with a poorer home literacy environment. While both of these studies contribute to our understanding of potential relationships between chaos and the HLE, the findings from both studies were derived from school-age children coming from families considered to be relatively low-risk and lacking diversity (Deater-Deckard et al., 2009; Johnson et al., 2008). These findings lend support to the notion that, similar to other parenting

behaviors considered beneficial to children's learning, the HLE may be negatively influenced by household chaos; however, no studies to date have examined these relations among younger children of preschool age who come from a variety of family backgrounds.

Household Chaos: Moderation by child age and gender

Household chaos is conceptualized as and measured as a variable at the level of the family; that is, levels of chaos are considered to be the same for all individuals in the home (Wachs & Evans, 2010). But the experience of household chaos also occurs at the level of the individual, and there may be important differences in how each person in a home experiences and responds to chaotic elements in their environment. Among potentially relevant child characteristics to consider in this regard are child age and gender, with some empirical and theoretical evidence suggesting that boys and younger children may be more adversely affected by environmental chaos (Evans & Wachs, 2010; Wachs et al., 2004). Gender is often considered as an important consideration in development, though its contribution is typically examined solely in terms of mean-level differences on outcomes such as literacy (Chatterji, 2006; NAEP, 2007; Ready, LoGerfo, Burkam, & Lee, 2005), language (NICHD ECCRN, 2004), and behavior (Entwistle, Alexander, & Olson, 2007; Ready, et al., 2005), with girls typically having the advantage over boys. The bioecological frame of reference recognizes that these person-level characteristics, such as gender and age, can have a significant influence on the way that developmental processes unfold (Ackerman & Brown, 2010).

Several studies have examined the potential moderating role of child gender in inquiries of environmental chaos, and have yielded mixed results. Boys have been found to be more sensitive to environmental risks than girls are (Rutter, 1987; Singer, Westfall, & Niswander, 1968), and this may be true of chaos as well. In the school setting, chaotic classrooms are related

to boys', but not girls', disruptive behaviors (Wachs et al., 2004) and gains in math performance (Ponitz et al., 2009). In the home setting, boys seemed to bear the brunt of chaos's effect on parenting; in chaotic homes, mothers were more likely to have low supportive engagement and cognitive stimulation, with their sons, and fathers spanked their sons more, as compared to their daughters (Cabrera, Tamis-LeMonda, Bradley, Shannon, & Hancock, 2012). In noisy homes, male but not female infants were found to have deficits in intellectual functioning (Evans, 2006). Other similar studies have found no significant moderating effect of gender on the influence of environmental chaos (Evans, 2003; Haines, Stanfield, Brentnall, Head, Berry, Jiggins, & Hygge, 2001; Pike et al., 2006). Developmental timing of the studies, the types of environmental chaos being considered (i.e., instability versus disorganization), the setting (school versus home), and outcomes being measured may all be important considerations in the question of chaos as it relates to child gender (Evans & Wachs, 2010).

Another potentially important child characteristic to consider in studies of chaos is that of the age of the child. One reason why age might be relevant may be attributed to children's attentional and regulatory capacities (Vernon-Feagans et al., 2012). Between the ages of three and five, children experience rapid development of self-regulation and other executive functions (Best & Miller, 2010; Diamond, 2002). Younger children do not have the same abilities as older children and adults to filter out unnecessary stimuli in their external environments in order to attend to relevant stimuli, and, thus, may be more susceptible to the direct effects of chaotic environments because of their reduced ability to filter extraneous stimuli (Blair, 2006).

Additionally, because younger children rely more heavily on parental supports for a variety of needs, not just those related to executive function, these children may also experience elevated indirect effects of chaotic environments that operate through their caregivers. This assumption

is supported by the findings of Coldwell and colleagues (2006), who determined that the negative effects of household chaos on parenting quality were worse for younger children as compared to older children. However, the hypothesis that younger children may be more susceptible to the influence of household chaos is in part theoretical to this point, and empirical studies suggesting the moderating role of age have not been replicated.

Study Summary and Research Aims

This study adds to the extant literature by extending our understanding of the home and contextual contributions to children's early language and literacy development, by considering the joint influences of household chaos, the HLE, and child gender and age. Further, this study fills a gap in the research literature by answering the above questions using a more representative sample than in previous studies, and provides valuable information about an understudied group in the chaos literature – preschoolers from a wide range of socioeconomic backgrounds.

Therefore, by studying the home environments of preschoolers and their families from a wide range of backgrounds, we examine whether household chaos is negatively associated with the home learning environment that parents provide. We hypothesize that, similar to other studies that incorporate other positive parenting behaviors, there will be a negative association between the degree of household chaos and the frequency with which parents engage in HLE activities. Further, we examine the relationship between household chaos and children's outcomes, specifically, whether household chaos relates to children's outcomes in language and literacy, both directly, and indirectly, through the HLE. Though this question has been relatively unexplored, especially as it relates to early literacy development, there is a preponderance of evidence linking household chaos to a variety of child outcomes such as socioemotional development and cognitive skills. Therefore, we can reasonably expect the same direct

relationship to exist between chaos and language and literacy. Additionally, including the HLE, an established predictor of early language and literacy skills, into the model offers a more complete view of the home environment and may give insight into the possible pathways between the chaos and children's development; we hypothesize that chaos is related to children's outcomes not only directly, but also indirectly, through its influence on parenting behaviors, ie. the HLE. Finally, we explore whether these relationships - between household chaos, HLE, and language and literacy - differ depending on children's age and gender. Based on empirical findings and theoretical assumptions about the ways that chaos exerts its influences, we hypothesize that the negative effects of chaos will be worse for both boys as well as younger children.

Method

Participants

Participants in this study were part of an ongoing multi-site longitudinal study aimed at developing a preschool language assessment, which included assessing preschool-age children's language and literacy skills and their family and home environments. Two large Midwestern universities collaborated on this study and data was collected from the communities surrounding both universities.

Consent to participate in the study was obtained from 343 families; 337 children were deemed eligible to participate, based on eligibility criteria listed below. At the time of assessment, children were on average 51.15 months old (S.D. = 7.65), ranging from 34 months to 67 months, and 53.4% were males. Because the primary goal of the study was to develop an assessment of children's language, the sample was recruited to be representative of the general U.S. population in terms of race, ethnicity, and socioeconomic status. The majority of parents

reported their children's race as white (59.6%), with smaller percentages reporting Black or African American (17.2%), Multiracial (16.0%), Asian (4.7%), or other (.30%), with 2.1% missing race information. Most families identified their ethnicity as Not Hispanic (89.0%), with 7.1% identifying as Hispanic/Latino, and 3.9% of families not responding to the ethnicity item. English as a primary language was listed for the majority of families (93.5%), while Spanish was the primary language for 3.3% of families. Parents reported on their highest level of education, reporting the following: .9% had eighth grade or less, 4.7% had some high school but no diploma, 4.5% had high school diploma or equivalent, 4.7% had high school diploma or equivalent plus technical training or certificate, 17.8% had some college but no degree, 5.9% had an associate's or two-year degree, 20.2% had a bachelor's degree, 3.3% had at least one year of course work beyond a bachelor's degree, 22.0% had a master's degree; 2.7% had an education specialist or professional diploma requiring at least one year of coursework beyond a master's degree, 10.1% had a doctoral degree, and 2.7% indicated they had a level of education classified as "other". Parents also reported on the type of area they lived in, with 38.0% indicating they lived in an urban area, 49.6% reported they lived in suburban area, and 6.2% reported they lived in a rural area. See Table 1 for full description of demographic information. There was missing data for 51 cases (15.1%) related to the income item. Most of the parents filling out the questionnaire were mothers (N=299; 88.7%); other parents or caregivers included fathers (N=31; 9.2%), grandmothers (N=3; .9%), guardian (N=3; .9%), and foster mother (N=1; .3%).

TABLE 2.1
Descriptive Information of Study Participants

Child Age in Months (<i>n</i> = 342)		
Min		34.00
Max		69.00
Mean		51.23
SD		7.78
Gender (<i>n</i> = 340)		
Female		155 (43.6%)
Male		185 (54.5%)
Race (<i>n</i> = 335)		
White		203 (60.6%)
Black or African American		61 (18.2%)
Multiracial		53 (15.8%)
Asian		17 (5.0%)
Other		1 (.3%)
Ethnicity (<i>n</i> = 327)		
Not Hispanic/Latino		303 (92.7%)
Hispanic/Latino		24 (7.0%)
Primary Language is English (<i>n</i> = 342)		
Yes		320 (93.6%)
No		22 (6.4%)
Family Income (<i>n</i> = 289)		
Low (Less than \$25,000)		103 (35.6%)
Middle (\$25,000 - \$75,000)		66 (22.8%)
High (\$75,000 or greater)		120 (41.5%)
Parent education (highest degree) (<i>n</i> = 342)		
Less than high school		20 (14.1%)
High school diploma or equivalent		16 (4.8%)
Technical training beyond diploma		16 (4.8%)
Some college		60 (17.9%)
Two-year degree		20 (6.0%)
Bachelor's degree		69 (20.6%)
1+ years beyond bachelor's		12 (3.6%)
Master's degree or higher		122 (36.4%)

In order to obtain a normative sample on which to base the development of the language assessment, the study had exclusion criteria based on cognitive and language ability. Children who had any medical or developmental problem that resulted in ‘moderate’ or ‘high’ effects on their learning were excluded from the study (N=2). Further, parents were asked to rate their child’s ability to understand and speak English; those who indicated that either their children couldn’t speak or understand as well as a native speaker of English were excluded from the study (N=4). These eliminations resulted in a final eligible sample size of 337 participants eligible for this study, out of 343 who initially consented.

Procedure

The majority of parents in the study were invited to participate through their preschool or daycare. Informational packets were sent home to parents, which included an invitation to participate, a consent form, as well as a parent questionnaire with questions pertaining to demographic information, the home environment.

Trained research assistants worked individually with the children to collect the child measures in a quiet setting in the hallway or some other quiet workspace. Child assent was obtained before every assessment session; if children showed signs of fatigue or asked to be done testing was discontinued for that day.

Measures

Household Chaos Home chaos was assessed using a shortened version of the widely used Confusion, Hubbub and Order Scale (CHAOS; Matheny et al., 1995). The original scale is a 15-item parent self-report on a variety of items aimed at tapping into the overall level of order in the home; this scale has demonstrated acceptable reliability ($\alpha = .79$, Matheny et al., 1995; $\alpha = .83$, Dumas et al., 2005) and predictive validity (Dumas et al., 2005; Matheny et al., 1995). The

shortened questionnaire retains six of the original 15 questions, and has been used in a variety of studies on chaos in the home environment (Coldwell et al., 2006; Deater-Deckard et al., 2009; Johnson et al., 2008; Pike et al., 2006), with acceptable reliability ($\alpha = .63$; Petrill et al., 2004; Pike et al., 2006; $\alpha = .68$, Hart, Petrill, Deater-Deckard, & Thompson, 2007), including between raters ($r = .77$ between mothers and fathers, Hart et al., 2007) and over time ($r = .79$, Petrill et al., 2004) and predictive validity (Coldwell et al., 2006; Johnson et al., 2008; Petrill et al., 2004). Parents are asked to rate on a 5-point scale how accurately six different statements describe their home environment, ranging from Definitely True, Somewhat True, Not True or Untrue, Somewhat False, or Definitely False. The six items in the scale are: The children have a regular bedtime routine; You can't hear yourself think in our home; It's a real zoo in our home; We are usually able to stay on top of things; There is usually a television turned on somewhere in our home; and, The atmosphere in our house is calm.

Home Learning Environment Parents answered questions that represented a subscale from Morrison and Cooney's Parenting Questionnaire (2002), which has been found to positively predict children's literacy skills (Morrison & Cooney, 2002; Hindman & Morrison, 2012; Froyen, Skibbe, Bowles, Blow, & Gerde, 2013), with alpha reliability of .84 (Froyen et al., 2013); Cronbach's alpha for the seven items was .82 for the current study. The seven-item HLE subscale is a self-report measure of parent practices that asks parents to rate, on a scale from 1 to 5, which represents either how much an item is 'like' the parent in regard to engaging in a particular activity, or how frequently a certain activity takes place; higher scores reflect that parents are more likely to engage in that activity. The seven questions are: 'I try to provide my child with math workbooks'; 'My child and I play number games such as "This Old Man", or "1, 2, Buckle my Shoe"'; 'How frequently do you teach your child the names of letters?'; 'How

frequently do you teach your child letter sounds?'; 'How frequently do you teach your child to read words?'; and, 'How frequently do you teach your child to write?'.

Children's Language and Literacy Skills

Language. Children's language skills were assessed directly using the Clinical Evaluation of Language Fundamentals Preschool-Second Edition (CELF PS-2; Wiig, Secord, & Semel, 2004). This language battery includes the subscales of Expressive Vocabulary (EV), Word Structure (WS), Sentence Structure (SS), and Phonological Awareness (PA). For analyses, a latent factor representing children's language skills was created using these indicators of vocabulary, word structure, sentence structure, and phonological awareness, with high factor loadings of .80, .90, .76, and .70, respectively.

Expressive vocabulary assesses the child's ability to label illustrations of people, objects, and actions; the alpha reliability coefficient for this subscale is .82 for children ages 3 to 6. Word structure assesses a child's ability to apply word structure, or morphology rules, to spoken sentences in order to create new word meanings by adding specific morphemes, derive new words from base words, and use proper pronouns to refer to people, objects, and possessive relationships; the alpha reliability coefficient is .83 for children ages 3 to 6. Sentence structure assesses the child's ability to understand spoken sentences that increase in length and complexity and has an alpha reliability coefficient of .78 for children ages 3 to 6. Finally, the phonological awareness subtest designed to assess the child's knowledge of the sound structure of language and the ability to manipulate sounds, including concepts such as compound words, syllable blending, sentence segmentation, syllable segmentation, rhyme detection, and rhyme production.; the alpha reliability coefficient is .87 for children ages 4 to 6.

Literacy. Children's literacy skills were also represented by a latent factor, with indicators of decoding, letter name knowledge, letter sound knowledge, and print concepts; these indicators yielded high factor loadings of .86, .88, .84, and .67, respectively.

To test letter name knowledge, children were asked to identify the name of eight randomized upper and lower case letters. Children were scored as 0 (incorrect) or 1 (correct) for each letter. From children's scores on individual letters, a projected overall score of what would be expected if children were given all 52 upper and lower case letters was computed using Item Response Theory Modeling. This method is much less onerous on the part of the child, compared to testing all 52 upper and lower case letters, and has been shown to be equally predictive of children's overall letter knowledge as testing the entire battery of letters (Bowles, Pentimonti, Gerde, & Montroy, 2014). IRT-based letter name knowledge scores were used for analyses.

To test letter sound knowledge, children were asked to provide the sound that a particular letter makes. Children were given six randomized letters, using the same IRT procedure described with letter name knowledge; they received a 1 for correctly identifying a sound, and a 0 for incorrectly identifying a sound. One example was provided to children of how to give a letter sound prior to the start of the test. After the example, if children gave a letter name rather than a letter sound, they were given one prompt to remind them that they are supposed to give the sound, ie. "Yes, that's the letter B, but what does sound does it make?". IRT-based letter sound knowledge scores were used for analyses.

Children's knowledge of letters, early word recognition, and early decoding skills were assessed using the letter-word identification subscale of the Woodcock-Johnson III Test of Achievement (WJIII; Woodcock, McGrew, & Mather, 2001). The subscale is comprised of 76 items of increasing difficulty; ceiling is reached when a child responds incorrectly to 6

consecutive questions. Reliability for the WJ-III ranges from .96 to .99 for children ages three to eight (Woodcock et al., 2001). Rasch-based w-scores were used for analyses.

Children's concepts of print was assessed using the Preschool Word and Print Awareness (PWPA; Justice & Ezell, 2001). This assessment, designed for children ages 3-5, assesses children's knowledge of the form and function of print and the relationship between oral and written language. It is not designed to measure children's ability to read, per se, but rather, their awareness of the forms and conventions of the printed words, including such things as how books work, where the words are on the page, and what the printed words themselves represent. Example items include "Show me the name of the book"; "Where do I begin to read?"; "Do I read this page first (pointing to left) or this page (point to right) first?"; and "Show me the first letter on this page". It has demonstrated good inter-rater reliability (Justice & Ezell, 2000), and IRT analyses have indicated that it can be measured as a single trait reliably, differentiating among children with varying risk factors (Justice, Bowles, & Skibbe, 2006).

Socioeconomic Status Parents indicated their annual household income, selected either 'Less than \$25,000', '\$25,000 - \$75,000', or 'Greater than \$75,000'. Parents also (typically the mother, in 89% of cases) reported on their highest level of education, ranging from: eighth grade or less; some high school but no diploma; high school diploma or equivalent; high school diploma or equivalent plus technical training or certificate; some college but no degree; associate's or two-year degree; bachelor's degree; at least one year of course work beyond a bachelor's degree; master's degree; education specialist or professional diploma requiring at least one year of coursework beyond a master's degree; doctoral degree; or 'other'.

Missing Data

Data was missing for less than 5% for the majority of child variables, and was not systematic in nature, which can be considered ignorable missing data (Kline, 2011). However, for the parenting variables, including demographic variables, there was a higher percentage of missing data –15% missing with the income item, and 14.5% missing for the chaos and HLE items. This is largely due to the fact that at one of the data collection sites, the parenting questionnaire was inadvertently left out of the materials sent home to parents. The questionnaires were mailed separately at a later date and parents were asked to fill them out and return them.

Missing data was addressed using Full Information Maximum Likelihood (FIML) estimation methods, considered one of the best methods for handling missing data in analyses, provided the data are missing completely at random (Enders & Bandolo, 2001).

Analysis Plan

Data was analyzed in a Structural Equation Modeling (SEM) framework using AMOS (Arbuckle, 2013) and MPlus software (Muthén & Muthén, 2007). In particular, MPlus was utilized for the mediation analyses, as it allows for bootstrapping with missing data. Overall, the strength of SEM is that it allows for the testing of a theoretical model against the data, through examining covariances among a group of variables, while also giving an overall fit of the model to the existing data using various fit indices such as the Chi-Square test statistic, RMSEA, CFI, and TLI. SEM also permits for testing of alternative models to the data and enables the researcher to determine if competing models provide better or worse fit to the data (Kline, 2011).

Results

Describing Household Chaos Across Families

The first research aim of this study was to describe household chaos, both in aggregate form and according to the individual indicators of chaos, across participating families, as well as to identify associations between household chaos, demographic characteristics, the home learning environment, and child outcomes. See Table 2.2 for a full listing of means, standard deviations, and correlations of study variables across the study. See Table 2.3 for descriptive information on all outcome variables by poverty status (poverty vs. not in poverty).

Average scores of household chaos were negatively associated with parental education levels ($r = -.27, p < .001$) and annual household income levels ($r = -.27, p < .001$). Average household chaos also demonstrated significant and negative associations with parents' average HLE score ($r = -.21, p < .001$), as well as all child outcome measures in language and literacy, ranging from $r = -.14$ to $r = -.24$. Conversely, average HLE scores were significantly and positively associated with the child outcome measures, ranging from $r = .12$ to $r = .27$, with the exception of child sentence structure scores ($r = .10, p = .083$). Contrary to previous research findings, average HLE scores in our sample were not significantly associated with parent education or income levels ($r = .07, p = .262$, and $r = .00, p = .99$, respectively).

Across all of the families in our sample, the average chaos score, out of a possible range of 1 to 5, was 2.09 ($SD = .53$, range = 1 to 3.5). Because chaos has been empirically linked to household income levels, and we found that chaos was negatively related to income levels in our current sample, we also computed average chaos levels within each of the three income levels (1 = $< \$25,000$; 2 = $\$25,000$ to $\$75,000$; and, 3 = $\$75,000+$). Average levels of chaos differed across income levels, with higher average levels of chaos reported in the lowest income bracket.

In particular, families in the lowest income bracket reported an average chaos score of 2.27 (SD = .51); families in the middle income bracket reported an average chaos score of 2.08 (SD = .55); and, families in the highest income bracket reported an average chaos score 1.95 (SD = .50).

TABLE 2.2

Means, Standard Deviations, and Bivariate Correlations of Study Variables

Var	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
Edu	6.96	2.57	--											
IncM	2.06	0.89	.71**	--										
Chaos	2.09	0.53	-.27**	-.27**	--									
HLE	3.61	0.77	.07	.00	-.20**	--								
Dec	347.20	36.30	.34**	.38**	-.18**	.22**	--							
LN	30.29	18.40	.38**	.39**	-.14*	.24**	.77**	--						
LS	10.55	8.73	.36**	.32**	-.24**	.27**	.70**	.76**	--					
PC	102.18	18.52	.30**	.31**	-.16**	.20**	.61**	.54**	.60**	--				
EV	20.60	7.73	.22**	.34**	-.18**	.19**	.50**	.52**	.54**	.56**	--			
SS	13.70	4.66	.25**	.24**	-.15*	.10	.47**	.41**	.48**	.61**	.62**	--		
WS	14.23	5.10	.25**	.29**	-.14*	.17**	.54**	.55**	.52**	.62**	.70**	.67**	--	
PA	10.66	6.99	.29**	.26**	-.14*	.12*	.50**	.48**	.54**	.57**	.52**	.54**	.61**	--

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

Note. Edu = Parent Education; IncM = Family Income (1-3); Dec = Decoding; LN = Letter Name; LS = Letter Sound; PC = Print Concepts; EV = Expressive Vocabulary; SS = Sentence Structure; WS = Word Structure; PA = Phonological Awareness.

TABLE 2.3

Descriptive Information on Study Outcomes by Poverty Status

Outcome	Poverty (<i>n</i> = 105)				Not in Poverty (<i>n</i> = 187)			
	Mean	SD	Min	Max	Mean	SD	Min	Max
HLE Avg	3.64	.76	1.43	5.00	3.59	.78	1.43	5.00
Chaos Avg	2.27	.51	1.00	3.50	2.00	.52	1.00	3.33
Literacy								
Decoding (W-score)	330.74	27.52	276.00	449.00	353.42	38.36	264.00	525.00
Letter Name (Est. correct/52)	21.52	18.57	1.02	48.81	33.74	17.29	1.02	49.30
Letter Sound (Est. correct/52)	7.08	7.40	1.02	23.60	11.63	8.80	1.02	23.60
Print Concept (46–161)	95.00	16.51	46.00	128.00	104.48	18.99	46.00	161.00
Language								
Sentence Str	12.30	4.44	1.00	22.00	14.21	4.75	0.00	22.00
Word Structure	12.25	4.76	0.00	21.00	14.80	5.10	0.00	23.00
Vocabulary	17.27	7.07	0.00	36.00	22.13	7.74	0.00	39.00
Phonological	8.35	5.50	0.00	22.00	11.25	7.56	0.00	24.00

Average chaos score for the lowest income level was significantly lower than the average score in the highest income score ($t = 4.77$; $p < .001$; $d = .63$). This pattern was also true when looking at each of the six indicators of chaos; with each indicator, the average score decreased as income increased.

Direct and Indirect Relations of Household Chaos to Children's Language and Literacy Outcomes

The second aim in our study examined both the direct and indirect influences of household chaos on children's outcomes. Specifically, I used mediation analyses with bootstrapping estimation methods in a structural equation modeling format to test whether household chaos has a direct influence on children's language and literacy skills, and if this influence is mediated in part by parental provision of the HLE. To ease in the interpretation of findings, separate models were conducted for literacy and language outcomes.

Children's Literacy Skills

To measure direct and indirect effects of chaos on children's literacy skills, I began with a model that examined the direct effect of chaos on the latent literacy factor along with the indirect effect of chaos operating through the HLE for the entire sample, controlling for the direct influence of income on literacy. This model, presented in Figure 2.1, provided an adequate fit for the data ($\chi^2 = 33.71$, $df = 11$, $p < .001$; CFI = .97; TLI = .95; RMSEA = .08). The standardized and unstandardized loadings and regression coefficients for the model are presented in Table 2.3. Chaos did not have a direct effect on children's literacy skills ($\beta = -.04$, $p = .51$). I then used bootstrapping to estimate the indirect effect of chaos as it operates through the HLE, creating a 95% confidence interval. The bootstrapped point estimates and confidence

intervals are presented in Table 2.4. Chaos had a significant indirect effect on literacy through the HLE (-.056 ; 95% CI [-.092, -.020]).

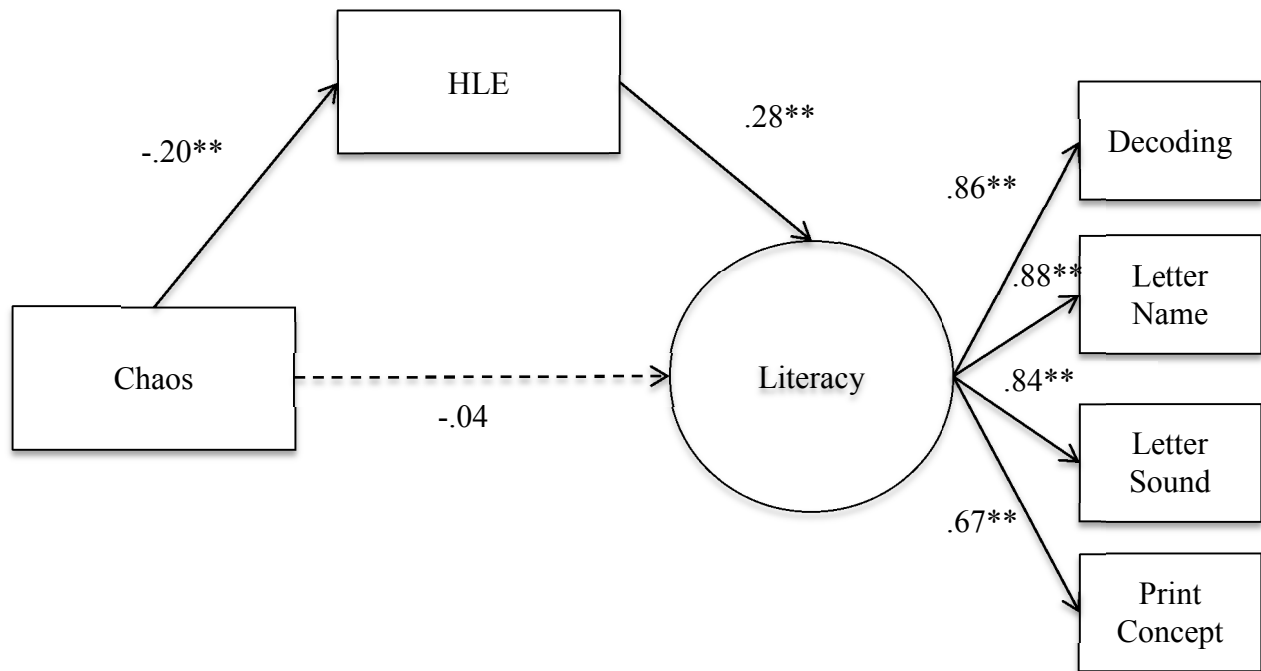


FIGURE 2.1 Path Diagram of Chaos, HLE, and Children's Early Literacy Skills.

Note. Coefficients are standardized estimates.* $p < .01$, ** $p < .001$. $\chi^2 = 33.71$, $df = 11$, $p = < .001$; CFI = .97; TLI = .95; RMSEA = 0.08

TABLE 2.4

Unstandardized, Standardized, and Significance Levels for the Model in Figure 2.1 (N = 342)

Pathways	Unstandardized	SE	Standardized	<i>p</i>
Chaos → HLE	-.30	.08	-.20	< .001
HLE → Literacy	11.12	2.38	.28	< .001
Chaos → Literacy	-2.19	3.33	-.04	.51
Income → Literacy	14.74	2.16	.42	< .001

Note. $X^2(11) = 33.72$. CFI = 0.97. TLI = 0.97. RMSEA = 0.08

TABLE 2.5 *Mediation of the Effect of Chaos on Children's Literacy*
(N = 342)

			Bootstrapping Percentile 95% CI	
	Standardized Point Estimate	<i>SE</i>	Lower	Upper
	Indirect Pathway: Chaos → Literacy			
Chaos → HLE → Literacy	-.056	.019	-.092	-.020
Total	-.093	.055	-.202	.016

Note. Based on 10,000 bootstrap samples.

Because considering the direct effects of income in this model may underestimate the direct effects of chaos (Evans & Wachs, 2010), I then chose to control for income by conducting the same mediation analyses within groups (by income) while removing the direct effect from income to literacy; group 1 is families in poverty (reporting incomes of \$25,000 or less per year, n = 103), and group 2 is families not in poverty (reporting incomes of greater than \$25,000 per year, n = 185).

Before comparing latent factors across two or more groups, it is necessary to establish measurement invariance, providing evidence that these two factors are measured in similar ways (Byrne, Shavelson, & Muthen, 1989) so that any comparison between the groups are meaningful. To establish strong measurement invariance, whereby factor loadings and intercepts are considered equal across groups, a series of constraints are placed on a baseline model, first constraining all factor loadings of indicators to be equal (weak invariance), and then constraining all indicator intercepts to be equal (strong invariance), while testing for misfit. To begin with, I established baseline configural invariance for the latent literacy factor with the indicators of decoding, letter name, letter sound, and print concepts ($\chi^2 = 21.402$, $df = 4$, $p = .73$; CFI = .97; TLI = .92; RMSEA = .17). Next I constrained all four factor loadings to be equal across the two groups; this resulted in significant model misfit ($\Delta\chi^2 = 29.87$; $\Delta df = 3$; $p = <.001$; CFI = .93; TLI

= .88; RMSEA = .21), suggesting that all factor loadings are not equivalent across the groups. Thus, I relaxed one factor loading, letter name, to vary freely, while constraining all others to be equal; this did not result in significant model misfit ($\Delta\chi^2 = 3.03$, $\Delta df = 2$, $p = .22$; CFI = .97; TLI = .94; RMSEA = .12). The next step of constraining all indicator intercepts to be equal did not result in significant model misfit ($\Delta\chi^2 = 4.53$, $\Delta df = 3$, $p = .21$; CFI = .97; TLI = .96; RMSEA = .13), providing evidence for partial strong metric invariance, and thus allowing for comparison between groups using the latent literacy factor as an outcome (Byrne et al., 1989).

Then, I conducted mediation analyses for each group, the families in poverty (group 1) and the families not in poverty (group 2). For group 1 and group 2, the pathway from HLE to literacy outcomes was significant and positive ($\beta = .22$, $p < .05$; $\beta = .23$, $p < .05$, respectively) and the pathway from chaos to literacy was not significant. For group 1, the pathway from chaos to HLE was not significant ($\beta = -.14$, $p = .15$), but this pathway was significant for group 2 ($\beta = -.27$, $p < .01$). Neither group had significant direct effects on literacy, but group 2 did have significant indirect effects on literacy through HLE (-.095 ; 95% CI [-.159, -.031]).

Because the patterns of significance relating to direct and indirect effects suggested possible differences between groups, I then tested to see if there was a statistical difference between regression coefficients between the three study variables. To do this, I constrained the three estimated regression coefficients relating to: chaos predicting HLE, HLE predicting literacy, and chaos predicting Literacy, to be equal across groups to see if this constraint affected model fit. The constrained model did not fit the data significantly worse than the first model in which in which all coefficients were allowed to vary freely ($\Delta\chi^2 = 3.55$, $\Delta df = 3$, $p = .31$; CFI = .94; TLI = .92; RMSEA = .11). Therefore, in balancing model parsimony and model fit, this model is considered a better model than a model in which the two groups are treated as different.

This model indicates that there is an indirect effect of chaos on literacy for both groups ($-.070$; 95% CI $[-.112, -.028]$), through the HLE, with no evidence of a direct effect of chaos on literacy, consistent with my original model of the full sample including income as a direct predictor of literacy skills. Thus, I retained the original model using the full sample with income as direct predictor of the latent literacy factor, depicted in Figure 2.1.

Children's Language Skills

To measure direct and indirect effects of chaos on children's language skills, I began with a model that examined the direct effect of chaos on the latent language factor along with the indirect effect of chaos operating through the HLE for the entire sample, controlling for the direct influence of income on language. This model provided an adequate fit for the data ($\chi^2 = 9.67$, $df = 11$, $p = .56$; CFI = 1.00; TLI = 1.00; RMSEA = .00). Similarly to the model with literacy as an outcome, chaos did not have a direct effect on children's language skills ($\beta = -.07$, $p = .293$). I then used bootstrapping to estimate the indirect effect of chaos as it operates through the HLE, creating a 95% confidence interval; chaos had a significant indirect effect on literacy through the HLE ($-.036$; 95% CI $[-.067, -.005]$).

Using the same reasoning and approach as I took for literacy, I then chose to control for income by conducting the same mediation analyses within groups (by income) while removing the direct effect from income to literacy; group 1 is families in poverty (reporting incomes of \$25,000 or less per year), and group 2 is families not in poverty (reporting incomes of greater than \$25,000 per year).

As with the literacy factor, I initially established measurement invariance of the language factor across groups before proceeding with the multi-group mediation analyses. To begin with, I established baseline configural invariance for the latent language factor with the indicators of

expressive vocabulary, sentence structure, word structure, and phonological awareness ($\chi^2 = 2.588$, $df = 4$; CFI = 1.00; TLI = 1.00; RMSEA = .00). Next I constrained all four factor loadings to be equal across the two groups; this resulted in significant model misfit ($(\Delta\chi^2 = 10.598$; $\Delta df = 3$; $p < .05$; CFI = .99; TLI = .99; RMSEA = .06), suggesting that all factor loadings are not equivalent across the groups. Thus, I relaxed one factor loading, phonological awareness, to vary freely, while constraining all others to be equal; this did not result in significant model misfit ($\Delta\chi^2 = .15$, $\Delta df = 2$, $p = .93$; CFI = 1.00; TLI = 1.00; RMSEA = .000), indicating partial weak factorial invariance. The next step of constraining all indicator intercepts to be equal did not result in significant model misfit ($\Delta\chi^2 = 4.82$, $\Delta df = 3$, $p = .19$; CFI = 1.00; TLI = 1.00; RMSEA = .000), providing evidence for partial strong metric invariance, and thus allowing for comparison between groups using the latent language factor as an outcome (Byrne et al., 1989).

I then proceeded with mediation analyses for each group, the families in poverty (group 1) and the families not in poverty (group 2). This model fit the data well ($\chi^2 = 23.085$, $df = 22$, $p = .19$; CFI = .99; TLI = .99; RMSEA = .018). For group 2, the pathway from HLE to language outcome was significant and positive ($\beta = .18$, $p < .05$), the pathway from chaos to language was significant and negative ($\beta = -.18$, $p < .05$), and the pathway from chaos to HLE was also significant and negative ($\beta = -.27$, $p < .001$). For group 1, the pathway from HLE to language was not significant at the .05 level ($\beta = .17$, $p = .09$), the pathway from chaos to language was not significant ($\beta = .11$, $p = .33$), and the pathway from chaos to HLE was not significant ($\beta = -.14$, $p = .15$). Group 1 did not have significant total, direct, or indirect effects on language. Group 2, however, had significant total effects ($-.23$; 95% CI $[-.15, -.09]$), direct effects ($-.18$; 95% CI $[-.33, -.03]$), and the suggestion of significant indirect effects using a 90% confidence interval ($-.05$; 90% CI $[-.09, -.005]$).

Because the patterns of significance relating to direct and indirect effects suggested possible differences between groups, I then tested to see if these models were statistically different by determining if there was a statistical difference between regression coefficients between the three study variables. To do this, I constrained the three estimated regression coefficients relating to: chaos predicting HLE, HLE predicting language, and chaos predicting language, one at a time to be equal across groups to see if this constraint affected model fit. The first model constrained the path from chaos to HLE to be equal across both groups, and then tested this model against the baseline model; this model did not fit the data significantly worse than the first model in which all coefficients were allowed to vary freely ($\Delta\chi^2 = 1.311$, $\Delta df = 1$, $p = .25$; CFI = .99; TLI = .99; RMSEA = .02). From there, I constrained the coefficient from HLE to language to be equal across the two groups, and again, this model did not result in significant model misfit ($\Delta\chi^2 = .073$, $\Delta df = 1$, $p = .787$; CFI = .99; TLI = .99; RMSEA = .012). Finally, I constrained the regression coefficient from chaos to language to be equal across the two groups; this final constraint did add significant misfit to the model ($\Delta\chi^2 = 5.305$, $\Delta df = 1$, $p = .021$; CFI = .99; TLI = .99; RMSEA = .036), suggesting that the model in which the pathway from chaos to language is allowed to vary freely between the two groups, along with pathways from chaos to HLE and HLE to language constrained to be equal, is the best model in terms of balancing model parsimony and model fit. The two models for groups 1 and 2 are depicted in Figures 2.2 and 2.3, respectively. The standardized and unstandardized regression coefficients for each model are presented in Table 2.5 and 2.7, respectively. Overall, both group 1 and group 2 have indirect effects from chaos to language, via the HLE. Only group 2 has significant total and direct effects of chaos on language. The bootstrapped point estimates and confidence intervals for group 1 and group 2 are presented in Table 2.6 and Table 2.8, respectively.

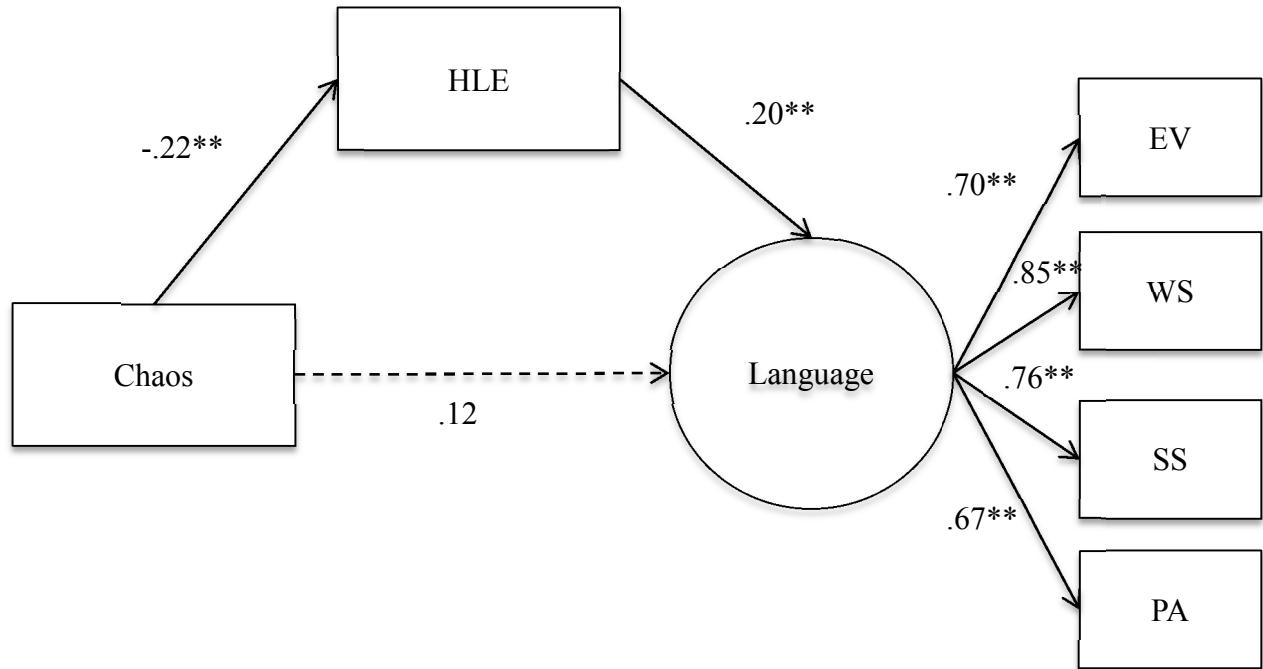


FIGURE 2.2 Path Diagram of Chaos, HLE, and Children's Early Language Skills for Group 1 Families in Poverty. Note. Coefficients are standardized estimates. EV = expressive vocabulary; WS = word structure; SS = sentence structure; PA = phonological awareness.

* $p < .01$, ** $p < .001$. $\chi^2 = 24.47$, $df = 24$, $p = .44$; CFI = .99; TLI = .99; RMSEA = 0.012

TABLE 2.6
Unstandardized, Standardized, and Significance Levels for the Model in Figure 2.2 (N = 103)

Pathways	Unstandardized	SE	Standardized	<i>p</i>
Chaos → HLE	-.34	.08	-.22	< .001
HLE → Language	.78	.28	.20	< .001
Chaos → Language	.70	.71	-.04	.33

Note. $X^2(24) = 24.47$. CFI = 0.97. TLI = 0.97. RMSEA = 0.012

TABLE 2.7 *Mediation of the Effect of Chaos on Children's Language
For Group 1 Families in Poverty (N = 103)*

	Standardized Point Estimate	SE	Bootstrapping Percentile 95% CI	
			Lower	Upper
Indirect Pathway: Chaos → Language				
Chaos → HLE → Language	-.040	.020	-.082	-.005
Total	.070	.120	-.166	.312

Note. Based on 10,000 bootstrap samples.

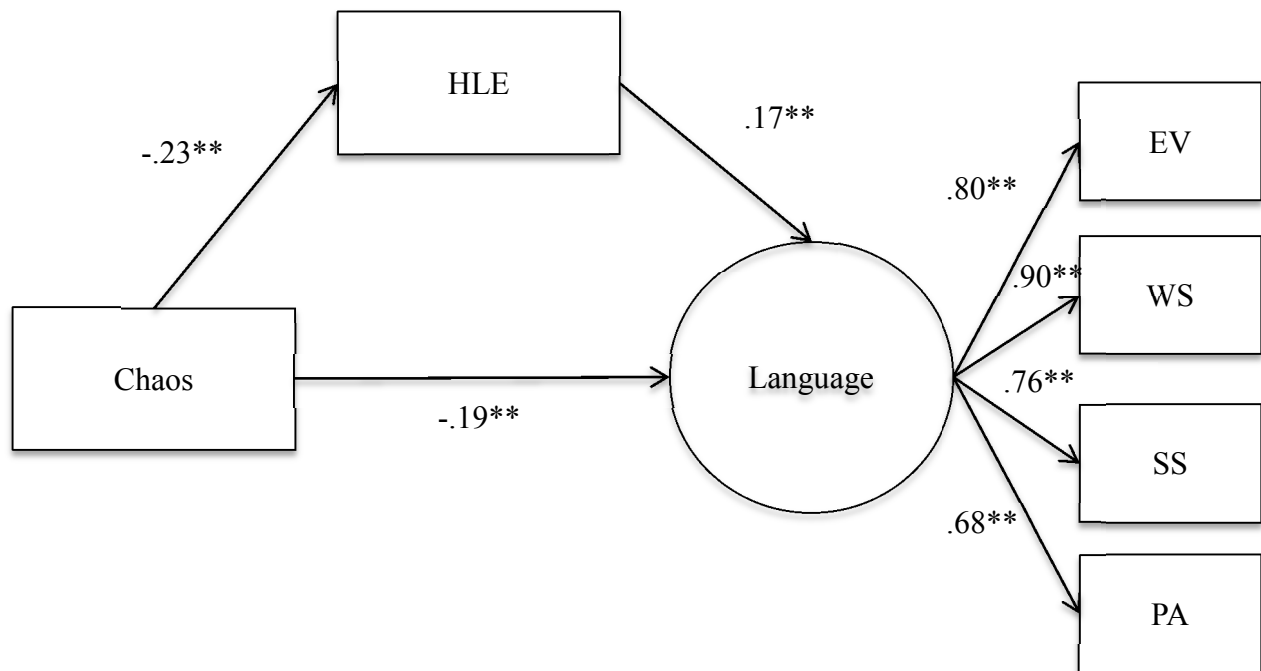


FIGURE 2.3 Path Diagram of Chaos, HLE, and Children's Early Language Skills for

Group 2 Families Not in Poverty. Note. Coefficients are standardized estimates. EV =

expressive vocabulary; WS = word structure; SS = sentence structure; PA = phonological awareness.

* $p < .01$, ** $p < .001$. $\chi^2 = 24.47$, $df = 24$, $p = .44$; CFI = .99; TLI = .99; RMSEA = 0.012.

TABLE 2.8 *Unstandardized, Standardized, and Significance Levels for the Model in Figure 2.3 (N = 186)*

Pathways	Unstandardized	SE	Standardized	<i>p</i>
Chaos → HLE	-.34	.08	-.23	< .001
HLE → Language	.78	.28	.17	< .001
Chaos → Language	-1.29	.53	-.19	< .001

Note. $X^2(24) = 24.47$. CFI = 0.97. TLI = 0.97. RMSEA = 0.012

TABLE 2.9 *Mediation of the Effect of Chaos on Children's Language For Group 2 Families Not in Poverty (N = 186)*

	Standardized Point Estimate	SE	Bootstrapping Percentile 95% CI	
			Lower	Upper
	Indirect Pathway: Chaos → Language			
Chaos → HLE → Language	-.038	.017	-.072	-.004
Total	-.223	.072	-.364	-.082

Note. Based on 10,000 bootstrap samples.

Moderations of Chaos by Child Age

To test whether the direct effect of chaos on children's outcomes is moderated by the age or gender of the child, I used structural equation modeling to examine the direct effects of HLE, chaos, age, and a computed variable of chaos x age, on the latent variables of child language and literacy. The variable chaos x age was not a significant predictor of language or literacy outcomes ($\beta = -.35, p = .41$; $\beta = -.04, p = .92$, respectively), indicating that the direct influence of chaos on child language and literacy does not depend on the age of the child.

Moderations of Chaos by Child Gender

Similarly, I tested for the possibility that the direct effect of chaos on children was moderated by the gender of the child. Again, I used structural equation modeling to examine the direct effects of HLE, chaos, gender, and a computed variable of chaos x gender, on the latent

variables of child language and literacy. Results indicate that the influence of chaos on child outcomes of language and literacy do not differ based on the gender of the child ($B = -.41, p = .11$; $B = .12, p = .64$, respectively).

Measuring Chaos

In this study, I operationalized the household chaos variable as an average score across the 6 indicator variables, which is in line with the majority of studies that examine chaos in relation to other family and child variables (e.g., Petrill et al., 2004; Pike et al., 2006; Matheny et al., 1995). The reliability coefficient Cronbach's alpha was .45 across the entire sample, which is also lower than reported reliability in a number of studies for the same 6-item scale, which ranges from .63 to .68 (Hart et al., 2007; Petrill et al., 2004; Pike et al., 2006;), or the longer 15-item measure on which the current shortened version is based, which typically demonstrates reliability of .80 or greater (Corapci & Wachs, 2002; Dumas et al., 2005; Matheny et al., 1995). Given the differences in overall chaos scores across income levels in this study, I examined Cronbach's alpha for the chaos scale within each income level separately. For the lowest income level ($n = 102$), Cronbach's alpha was .31 for the six items; for the second income level ($n = 65$), Cronbach's alpha was .57, and Cronbach's alpha coefficient for the highest income level ($n = 120$) was .51. Reliability evidence for this measure was stronger for the portion of the sample that was higher in income, and approached the levels of acceptable reliability reported in previous studies (Hart et al., 2007; Pike et al., 2006).

Examining Contributions of Individual Indicators of Chaos

For the primary analyses in this study, I considered chaos in aggregate form, consistent with the bulk of research in this area. However, in order to examine the individual contributions of the six indicators to parent and child outcomes, I conducted follow-up analyses in which I

regressed the outcomes of HLE and children's language skills on the six items comprising the chaos scale, using multiple regression in a structural equation modeling format. Because earlier analyses indicated no direct association between chaos and children's literacy skills, I did do any follow-up analyses in terms of individual indicators of chaos and outcomes in literacy.

When it comes to predicting the frequency with which parents engage in learning centered activities, as measured by the HLE, several items were significantly and negatively related to this item: 'It's a real zoo in our home' ($B = -.17, p < .05$), 'We are usually able to stay on top of things' ($B = -.12, p < .05$), and 'There is usually a TV on somewhere in our home' ($B = -.17, p < .01$). The item related to family routines, 'The children have a regular bedtime routine' approached significance at the .05 level in predicting the HLE ($B = -.11, p = .063$). For the latent language factor, only the item related to the TV being on was a significant predictor ($B = -.30, p < .001$).

Discussion

Consistent with prior work that suggests a negative association between household chaos and outcomes for both parents and children in the home (Matheny et al., 1995; Deater-Deckard et al., 2009; Valiente et al., 2007), this study found that chaos in the home was negatively associated with preschool age children's language and literacy outcomes, as well as the parenting behaviors known to bolster such skills. Moreover, this study begins to clarify the ways that chaos can influence children's language and literacy development, through its indirect links to children's development via the HLE that parents provide, and, for some families, direct links to children's outcomes in language.

Findings from this study contribute to our general understanding of the mechanism involved in the contributions of chaos to development and family functioning, and to early

language and literacy development specifically. Part of the reason why chaos matters for children is because of its influence on the caregivers in their environment, especially as it relates to the provision of learning related activities. Much work has been dedicated to understanding how children's early experiences can support their competencies in language and literacy as they approach formal schooling (Christian et al., 1998; Crosnoe, Leventhal, Wirth, Pierce, & Pianta., 2010); however, most work considers only parent-child interactions while neglecting the important role of the environment (Hindman & Morrison, 2012; Senechal & LeFevre, 2002), or, conversely, linking household chaos and children's cognitive and academic outcomes without including the parenting practices known to bolster such skills (Petrill et al., 2004; Pike et al., 2006). The home environment sets the stage for children's learning (Evans & Wachs, 2010; Wachs, 1989), and children who experience more organized and less chaotic homes may be set up to have more success in exploring their environments and interacting in ways that promote learning and development. This study lends further support to the idea that contextual features, especially order and organization, set the stage for high quality interactions to take place, which in turn promote children's competencies and development.

Household Chaos Across Families

The first aim of this study was to describe how families from diverse backgrounds rate their perceived levels of household chaos. On average, families in our sample tended to report relatively low levels of household chaos as part of their everyday lives, with average levels just over two out of five, which is line with other studies using the same 5-point scale (Petrill et al., 2004; Pike et al., 2006). Looking at the individual elements of chaos examined in this study as part of the overall aggregate assessment of household chaos yielded more in-depth information about how each of these might look in a typical family home. For instance, few families, 15% or

fewer, report that they ‘can’t think’ in their home, or that they consider their home to be a ‘zoo’. Most families, nearly 90%, feel that they can usually ‘stay on top of things’. On average, families may feel that these chaotic elements are relatively low in their everyday lives, but even small differences in overall levels of chaos may be important for family functioning.

Household chaos considered on a whole, along with its constituent parts, is highest in homes from the lowest income bracket, and decreases as income increases, consistent with the bulk of work in this area (Evans & Hygge, 2007; Deater-Deckard et al., 2009; Matheny et al., 1995). The tendency for a television to be on somewhere in the house was the item with the greatest amount of variability, which differed along lines of household income. The persistent pattern of higher chaos associated with lower income levels (Evans, 2006; Evans & Hygge, 2007; Matheny et al., 1995) may stem in part from the importance of economic resources in determining the rhythm of everyday life for families. For instance, families with fewer resources are more likely to have frequent moves, work unpredictable hours, live in noisier neighborhoods, and experience uncertainty in meeting the daily needs of the family (Conger, Conger, & Martin, 2010; Evans, 2004). Faced with the accompanying stressors of being economically disadvantaged, parents may find more difficult to establish and maintain a home environment that is orderly and organized.

The differences are greatest between the highest and lowest income brackets, with a medium effect size ($d = .63$) in average chaos levels, such that families in poverty were more likely to report higher levels of chaos in their homes. There is some evidence to suggest that household chaos, in terms of both level and negative influence, is stable longitudinally (Hart et al., 2007), suggesting that these differences, and their consequences, will likely persist over time. One study found that the order and cleanliness of children’s homes when they were young

predicted their economic and social success as adults 30 years later (Fluori, 2009); if household chaos and its negative impacts on the family endure over time, it is possible that the effects will be cumulative, continuing to compound risk factors for children well beyond their early years.

Household Chaos: Links to Parenting Behaviors and Child Outcomes

Children's Literacy Development

For all families in this sample, regardless of their income levels, household chaos was linked to preschool children's literacy outcomes indirectly through the HLE; specifically, higher chaos was associated with fewer HLE activities that parents engage in, which in turn was associated with lower literacy skills in children. Other studies find that environmental chaos influences children's development in cognitive skills and language development (Petrill et al., 2004; Pike et al., 2006; Deater-Deckard et al., 2009), although few take into account the known importance of parental activities that target children's learning. Because the nature of literacy development relies in part on explicit instruction about the code-based system of the written language, including connecting letters to sound, and learning the correct form of each letter (Justice, Chow, Cappelini, Flanigan, & Coloton, 2003), children rely on their caregivers' focused attention on these concepts (Adams, 2002). Thus, it makes sense that the primary way that the environment matters for the learning of an explicit skill like literacy is through its impact on caregivers' ability to engage in activities oriented toward teaching and supporting these skills.

Children's Language Development

As with literacy, chaos was indirectly linked with children's outcomes in language for all families via its influence on the HLE, such that chaos was negatively associated with the frequency of parent HLE activities, which in turn predicted child language skills. Although literacy and language are often grouped together, they represent distinct skill sets (Storch &

Whitehurst, 2002). And, even though HLE activities can contribute to the development of both language and literacy, children learn these two skills in slightly different ways (Connor, Morrison, & Slominski, 2006; Senechal & LeFevre, 2002). Therefore, it is not surprising to see that there are both similarities and differences in the way that chaos is related to children's early language development.

Although chaos had indirect links to language and literacy alike, only language was directly associated with chaos levels. The direct link between chaos and children's language may reflect the nature of children's language development, which, at its most optimal, occurs through frequent, positive, and responsive verbal talk between parents and children, which takes places over days and years to build a rich and varied language skill set (Hart & Risley, 1995; Hoff, 2003). Language in particular doesn't necessarily require explicit instruction, as is the case with literacy, but, rather, through consistent, responsive conversationally oriented activities that happen throughout the day (Justice et al., 2008; Hart & Risley, 1995; Hoff, 2003). There is some evidence that chaos at home is stable across time (Hart et al., 2007), and, consequently, the consistent presence of this home stressor may interfere with the daily language interactions between parents and children alike, having both direct and indirect ramifications on children's language development.

Although research overwhelmingly suggests that chaos, taken as a whole, is negative for children and families (Dumas et al., 2005; Johnson et al., 2008; Matheny et al., 1995), this study suggests that the negative influence of chaos varies as a function of the family's economic background when it comes to children's language development; the direct association between chaos and language was only present for those families with incomes above the poverty line. That the direct relationship between chaos and children's language skills is absent for families in

poverty may be due to the presence of other external stressors in these families' environments. Families in poverty can experience significant stress in a variety of ways, from difficulty paying bills and feeding their children, to finding consistent childcare, to being able to spend time with their children (Conger et al., 2010; Evans, 2004). It is possible that these different elements of household chaos, while potentially a negative source of stress for family functioning, are insignificant in the face of other, more stressful influences on the more basic needs of families. In this scenario, the harmful effects of chaos are not expressed when considered with other stressors. Johnson and colleagues (2008) found something similar in their study of chaos, the home literacy environment, and children's early reading skills; in their study, chaos was only a significant predictor for children whose mothers had above average reading ability. They hypothesized that the negative effects of chaos were only apparent once more lower order prerequisites to parent-child interactions were met. In this way, chaos has the potential to negatively influence all families and children, but its influence diminishes when we consider more urgent and substantial needs that are often associated with poverty.

Moderations by Child Age and Gender

This study did not yield any supporting evidence that the experience of chaos is different for boys as compared to girls. This may be because the role that context plays in development likely depends on the nature of the outcome being measured (Evans & Wachs, 2010); in this study, we examined language and literacy outcomes, and other studies suggest that boys may be more vulnerable to the effects of environmental chaos as it relates to their externalizing behaviors (Wachs et al., 2004), or their gains in math skills (Ponitz et al., 2009) in the school setting. It is possible that chaos may influence boys differently, but only as it relates to particular

skills and competencies. When it comes to the relationship between chaos, HLE, and children's language and literacy skills, the overall effect was negative for everyone, regardless of gender.

Similarly, child age was not a significant contributing factor to the effects of chaos on language and literacy. The notion that child age may play a moderating role in the effects of chaos is largely theoretical at this point, and is based on the assumption that chaos creates environments that impede children's ability to filter out extraneous stimuli and focus attention on stimuli that are relevant, a task that is more difficult for younger children with less developed executive function capabilities (Blair, 2002; Evans & Wachs, 2010). It is possible that in this study, we did not have an adequate age range to capture varying degrees of child executive function; or, similarly, if executive function or self-regulation was measured directly and with adequate variability, we may see differences in the influence of chaos along lines of children's ability to inhibit their behavior and devote their attention to task. Alternatively, it is possible that chaos negatively influences children irrespective of their age; indeed, chaos has disruptive effects on a variety of parenting behaviors (Corapci & Wachs, 2002; Coldwell et al., 2006; Valiente et al., 2007), suggesting that age alone may not be a determining factor in the negative implications of chaos.

Contributions of Individual Elements of Chaos

Television use appears to be particularly salient in terms of what contributes to a chaotic environment, and also why chaotic environments matter for families and children. The presence of a television being turned on somewhere in the home, which was less likely to be true in higher income homes, was a consistently significant predictor in parent and child outcomes when the relative contributions of the constituent parts of chaos were examined in follow-up analyses. Studies on background television in the home may give us some insight into the specific ways

that chaos may influence adults and children in the home; TV can interrupt children's attention and independent play, and prevent caregivers from engaging in responsive, cognitively stimulating ways with their children (Kirkorian, Pempek, Murphy, Schmidt, & Anderson, 2009; Setliff & Courage, 2011). Fortunately, television use in the home may be a fruitful avenue for intervention (Dennison, Russo, Burdick, & Jenkins, 2004; Escobar-Chaves, Markham, Addy, Greisinger, Murray, & Brehm, 2010), one which may serve to inform broader practical approaches tackling household chaos overall. The other items that emerged as being important predictors of language and HLE may tap into parents' overall perception of how organized their home is and their ability to promote order and structure in their home. Taken together, these different items may reflect what is happening in chaotic homes on a broader scale; in these environments children's quality exchanges in their environments are interrupted and degraded, with parents registering the effects of the disorder yet perceiving that they are unable to manage and organize their resources (Corapci & Wachs, 2002; Evans & Wachs, 2010).

Limitations and Future Directions

One potential limitation in this study is that both the HLE and household chaos levels were obtained via parent report. The social desirability that most parents attach to providing high quality learning interactions to their children may lead to skewed report of these types of activities; additionally, there are other, valuable home learning activities not captured in the battery used in this study, including parent-child play, trips to the library, and having conversations around books (Stipek, Milburn, Clements, & Daniels, 1992; Storch & Whitehurst, 2002). In addition, the scale measuring household chaos demonstrated low reliability in this sample, though other studies have utilized this scale and have reported higher reliability statistics (ie., Pike et al., 2006). It is possible that this particular measure of household chaos does not

capture the breadth that the construct of chaos represents; in particular, this scale does not address aspects of family instability, which is likely an important aspect to consider for family and child outcomes (Ackerman et al, 2010). Though the CHAOS scale has been used widely and has the benefit of providing a quick, non-invasive, and reliable measure of the levels of organization and order in the home, (Johnson et al., 2008; Petrill et al., 2004; Pike et al., 2006), it is possible that direct observations of home environments may give more objective indicators of overall household chaos. Although in-depth home observations are time-consuming and costly, they may nonetheless yield rich information about the multi-faceted nature of chaos, particularly for those families who have fewer economic resources and, presumably, more stressors to contend with (Conger et al., 2010). Understanding not only the *quantity* of chaos that families experience, but also the *meaning* that chaos holds for families will be integral if we want to begin to build family supports in this area.

Future work in this area should contribute to the field's understanding of the qualitatively different ways that families experience chaos, which will likely help to inform chaos as a construct, the mechanism underlying its influence on children and families, and ultimately, how we may begin to address it through intervention. However, nearly all of the work in this area examines household chaos in terms of the amount of chaos present, with no studies to date delving into what individual elements of chaos may mean to families. The meaning and influence of chaos may be different across families, and future qualitative investigations into how families perceive and experience chaos may lead to improved ways of measuring chaos, and ultimately, efforts at prevention or intervention with household chaos.

Additionally, considering parent attributes and skills may also help to shed light on how chaos operates within a family system. A home life that is disorganized and unpredictable likely

stem in part from the parents' ability to adequately plan, organize, and manage a household. Several items of the more extended chaos scale tap into this notion, asking parents to rate the degree to which they can stay on top of things, how often they feel rushed, and their ability to find things in their home when they need them. Parent strengths, or weaknesses, in this arena, could relate to other domains of parenting and the overall wellbeing of the family and the developing child. Supporting evidence for this comes from longitudinal studies in which investigators measured a house's overall cleanliness and organization when children were young; over thirty years later, children that grew up in a more orderly, clean house, were doing better on a variety of measures of well-being than children who grew up in less organized homes (Fluori, 2009). Chaotic homes may be a reflection of parents' own executive function and ability to plan and organize, the effects of which are felt by children not only in the immediate environments, but also in the ways that parental executive function permeates other parent-child exchanges over time. In trying to understand the particulars of exactly why chaos matters for children and families, future studies that consider the role that parent executive function plays in this regard may help to inform both mechanism and interventions.

Conclusion

For all families, regardless of their income level, chaos indirectly influenced both language and literacy outcomes, such that higher chaos was linked with fewer HLE activities, which in turn was linked with lower skills in both areas. In addition, chaos was directly linked with language outcomes, but only for those families who are not in poverty. This is noteworthy given that, while evidence continues to mount that chaos is important for children's general cognitive outcomes, it is rarely considered together with the specific parenting behaviors that are known to be important for such outcomes (for exceptions, see Deater-Deckard et al., 2009;

Johnson et al., 2008), and, similarly, studies of the HLE generally do not consider the importance of household context (e.g., Hindman & Morrison, 2012; Hood et al., 2008), as this study does.

Household chaos operates within the broader context of the home environment, potentially influencing children, adults, and family functioning in a variety of ways. This study contributes to the growing body of work examining the numerous ways that household chaos influences families, by demonstrating that chaos is not only linked to positive parenting behaviors generally (Corapci & Wachs, 2002; Evans et al., 1999), but, that it specifically influences parents' home learning activities, highlighting additional factors to consider when supporting children's development in language and literacy. Helping families to provide a more organized and structured home life may enable children to explore their environments in ways that promote development, while at the same time supporting parents to engage in more frequent and higher quality parent-child interactions that are known to be beneficial for a variety of child outcomes.

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CHAPTER 3: STUDY TWO

Household chaos and the Home Learning Environment: Practical Implications for Supporting Children and Families

ABSTRACT

The importance of creating environments that promote children's learning and engagement is underscored in this paper, with a discussion about practical ways that families can reduce overall levels of household chaos. Specifically, this paper reviews my study on the home environments of preschool children and their developing language and literacy skills, and, together with the larger body of work on environmental chaos, makes practical recommendations for ways that practitioners can support families to increase the degree of order and organization in their homes while limiting noise and instability. My study demonstrates that household chaos can influence children and their caregivers, by decreasing the frequency of positive, learning related activities in which parents engage. Additionally, my study suggests that specific elements of household chaos, such as the likelihood of the television being on, may be particularly important for family functioning. Basing recommendations for practitioners on my study findings, along with the field at large, this paper focuses on three areas that are important indicators of household chaos that influence child and family functioning: the presence of the television in the home, the regular and frequent occurrence of family routines, and the degree of order and organization in the home.

Background

Children's Development Through a Systems Perspective. Children's development is a function of the reciprocal interactions between children and the multiple systems that surround

them (Bronfenbrenner & Morris, 1998). Using the bioecological systems perspective of human development, we recognize that young children are a product of their many and varied interactions with their caregivers, as well as the context in which these take place, from those closest to the child, such as the home, extending outward to the social and cultural context they inhabit (Bronfenbrenner & Evans, 2000). Within this framework, a comprehensive look of child development involves a broad person-process-context approach; with person referring to the child, process encompassing the face-to-face interactions between child and caregiver, considered the “drivers” of development, and context signifying the environment that surrounds the developing child (Bronfenbrenner & Evans, 2000).

The home environment is the system closest to the young child, and none is more important in determining children’s future outcomes (Bronfenbrenner & Evans, 2000; Crosnoe, Leventhal, Wirth, Pierce, & Pianta, 2010). Most work on children’s development in the early home context centers on their direct interactions with their parents, linking these interactions to outcomes in language (Rodriguez, Tamis-LeMonda, Spellmann, Pan, Raikes, Lugo-Gil, & Luze, 2009), social emotional skills (Denham, Mitchell-Copeland, Strandberg, Auerbach, & Blair, 1997), and cognitive and academic success later on (Hindman & Morrison, 2012). However, recent studies have expanded the scope of work to also consider how the contextual features of the environment itself may matter for children’s development. Specifically, evidence is mounting that the overall structure, order, and organization of the home environment may influence both children and the adults in the home (Corapci & Wachs, 2002; Evans & Wachs, 2010; Matheny et al., 1995).

Household chaos refers to the degree to which home environments are disorganized, unstructured, lacking in routines, and have high levels of background noise and distraction

(Evans & Wachs, 2010). Chaotic households can influence parents in detrimental ways, contributing to lower parental warmth and responsivity (Coldwell, Pike, & Dunn, 2006; Corapci & Wachs, 2002), lower self-efficacy (Corapci & Wachs, 2002), less cognitively stimulating language (Evans, Maxwell, & Hart, 1999), and fewer parent-child learning activities (Deater-Deckard, Mullineaux, Beekman, Petrill, Schatschneider, & Thompson, 2009). Similarly, chaotic households are negatively associated with children's outcomes in language (Petrill, Pike, Price, & Plomin, 2004), behavior problems, and attention skills (Dumas, Nissley, Nordstrom, Smith, Prinz, & Levine, 2005). Like many other stressors in the home setting that influence both parents and children (Conger, Conger, & Martin, 2010; Evans, 2004), household chaos is linked with family socioeconomic (SES), with families lower in SES having higher levels of chaos (Matheny, Wachs, Ludwig, & Phillips, 1995; Petrill et al., 2004)

Why Household Chaos Impacts Children. Environmental chaos may influence children's development through multiple pathways, all of which essentially disrupt the "good" exchanges that children experience, ie., those exchanges that are positive and developmentally supportive, such as playing with toys or communicating with their parents (Bronfenbrenner & Evans, 2000). Chaos may directly impact children by increasing their need to filter out extraneous stimuli, resulting in potentially filtering out other beneficial information in their environment, such as their parents talking to them (Evans et al., 1999). Chaotic environments may make it difficult for children to pay attention to and learn complex material (Evans & Lepore, 1993), and to interact with their immediate environments in ways that stimulate cognitive development (Petrill et al., 2004).

Children may also experience the indirect effects of chaos in the ways it operates through their caregivers. For instance, chaotic environments may jeopardize the parent-child interactions

available to the child, via lower parental responsivity (Corapci & Wachs, 2002) and fewer cognitively stimulating parent-child activities (Johnson, Martin, Brooks-Gunn, & Petrill, 2008) that are associated with chaotic environments. Overall, chaotic environments can interfere with children's experience of positive learning interactions, which can subsequently impede their development; my study examined this process as it relates to early language and literacy development.

Children's Early Language and Literacy Development. Preschool language and literacy skills are considered key indicators of children's readiness for school (NELP, 2008), supporting and mutually reinforcing each other (Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003), facilitating emotional regulation and adjustment to the school setting (Catts, Fey, Zhang, & Tomblin, 1999), and predicting success in school and beyond (Cunningham & Stanovich, 1997; Entwistle, Alexander, & Olson, 2005). As such, much work has been done in order to understand the various ways that these skills are supported during these early ages, with the consensus settling on children's early home experiences with their parents as the most important determinant (Crosnoe et al., 2010; Lee & Burkam, 2002; Shonkoff & Phillips, 2000). Specifically, when parents consider themselves to be active players in their children's early learning, and engage in more frequent learning-related activities such as joint reading, writing together, and playing board games, considered part of the home learning environment (HLE), children do better in language and literacy (Hindman & Morrison, 2012; Bennett, Weigel, & Martin, 2002).

Most studies do not investigate the specific environments in which these parent-child learning activities take place, but evidence from daycare and classroom settings suggests that the environment itself should also be a core consideration in supporting children's learning (NICHD

ECCRN, 2002; Ponitz, Rimm-Kaufman, Brock, & Nathanson, 2009; Wachs, Gurkas, & Kontos, 2004). For example, noisy school environments and chaotic, disorganized classrooms are associated with lower literacy skills during preschool and early elementary grades (Maxwell & Evans, 2000; Ponitz et al., 2009); when teachers provide organizational supports, children are more engaged with the teacher and with the task itself (Curby, Downer, & Booren, 2014). In the home setting, higher household chaos is linked with fewer parenting behaviors that facilitate early learning, such as responsiveness and engagement in toy play (Corapci & Wachs, 2002; Evans et al., 1999), and, in particular, HLE activities such as shared reading and writing together (Deater-Deckard et al., 2009; Johnson et al., 2008). This suggests that chaos can influence children indirectly by affecting what parents are doing with their children.

In general, chaotic environments predict lower children's language skills, even when accounting for other risk factors such as maternal depression and harsh discipline behaviors (Coldwell et al., 2006; Petrill et al., 2004). However, most of the research linking chaos and young children's developing language and literacy skills does not consider HLE-related parenting behaviors as an important part of the process. One notable exception is a study by Johnson and colleagues (2008), which found that household order contributed to children's expressive vocabulary in kindergarten, even after accounting for the influence of the HLE. The same association was found for children's literacy skills in kindergarten and first grade (Johnson et al., 2008); this is one of the only studies linking household chaos and children's early literacy development, however this resonates with prior research indicating that classrooms high in order and low in chaos yield greater growth in children's literacy across the first grade year (Ponitz et al., 2009).

Untangling Specific Effects of Household Chaos. Typically, studies of household chaos consider it a combination of multiple elements that represent an overall summary of chaos, summing or averaging across numerous items related to family routines, crowding, noise levels, organization, and structure (Deater-Deckard et al., 2009; Matheny et al., 1995). But, aside from an overall effect of chaos on families, these individual variables themselves may have distinct links with development, and they may operate differentially on the processes in the child's home. For instance, Martin and colleagues (2012) found that when the multiple indicators of chaos are separated out and their individual impacts on children are examined, the items that are most important for children's development were the presence of a television in the house and the occurrence of regular family routines. Television use may be an especially relevant aspect of household chaos, contributing to noise levels and distraction; more television use in the home is linked with less engagement in learning activities, such as book reading (Vandewater, Bickham, Lee, Cummings, Wartella, & Rideout, 2005), and background television results in fewer interpersonal interactions and language between parents and children (Kirkorian, Pempek, Murphy, Schmidt, & Anderson, 2009; Setliffe & Courage, 2008). Positive features of the environment, indicative of lower household chaos, are participation in regular family routines and the availability of orderly, organized spaces for children, which may promote parent-child learning interactions (Weigel et al, 2012; Martin et al., 2012), and children's engagement and learning (Aram, Bazelet, & Goldman, 2010; Neuman & Roskos, 1992).

Conclusion. Children's early home experiences are widely regarded as the primary determinant of children's skills in language and literacy development and overall school readiness (Shonkoff & Phillips, 2000). However, most research considers only parent-child interactions while neglecting the important role of the environment (Hindman & Morrison, 2012;

Sénéchal & LeFevre, 2002), or, conversely, research linking household chaos and children's cognitive and academic outcomes (Petrill et al., 2004; Pike, Iervolino, Fley, Price, & Plomin, 2006) often does so without including the parenting practices that are known to bolster such skills (for an exception, see Johnson et al., 2008). Essentially, these two lines of research only consider two of the three pieces of the person-process-context framework, and thus, may not allow for a comprehensive examination of the multiple systems that may influence children's language and literacy development in the home setting. Studies that take into account the various ways that household chaos, as a whole and parsed into its individual indicators, may influence children, parents, and their learning interactions may provide additional pieces of the puzzle explaining how we can create opportunities to support children's early learning in the home.

Empirical Support for the Importance of Chaos

In order to learn more about how household chaos is related to the learning environment that children experience at home, as well as their developing language and literacy skills, I examined the home environments of 342 preschoolers from a range of economic backgrounds (Foster, in prep). Parents reported on their levels of chaos in their homes using a 6-item questionnaire which rated, on a scale from 1-5, the accuracy of six statements: TV is on all the time; the house is a zoo; we have a regular bedtime routine; we are usually able to stay on top of things; the atmosphere in our home is calm; and, you can't hear yourself think in our home. I then used an average score of household chaos for analyses. Parents also reported on the frequency that they engaged in a variety of home learning environment activities, such as playing math games, practicing writing, and reading (Morrison & Cooney, 2002). Children's language and literacy skills were tested directly, comprised of elements of vocabulary, sentence structure,

and phonological awareness (Clinical Evaluation of Language Fundamentals-Preschool; Wiig, Secord, & Semel, 2004) and decoding (Woodcock, McGrew, & Mather, 2001), concepts about print (Justice & Ezell, 2001), and letter knowledge. I then examined the relationship between chaos and the HLE, and tested whether chaos predicts children's outcomes both directly, and indirectly, through its influence on parenting behaviors that are part of the HLE.

I found that, across the board, families with lower income reported higher levels of chaos, both in its composite form, and for each of its individual indicators. The effect size of the mean difference between the lowest income bracket in our study, that of less than \$25,000 per year, which is considered at poverty level for a family of four (U.S. Census, 2014), and the highest income bracket, \$75,000 or greater, was $d = .63$, which is considered a medium effect size (Cohen, 1988). Parent report of household chaos was negatively associated with family income ($r = -.27, p < .001$), parent education levels ($r = -.27, p < .001$), the HLE ($r = -.21, p < .001$), and all child outcome measures in language and literacy (ranging from $-.14$ to $-.24$).

In line with other studies that find negative associations between levels of chaos and other positive parenting behaviors, I found a negative relationship between chaos and HLE; that is, the higher the levels of chaos that parents report, the less frequently they report engaging in HLE activities. Household chaos was indirectly related to children's early language and literacy skills, through its influence on the HLE. And, chaos was directly linked with children's language skills for those families who are not in poverty ($\beta = -.19, p < .05$). Findings suggest that household chaos can influence children and their caregivers by decreasing the amount of positive, learning related activities in which parents engage.

Many conceptualizations of household chaos treat it as a composite variable, essentially summing or averaging the ratings of six different indicators of household chaos: TV is on all the

time; the house is a zoo; we have a regular bedtime routine; we are usually able to stay on top of things; the atmosphere in our home is calm; and, you can't hear yourself think in our home (Petrill et al., 2004; Pike et al., 2006; Hart, Petrill, Deater-Deckard, & Thompson 2007). But there is some evidence that these different elements used to measure chaos may have specific influences on children's development (Martin et al., 2012). Therefore, I looked at each of the six chaos variables separately, exploring how each of these individual variables relate to children's language skills and parents' provision of the HLE.

With regard to predicting the frequency of HLE activities engaged in by parents, the items 'It's a real zoo in our home' ($\beta = -.17, p < .05$), 'We are usually able to stay on top of things' ($\beta = -.12, p < .05$), and 'There is usually a TV on somewhere in our home' ($\beta = -.17, p < .01$) were negatively related. The item tapping family routines, 'The children have a regular bedtime routine', approached significance at the .05 level in predicting the HLE ($\beta = -.11, p = .063$). When looking at children's early language skills, the item related to the TV being on was the only significant predictor ($\beta = -.30, p < .001$) of children's language skills.

Practical Recommendations for Families and Those working with Families

The awareness of the different ways that household chaos can negatively influence children and families is growing across various fields of study (Evans & Wachs, 2010). Though the individual elements that comprise chaotic environments – background noise, lack of routines - may seem relatively innocuous at first glance, there is consistent evidence that they can be harmful to children's wellbeing. These particular elements work together to characterize a chaotic home environment, but there is reason to believe that these elements can be practically targeted with relative ease within the home.

Reducing chaos in the home through targeted interventions will likely be a goal of future studies, but in the meantime, we can use our current knowledge about chaos and its indicators, along with the what we know about what is best practice for children's language and literacy development, to create practical recommendations for families in an effort to mitigate the consequences of household chaos. Reducing overall levels of environmental chaos may be optimal, but the path to accomplishing this goal likely involves targeting the individual elements of chaos known to be important for child and family wellbeing. Below I review the literature on several specific indicators of household chaos found to important for child and family functioning, including television use, engagement in family routines, and creating organized learning spaces, and translate these into practical recommendations for those who work with families, especially for creating a quality home learning environment for children.

Use the Television in an Intentional Way

Television use seems to be a particularly salient contributor to chaotic home environments and to the negative outcomes associated with them (Foster, in prep; Martin et al., 2012). In my study, the more likely a family was to have their television on throughout the day, the fewer HLE activities engaged in by families, and the lower the children's language and literacy skills in preschool. The negative association between television use and children's development is worrisome, given that in the United States, 40% of children under the age of three grow up in homes in which the television is usually on (Vandewater et al., 2005). Families who have low economic resources are more likely to have the television on more frequently (Foster, in prep), with some families reporting that the television is on upwards of 14 hours a day (Bradley, Corwyn, McAdoo, & Garcia-Coll, 2001).

Effects of Television on Parents and Children. Children in heavy-television households spend less time reading and are less likely to be able to read than children exposed to less television (Vandewater et al., 2005), and the adults in the home spend less time in instructional learning-related activities with their children (Clarke & Kurtz-Costez, 1997). The American Academy of Pediatrics (1999) recommends that children younger than two are not exposed to television or other screen media at all, and that older children's time spent in such activities is less than two hours per day; the rationale behind this recommendation is that when children are watching TV, they may be displacing the quality social interactions with their caregivers that are so crucial to development (Martin et al., 2012; Rideout & Hamel, 2006). However, it is likely that many young children exceed these viewing recommendations, which is meaningful given that early viewing patterns persist into later childhood (Certain & Kahn, 2002).

While television use in general is implicated in negative outcomes for families and children (Clark & Kurtz-Costez, 1997; Duch et al., 2013; Vandewaater et al., 2005), the nature of television's influence on children may hinge on the content of the television programming (Wright et al., 2001). Some studies find no negative ramifications of high dosages of television programming designed for children (Barr et al., 2010; Zimmerman & Christakis, 2007), and some even indicate positive associations between watching high-quality children's programming - those that are rich with language and learning opportunities accessible to young children, such as Sesame Street (Wright et al., 2001) and Dora The Explorer (Linebarger & Walker, 2005) - and children's school readiness skills (Linebarger & Walker, 2005; Wright et al., 2001).

The Problem With Background Television. Though less studied, the amount of background television, consisting of adult-directed programming, may have negative consequences for children and families. Wright and colleagues (2001) found that, while well-

designed children's programs may benefit children because of education opportunities that are embedded within these programs, adult-directed television, or "background" television, was associated with lower school readiness skills in preschoolers. Overall, background television is associated with lower levels of children's attention and engagement, as well as parents' ability to tune in to children's needs and respond to them in high-quality ways (Kirkorian et al., 2009; Setliffe & Courage, 2011). When children are playing while an adult-directed television program is on in the background, the TV frequently attracts children's attention, but does not hold it, resulting in less complex toy play marked by frequent interruptions (Setliffe & Courage, 2011). Adult programming only captures children's attention for approximately 5% of the time that it's on, compared to the 70% amount of time children attend to children's programs (Wright et al., 2001), but adult-oriented programming nonetheless disrupts children's quality interactions with the environments and adults around them.

It is possible that adult-directed television, which essentially becomes background noise for children, may disrupt children's positive interactions – with their caregivers, or with their environment through complex toy play – without any educational benefit from the content of the programming (Wright et al., 2001; Setliffe & Courage, 2008). On the other hand, when television that is high quality moves to the foreground for children, it can provide a positive learning interaction in and of itself. And, making TV a co-viewing experience may have especially positive aspects for children; when parents watch high-quality TV with their children, they may be interacting less frequently with their child, but they nonetheless engage in some behaviors that are positive for children, such as labeling objects, asking questions, resulting in increased child engagement (Barr et al., 2010).

Interventions Targeting TV Usage. If the prevalence of the television in the American home is somewhat discouraging, then, conversely, it is encouraging that family television habits may be amenable to change through intervention. Numerous interventions, predominantly targeting childhood obesity, have been successful in reducing children's television viewing specifically (Dennison, 2004; Johnson, Birkett, Evens, & Pickering, 2005), as well as reducing the amount of time the television is on in general in the home (Escobar-Chaves, Markham, Addy, Greisinger, Murray, & Brehm, 2010; Gorin, Raynor, Chula-Maguire, & Wing, 2006). Successful strategies for reducing television viewing by the whole family include family education on the benefits of less television consumption (Johnson et al., 2005), along with behavioral strategies such as making TV viewing goals, reducing cues for television watching, such as storing the TV in a cabinet, and replacing TV with other family activities (Gorin et al., 2006). Targeting the specific goal of turning off the TV when no one is watching was successful in reducing household TV time (Escobar-Chavez et al., 2010).

How to Make it Happen at Home. Especially for younger children, their early exposure to television in the home relies primarily on their parents' beliefs and values surrounding television use (Vandewater et al., 2005). If parents believe that television viewing is negative for children's development, they are less likely to have the television on. Early interventionists working with families can help to provide parents with knowledge about the potential effects of television on the family as a whole, which may influence parental beliefs and practices related to how much television their children are exposed to. The notion that adult-directed programming and background television may be even more negative to their child's development than frequent watching of children's television programs may be surprising to many parents. In keeping with the reality that television is very much a part of the average family's life, practitioners can

support parents in selecting high-quality children’s programming that may be most beneficial to their development. At the same time, practitioners can encourage parents to limit children’s direct television viewing, while potentially replacing some TV time with family learning activities. And, finally, practitioners can educate parents on the potential negative impacts of simple background and adult-directed TV, and encourage parents to limit their own “adult” television shows in the presence of children, and perhaps, most simply, to work with the family to turn the television off when no one is watching.

TABLE 3.1 *Practical Recommendations for TV Usage*

Make it Happen at Home: Use the TV in an Intentional Way
• Encourage limited television viewing by children in line with AAP recommendations.
• When children do watch TV, provide access to high-quality, developmentally appropriate programming.
• Be aware of and try to eliminate children’s exposure to television content that is adult-directed.
• Replace some TV time with family learning activities
• Turn off the TV when no one is watching.

Strengthen and Support Family Routines

Family routines are the patterned interactions that a family engages in that are repeated over time (Wolin & Bennett, 1984), and include such things as sharing meals together, how families start the day together, and regularly occurring parent-child activities like reading books together. The nature and meaning of routines differs for each family, but overall, routines reflect how a family unit is organized and how they “find meaning as a collective unit” (pp. 381, Fiese, Tomcho, Douglas, Josephs, Poltrock & Baker, 2002). Because family routines typically involve

multiple family members and consist of an overall family process, they are an important consideration when looking at children's development within their family systems (Bronfenbrenner & Morris, 1998; Fiese et al., 2002).

Benefits of Routines. Routines provide a structure for daily life, and the presence of family routines can serve as a protective factor for children and families. Predictable and regular participation in activities like family mealtime, bedtime routines, playing, and reading, may help to buffer children against the pervasive negative effects of poverty (Brody & Flor, 1997; Fiese & Everhart, 2008); children's experience with more family routines is positively associated with higher socio-emotional health, self-regulation, and cognitive ability in the preschool period (Ferretti & Bub, 2014; Koblinsk, Kuvalanka, & Randolph, 2006; Muniz, Silver, & Stein, 2014), including reading ability through third grade (Serpell et al., 2007). Stronger family routines also increased the frequency with which families engaged in learning activities that enhance children's literacy development (Weigel, Martin, Bennett, 2010). Overall, family routines can be a developmental asset for young children.

How do Routines Help Families? There are several possible reasons why routines may be so important for children and family wellbeing; these include the effects that routines have on the predictability of interactions, as well as the fact that routines provide an avenue for rich learning opportunities to take place. The "absence of predictable patterns of cause and effect" (Evans, 2006) may influence children's ability to learn; in order for children to gain competence in a skill, the interactions that promote such a skill need to happen regularly and in a predictable manner, so that the task, and the subsequent learning, can grow in complexity (Bronfenbrenner & Evans, 2000). Unpredictable environments may prevent events from unfolding the same way every time, potentially disrupting children's ability to generalize their learning. Everyday

routines may provide a consistent format for engaging with children in ways that allow parents and children to build upon prior experiences.

Another reason why routines may be so important in young children's development is because they provide, on a consistent and predictable basis, rich opportunities for parents and children to engage in meaningful conversations (Dickinson & Tabors, 2001; Ferretti & Bub, 2014). For instance, mealtime provides an informal setting that allows frequent avenues for engaging in high-quality language and conversations; the presence of the whole family allows for more complex conversations between family members (Blum-Kulka & Snow, 2002) and opportunities to engage in more elaborate talk (Beals, 2001). When parents do not have routines in place, they may not be sufficiently organized to provide the types of responsive, high-quality learning exchanges that are so important to children's development. Less frequent routines may limit the frequency with which parents are able to engage in such learning related activities (Weigel et al., 2010), which is important for children's skill development (Hindman & Morrison, 2012). The presence of family routines can provide a buffer against stress, allowing families the freedom to focus their efforts and attention to activities that foster children's development, rather than on managing other elements of the environment (Snow, Barnes, Chandler, Goodman, & Hemphill, 2001).

The benefits of implementing a family routine such as reading books together at bedtime may be twofold. By incorporating learning-related routines into the everyday rhythm of the family, children can benefit from a predictable pattern of behavior and routines, known to benefit children in a variety of ways (Bronfenbrenner & Evans, 2000; Martin et al., 2012). And, when the interactions within the routines themselves are built around a learning activity, such as book reading, positive influences on language, literacy, and even the parent-child relationship

(Spagnola & Fiese, 2007), are likely to follow. Routines provide regular opportunities to promote children’s learning as well as for building relationships between family members (Kubicek, 2002).

How to Make It Happen at Home. Early interventionists working with families already utilize approaches that are derived from and embedded within family routines (McWilliam & Scott, 2001). Practitioners can strengthen families’ participation in routines by promoting their awareness of the positive effects that routines have on their children as well as the family as a whole, and identifying and addressing potential barriers to routine implementation. Further, practitioners can work with families to embed routines that provide rich learning opportunities, such as a bedtime reading routine and family participation in mealtime, in an effort to provide consistent and positive learning opportunities for children within a predictable context.

TABLE 3.2 *Practical Recommendations for Promoting Routines*

Make it Happen at Home: Embed Meaningful Everyday Routines
• Identify families’ existing routines and then build on these to 1) increase their regularity and 2) increase their frequency
• Increase regularity and complexity of routines involving parents and children around mealtime and bedtime
• Aim to implement one daily routine built around a parent-child learning activity. Ideas include: making a schedule for the day, playing a board game after dinner, or reading a book at bedtime.

Create Orderly Spaces for Learning

Parents are their child’s first and longest-term teachers, and the engagement in learning-related activities sets children on a course for future success (Hindman & Morrison; Crosnoe et al., 2010). Parents can take an active role in their child’s learning not just by the types of activities they engage in, but also in the ways they arrange their home spaces for learning,

recognizing that children's development in any given competency is a function not just of the processes, or interactions, in which they partake, but also the environments they inhabit (Bronfenbrenner & Morris, 1998). Environments can also facilitate or hinder the processes that parents and children take part in together (Bronfenbrenner & Evans, 2000).

Environments That Support Learning. The physical design of the environment is an important feature of the broader learning environment, and can influence children's learning and behavior in these settings (Neuman, Koh, & Dwyer, 2007). The organization, structure, and complexity of classrooms and learning spaces can have implications for how children use these spaces. For instance, access to learning tools such as books and materials for writing increase children's participation with these objects, and subsequent literacy development (Morrow, 1990; Neuman & Roskos, 1992). Grouping objects together as part of meaningful themes, and incorporating objects that lend themselves to genuine experiences increases children's sustained play and the complexity of that play (Neuman & Roskos, 1993). Some features of an orderly and organized environment that support literacy engagement, both at home and at school, include a specific area set aside for books, an orderly and inviting space, books at children's height, and available space to use materials such as books, games, and writing utensils, as measured by the Child/Home Environmental Language and Literacy Observation (CHELLO; Neuman et al., 2008).

Taking Cues from Classroom Environments. Much of what we know about the relationship between children's learning and the arrangement of the environments comes from studies on the classroom setting. High-quality preschool and childcare settings are characterized in part by the environmental features of well-organized classrooms with appropriate amounts of stimulation and without overcrowding (NICCHD ECCRN, 2000). Work by Ponitz and

colleagues (2009) indicates that classroom organization, and overall chaos, measured in a similar way to my previous study (Foster, in prep), predicted children's growth in literacy and math over the school year for kindergarteners and first graders (Ponitz, Rimm-Kauffman, Brock, & Nathanson, 2009). When preschool teachers provide supports that provide classroom organization and orient the child to the task, children are more engaged both with the teacher, and with the task at hand (Curby, Downer, & Booren, 2014); the study authors propose that classroom organization helps to provide a framework for children to engage in positive ways with both the people and the tasks with their classroom environment, ultimately leading to higher engagement.

How to Make It Happen At Home. When adults provide organizational supports that facilitate children's attention to task and orient them to processes of learning, children are more engaged (Curby et al., 2014). Aside from making learning materials available, accessible, and inviting, parents can also create orderly spaces to maximize engagement in learning activities. In a study examining parental supports to the literacy skills of children ages 5 and 6, parents' provision of organizational supports during literacy activities predicted literacy skills for those children with ADHD (Aram, Bazelet, & Goldman, 2010); specifically, when parents provided a clear work space, comfortable chairs, and a tidy, quiet environment, these children had better outcomes in literacy. Though few studies examine the benefits of a calm, clutter-free work space, this is in line with theories which recognize the importance of the environment in development; this line of thinking suggests that orderly, organized spaces without excessive stimulation provide optimal learning environments for children (Evans & Wachs, 2010).

TABLE 3.3 *Practical Recommendations for Creating Orderly Learning Spaces*

Make it Happen at Home: Create Orderly Learning Spaces
• Carve out a designated learning space in the home where the child can independently access materials.
• Keep the learning space clean, clutter-free, inviting, and comfortable to the child.
• Make objects, such as books, paper, and writing utensils, visible and accessible to the child.
• Infuse real-life objects, including literacy materials, into the learning spaces. Examples include envelopes, recipe cards, old magazines, or clipboards.
• Be aware of the surrounding environment when you and your child are partaking in a learning activity. Limit distractions, such as the TV or clutter.

Parent-Child Interactions Remain the Crux of Development

Creating environments that help both parents and children to engage with one another sets the stage for high quality interactions between parents and children, which bolster children's subsequent language and literacy development. When provided with an organized, non-distracting home environment, parents are more likely to engage in higher quality interactions with their children, and children are better equipped to pay attention to, and benefit from, those interactions. Home environments that are low in chaotic elements may lay the groundwork for positive parent-child interactions, but the environmental setup is not in itself sufficient for children's development, as it is the direct exchanges between parents and children that are the true drivers of development.

These parent-child exchanges take place throughout each day, and, at their best, are built around children's everyday experiences, such as reading, playing, and sharing a meal together. When reading books, parents can have a conversation about the content of the book, explain new vocabulary, and encourage their children to make predictions about why something happened, or what's coming next (Wasik & Bond, 2001). Parents can point out letters, highlighting their

sounds and shapes, while looking at signs in the park, or while writing a grocery list together with their preschooler (Aram & Biron, 2004; Ezell & Justice, 2000). Playing provides a natural and motivating context for children's learning, and parents can be active play partners with their children, encouraging pretend play and symbolic thought, discussing the play episode and helping children to problem solve, and incorporating authentic literacy and learning materials into the play itself (Neuman & Roskos, 1993). Parents are their children's first and most important teacher, and they convey learning to them in a multitude of everyday interactions before children even begin formal schooling. Limiting household chaos, and ultimately supporting parents and children to have more frequent, higher quality interactions with one another, is one of the many ways we can create a home environment rich with learning opportunities.

Conclusion

Household chaos is part of the everyday lives of many families across America, especially for those who face more risk in terms of socioeconomic stressors (Foster, in prep; Matheny et al., 1995). There is mounting evidence that household chaos as a whole is negative for both children and their parents (Coldwell et al., 2006; Foster, in prep; Johnson et al., 2008). Based on the collective current research in this area, researchers and practitioners can begin to make practical recommendations for families about ways to limit the presence of chaos in the family environment, especially as it relates to providing learning opportunities to young children, in an effort to create environments that are positive for family functioning and child development.

The recommendations included in this paper entail some specific, practical ways that early interventionists can work with families to create home environments that support positive

engagement of parents and children together. Limiting household chaos and promoting orderly, structured, and predictable patterns in the home may have a wide range of benefits, especially when it comes to setting the stage for high quality parent-child learning interactions.

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CHAPTER FOUR: CONCLUSION

Across the areas of research, policy, and practice, there is a collective effort aimed at supporting children's early developmental competencies around their school readiness skills, with a particular emphasis on children's early language and literacy skills (NELP, 2008; Shonkoff & Phillips, 2000). The consensus across the board is that children's early experiences at home are the most important in setting them on the right track for later school success (Crosnoe, Leventhan, Wirth, Pierce, & Pianta, 2010; Lee & Burkam, 2002), with parents' provision of high quality learning related activities among the most important in this regard (Morrison & Cooney, 2002; Bennett, Weigel, & Martin, 2002). When parents are actively involved in supporting children's learning through the home learning environment (HLE), children are better prepared for school and equipped with stronger early language and literacy skills (Crosnoe et al., 2012; Hindman & Morrison, 2012).

However, there is more to the home environment than the activities that parents engage in with their children. Drawing from theory and research grounded in ecological systems theory, which recognizes the interplay between person-process-and context in development (Bronfenbrenner & Evans, 2000), there is a growing recognition that certain features of the home environment, namely the degree of order, organization, and stability, may be an important determinant for parenting behaviors and children's learning and development (Bronfenbrenner & Evans, 2000; Evans & Wachs, 2010). The study of household chaos is shedding light on the ways context matters for both parents and children.

Household Chaos, the HLE, and Children's Outcomes

Previous studies suggest that household chaos is important in determining children's development in a variety of areas, including cognitive skills, language skills, and even behavioral

problems (Coldwell, Pike, & Dunn, 2006; Dumas, Nissley, Nordstrom, Smith, Prinz, & Levine, 2005; Petrill, Pike, Price, & Plomin, 2004). What is missing in these studies, particularly those looking at language and cognitive skills, is the concurrent influence of parenting behaviors, such as the HLE, that are known contributors to these skills (Rodriguez, Tamis-LeMonda, Spellmann, Pan, Raikes, Lugo-Gil, & Luze, 2009; Hindman & Morrison, 2012). In the same vein, the studies that have established the strong link between the HLE and children's outcomes in language and literacy have almost entirely neglected the role of the home environment as it relates to order, organization, and structure.

Overall, the nature of the environment itself seems to matter when it comes to setting the stage for high quality learning interactions between parents and children unfolding in the home. Consistent with both theory and research relevant to ecological systems theory, Study One shows that a more chaotic home environment contributes to parents engaging in HLE activities less frequently, which then indirectly negatively influences children's language and literacy. Further, chaos appears to directly impact young children's language skills, though only for those families who are not in poverty. This work provides a more complete picture of the home environment and children's experiences within, and highlights implications for children's development in language and literacy.

The Importance of the Home Environment for Children's School Readiness

Early competence in language and literacy is an invaluable asset for young children, which can propel them on a course for success in school and beyond (Cunningham & Stanovich, 1997; Entwisle, Alexander, & Olson, 2005). Unfortunately, children in the United States arrive in kindergarten with vastly differing abilities in these areas, and these differences are often along the lines of SES (Lee & Burkam, 2002); thus, myriad efforts are aimed at supporting children in

the acquisition of these skills via their parents in their home environment during their early years (Shonkoff & Phillips, 2000; U.S. DHHS, 2010). While parent-child interactions remain the crux of what drives children's development (Bronfenbrenner & Evans, 2000; Crosnoe et al., 2010), the consideration of the home environment should be expanded to also include the organizational and structural supports as being relevant children's learning.

Implications for Practice

Currently, efforts in the field of environmental chaos have been centered on understanding the nature and impact of chaos on children and families, as opposed to intervention or prevention of chaos itself (Brooks-Gunn, Johnson, & Leventhanl, 2010). Future work will likely explore whether or not targeted intervention of household chaos can result in more orderly environments, and, most importantly, if that change ultimately results in better outcomes for children and families. In the meantime, however, there is some promise in interventions that target specific indicators of chaos such as television usage (Gorin, Raynor, Chula-Maguire, & Wing, 2006) noise levels (Maxwell & Evans, 2000), and those that capitalize on the potentially beneficial aspects of engagement in family routines (Martin, Razza, & Brooks-Gunn, 2012) and in creating orderly learning spaces within the home (Aram, Bazelet, & Goldman, 2010).

Study Two delves deeper into the literature surrounding the specific indicators of chaotic environments that may be most important for child and family wellbeing, including the tendency for a TV to be on (Martin et al., 2012), the frequency of family routines (Weigel, Martin, & Bennett, 2010), and the availability of orderly learning spaces accessible to the child (Aram et al., 2010; Curby et al., 2014). By helping families to be better aware of the potentially negative effects of distracting background television (Setliffe & Courage, 2011), parents can be better

equipped to limit such distractions and encourage high-quality children's programming in their home. Similarly, educating parents on the value of family routines (Martin et al., 2012; Spagnola & Fiese, 2007) and helping them to identify ways in which they can create meaningful routines within their family, may provide opportunities to children to experience predictable, high quality exchanges with their parents on a regular basis. And, supporting parents to create a clean, orderly space that is dedicated to learning may promote children's attention to task and engagement with these materials (Aram et al., 2010). Taken together, all of these practical recommendations converge on the objective of facilitating children's learning by setting up environments that support parent-child interactions and children's subsequent engagement and development.

Conclusion

Study One supports the existing literature base on household chaos, highlighting the role that chaos plays in the broader context of the home environment and influencing children, adults, and family functioning in a variety of ways. In particular, chaos is not only linked to positive parenting behaviors generally (Corapci & Wachs, 2002; Evans, Maxwell, & Hart, 1999), but, specifically to parents' home learning activities, which has important practical implications for supporting children's development in language and literacy. Using specific and practical recommendations to limit household chaos, as is outlined in Study Two, may help families to provide a more organized and structured home life. In turn, these positive environments may enable children to explore their environments in ways that promote development, while at the same time supporting parents to engage in more frequent and higher quality parent-child interactions that are known to be beneficial for children's development overall.

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