Navigating risk in home visitation: An examination of the predictive validity of the Healthy Families Parenting Inventory

by

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Abstract

Child abuse and neglect is a devastating yet preventable social problem. Currently, early childhood home visitation services are the primary approach to preventing maltreatment and improving child well-being in the United States. However, existing literature suggests that improvement is needed regarding how home visitation professionals identify and respond to risk factors for child abuse and neglect. Although there is substantial multidisciplinary literature that investigates the utility of standardized measures to determine future risk for maltreatment, there has been minimal inquiry into the validity of early childhood home visitation assessment instruments to accurately identify and classify children and their families by their risk for future maltreatment. In response to the dearth in the literature, the purpose of this dissertation was to examine the utility of the Healthy Families Parenting Inventory (HFPI) to predict a family's risk for future maltreatment. Families enrolled in Healthy Families Arizona, a child abuse and neglect prevention program, were followed for 12 months after the completion of the baseline HFPI to measure if the family had received an investigation of maltreatment from the public child welfare system. Bivariate results indicated that the generated risk classifications of the HFPI and the overall total composite score were related to the occurrence of a future maltreatment investigation. Specifically, the results from the binary logistic regression models provided evidence that as a family's score increased on the inventory, the likelihood of receiving an investigation of maltreatment decreased. Further, significant relationships were found between a family's score on several individual items of the HFPI and the occurrence of a maltreatment investigation. This dissertation concludes with a discussion of potential avenues of research on the topic of risk assessment in prevention programs serving at-risk families.

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CHAPTER 1

INTRODUCTION

The maltreatment of children including neglect and various forms of physical, sexual, and emotional abuse has endured as a social problem of significant scope, despite multi-system attempts at prevention and intervention. Currently, evidence-based early childhood home visitation programs are the primary approach to preventing maltreatment by improving child well-being and supporting vulnerable families with young children in the United States. These programs typically target at-risk families with children under the age of five, focusing on building supportive relationships with caregivers in their home environment to improve maternal and child well-being. Although home visitation programs target services towards homogeneous low-income families with young children, the literature suggests that there is wide variation in these families' levels of risk for adverse outcomes (Duggan et al., 2007; Peacock, Konrad, Nickel, & Muhajarine, 2013). Despite this variation, there has been minimal inquiry into the validity of early childhood home visitation assessment protocols to accurately identify and classify children and their families by level of risk for future maltreatment. To address this dearth in the literature, the examination of the assessment of risk within home visitation populations requires a multidimensional approach that is distinct from risk assessment among public child welfare populations. With the developmental-ecological theory as the guiding framework of this dissertation, this chapter will introduce characteristics of families involved in home visitation that place enrolled children at increased risk for child maltreatment, followed by expectant opportunities for the prevention of child

maltreatment as a result of empirical validation of an assessment instrument developed specifically for early childhood home visitation populations.

Theoretical Lens: Developmental-Ecological Model of Child Maltreatment

Prevailing ecological theories in child welfare posit that the likelihood of maltreatment is influenced by a diverse set of risk and protective factors that are interrelated and interact to determine risk within a family system (Belsky, 1993; Cicchetti, Toth & Maughan, 2000; Scannapieco & Connell-Carrick, 2005). As a multidimensional field of practice, it is agreed upon that the determinants of child maltreatment take place among a balancing act of interacting stressors and supports at the child, parent, family, community, and societal levels (Belsky 1980; Cicchetti & Rizley, 1981; Pecora & Harrison-Jackson, 2014; Scannapieco & Connell-Carrick, 2005; Thomlison, 2004). This recognition of the complexity of maltreatment has led to the development of a comprehensive developmental-ecological theory to organize risk factors, first outlined by Belsky (1993) in a model based on Bronfenbrenner's (1979) theory of child development. This framework divides risk and protective factors for child maltreatment into three categories, including parent and child factors, factors in the interactional context between parents and their children, and factors in the broader context.

In addition to organizing risk and protective factors for maltreatment, the great strength of the developmental-ecological theory is that the theoretical model describes the complexity of contexts in which children develop, and their families operate. As one set of researchers put it, the complexity of the environment in which children develop ranges

from “neurons to neighborhoods” (Shonkhoff & Phillips, 2000), and occurs within a bidirectional transactional process (Belsky, 1993; Lynch & Cicchetti, 1998) in which both children and primary caregivers are active agents. In the developmental-ecological theory of child maltreatment, risk and protective factors interact with each other in a manner that influences the overall likelihood that maltreatment will occur. For example, parents struggling with managing a child’s difficult behaviors may be more likely to use abusive corporal punishment when taxed by the stressor of poverty, than they would be if they had the financial resources necessary for helpful parenting education and childcare. The comprehensive nature of the developmental-ecological theory, along with its recognition of the manner in which factors relate to each other and co-occur, has lead it to be a helpful model of organization for much of the current research and recent advances in the literature on child maltreatment (Mohr, Noone Lutz, Fantuzzo & Perry, 2000; Lee, Guterman, & Lee, 2008; Zielinski & Bradshaw, 2006).

The developmental-ecological theory can contribute to a complete understanding of early intervention with at-risk families, as it functions as a “social map” for not only understanding interactive risk within a family system, but also in examining complexities in service provision. In home visitation programming it can function to show the relationship between intervention strategies, suggest alternative conceptualization of how services can be delivered, and propose multiple strategies of intervention. When there are multiple causal factors impinging on social problems such as maltreatment, the developmental-ecological theory can review multiple dimensions of understanding, and suggest more comprehensive interventions. Conceptualizing interactive risk and

protective factors as the primary determinant for child maltreatment risk assessment and subsequent service provision is the basis of this dissertation, and may reduce future maltreatment by assisting practitioners in accurately providing appropriate services to families at the right dosage, at the right time.

Child Maltreatment and High Risk Children

State and national prevalence data and prevailing theory on risk factors for child maltreatment reveal that young children residing within low-income families served by home visitation programming are at increased risk for abuse and neglect. Home visitation programs are designed to serve young children at-risk for child maltreatment, as these programs target overburdened families with young children who have been identified as at-risk for poor health and social outcomes at the time of program enrollment (Healthy Families, 2017; National Center for Children in Poverty, 2008). Consequently, many enrolled families have a significant number of maternal and child risk factors for maltreatment. For instance, mothers enrolled in home visitation are more likely to be living in poverty, are teen parents, undereducated, and struggling with unmet mental health or substance abuse issues (Ammerman, Putnam, Bosse, Teeters, & Van Ginkel, 2010; Dubowitz et al., 2011; Duggan et al., 2004; Raikes et al., 2006). Furthermore, enrolled infants are also more likely to suffer from birth defects, be of low birth weight, be born preterm, and have positive alcohol or drug screens as a whole, as reported in state and federal data (LeCroy & Milligan Associates, 2016; Lee, Mitchell-Herzfeld & Lowenfels, 2009).

A growing body of research demonstrates that a number of contextual factors such as single parenthood, prenatal and antenatal substance abuse, maternal depression, , and prolonged reliance on public assistance common among families involved in home visitation, are risks for child maltreatment in young children (Chung, Matthew, Elo, Coyne & Culhane 2007; Kiser & Black, 2005), and can have harmful effects on children's emotional, cognitive, and social capabilities (Berger, Paxson, & Waldfogel, 2010; Westbrook & Jones Harden, 2010). Further compounding individual risks, many families enrolled in home visitation programming experience risk factors within broader contextual levels including interpersonal violence, difficulty in connecting to community resources, and insufficient social support systems (Freisthler & Maguire-Jack, 2015). The conditions that commonly occur in impoverished neighborhoods where these families live, such as frequent episodes of community violence, inadequate housing, and shortage of social and recreational resources, heighten the levels of stress and isolation experienced by at-risk families (Fortin, Guay, Lavoie, Boisvert, & Beaudry, 2012; Leventhal & Brooks-Gunn, 2003; Thornberry et al., 2014). As these factors interact with one another, it is not uncommon for families involved in home visitation to experience confounding risk factors among multiple contextual domains, creating a cycle of extreme stress for affected families (Merritt, 2009; Thornberry et al., 2014; Whitaker, Orzol, & Kahn, 2006; Wolfe, 2011). Infants and young children residing within these families are at enhanced risk, as evidence suggests that many risk factors for child maltreatment have a greater negative impact on children's development when it occurs earlier in life (Corvo & Carpenter, 2000; Osfosky & Thompson, 2000; Ratclife & McKernan, 2010).

Overall, young children under the age of five continue to experience the highest rates of child maltreatment, entry into the child welfare system, reoccurrence of child abuse and neglect, poverty, homelessness, and fatal victimization compared to any other age group (USDHHS, 2016a; USDDHS, 2016b). Left untreated, child maltreatment can result in long-term adverse consequences that are difficult, and sometimes impossible, to overcome (Barlow & Scott 2010). However, existing research suggests that early intervention and prevention efforts such as home visitation, are effective at protecting vulnerable children by reducing risk factors for maltreatment within family contexts, yielding positive outcomes in child development and maternal life course (Barlow et al., 2006; Dumont et al., 2008; Easterbrooks et al., 2012; Green, Tate, Harrison, Hygren, & Sanders, 2014; LeCroy & Krysik, 2011). With home visitation enrollment exceeding over 500,000 children in the United States, these programs serve as the earliest entryway through which a sizeable number of at-risk families come to the attention of social service professionals (Stoltzfus & Lynch, 2009). Through identification and divisive intervention early in children's lives, early childhood home visitation programs have an opportunity to identify and treat at-risk families, potentially changing lifelong trajectories for at-risk children and their families.

Promise of Home visitation

Although the provision of home visitation services for young children and their families who may be at risk for adverse outcomes has been in existence for more than thirty years, these programs have recently received unprecedented levels of attention and support. Much of this attention and subsequent expansion of home visitation

programming is reflective of changing public policy and wide-spread recognition of the power of prevention in protecting vulnerable children from abuse and neglect (Russell, Britner, & Woodlard, 2007; Stagner & Lansing, 2009). Driving these expansion efforts are recent research findings that have demonstrated the profound effects of early life experiences on the development and structure of the brain, as well as on children's emotional and social development, and lifelong capacity for learning (Center on the Developing Child, 2010; Nelson, 2002; Shonkoff & Phillips, 2000). As a result, lawmakers are increasingly turning to well-established early childhood home visitation models as critical components of efforts to promote school readiness, improve parental capacities to care for their children, and prevent child abuse and neglect (Astuto & Allen 2009; Stoltzfus & Lynch, 2009).

A variety of intervention models fall into the category of home visitation programs, although all deliver services through regularly scheduled visits to the homes of families with young children. Most of these home visitation programs have some goals in common, including promoting early learning and optimal development in young children, reducing risk for maltreatment, improving parents' competence in caring for their child, and stimulating his or her learning and development (Avellar & Supplee, 2013; Johnson, 2009; Mikton & Butchart, 2009). While numerous alternative community resources exist that can potentially mitigate the troubles and difficulties that lead to maltreatment, at-risk parents often have difficulty identifying their need for assistance or accessing services, especially when limited resources and logistical challenges pose additional barriers to accessing necessary resources (Daro, 2000;

Johnson, 2009). Home visitation programs attempt to address this difficulty by reaching families in their homes, identifying potential needs, and offering a dually comprehensive and individualized program of services (Asuto & Allen, 2009, Sweet & Applebaum, 2004). It is expected that families receiving home visitation services in their homes will miss fewer appointments, and therefore receive more services (Brooks-Gunn, Berlin & Fuligni, 2000; Johnson, 2009). Existing research suggests that when implemented with precision and fidelity, home visitation programs can yield positive outcomes in altering maladaptive parenting practices, enhancing child development, improving the quality of the home environment, and curtailing challenging child behavior; subsequently enhancing child and family well-being (Caldera et al., 2007; Dumont et al., 2008; Easterbrooks et al., 2012; Green et al., 2014; LeCroy & Davis, 2016).

Although many existing programs have been found to have favorable program impacts on risk factors for child abuse and neglect, fewer show success in directly reducing child maltreatment (Howard & Brooks-Gunn, 2009; Reynolds et al., 2009). Some researchers have argued that many evaluations have failed to show programmatic impact as a result of weak methodological rigor, specifically as it pertains to study design and measurement complications inherent in using administrative data to measure child maltreatment (MacMillian et al., 2009; Reynolds et al., 2009; Slack, Jack, & Gjertson, 2009). Unfortunately, when changes are not detected on outcome measurements during program evaluations, it is often concluded that the program was not effective, when in actuality methodological variance or the inability of the measure to detect change in an applied setting negatively impacted the ability to detect significant findings (Geeraert,

Van den Noortgate, Grietens & Onghena, 2004; LeCroy & Krysik, 2010; Sweet & Applebaum, 2004). However, large-scale studies have increased in number and methodological sophistication in recent years. While there is still much work to be done in standardizing measurement in home visitation settings to enhance methodological rigor, improved quality of evaluation research has allowed for a synthesis of findings across studies that have produced favorable conclusions regarding the effectiveness of home visitation programs in reducing maltreatment (Bilukha et al., 2005; Fergusson, 2005).

Empirical literature suggests that by engaging families in the context of their communities through early childhood home visitation with a robust array of preventative service options, home-visitors can work towards reducing the occurrence of child maltreatment and strengthening at-risk families. Along with recognition of the importance of providing a broad, integrated range of services, the complex nature of risk for maltreatment also creates a need for programs to offer accessible and individualized services to families at risk of future maltreatment (Daro & Donnelly, 2002). The flexible nature of prevention programming creates this opportunity through development of treatment plans that are tailored to meet the unique needs of each family before maltreatment occurs; which is a benefit not afforded to public child welfare systems. Through early identification, practitioners can utilize standardized assessments to recognize early signs of trouble within the family context, and monitor the family's risk level while providing intensive early interventions that reduce the need for more substantive and costly later involvement with the public child welfare system. Despite

the promise of early childhood home visitation to protect children and alter the trajectory of at-risk families, there has been minimal attention paid to assessment of risk among children involved in home visitation programming. Current home visitation practice in the absence of universally adopted assessment instruments that have been empirically validated to assess risk creates difficulty in identifying service priorities when multiple risks exist among varying contextual domains, and disallows practitioners to take full advantage of the flexible nature of home visitation programming through implementation of individualized empirically guided treatment plans. The utilization of an empirically validated assessment instrument in home visitation provides opportunities for practitioners to utilize an empirically driven framework for practice that incorporates family engagement, strengths-based practice, and statistical precision.

Measuring Risk in Home visitation

The premise that a child's risk of future harm can be accurately predicted from a set of child, caregiver, and community characteristics gathered during an assessment is indeed appealing. Predictions are made every day in practice that drives high-stakes decision-making, with potentially tragic consequences. In this time of unprecedented demand for accountability in social service delivery systems, early childhood home visitation programs are increasingly pressured to deliver empirically based assessment and intervention programs with expert precision. Consequently, risk assessment is promoted as a means to systematically protect children and manage service demand by allocating limited resources more effectively (DePanfilis & Zuravin, 2001; English & Pecora, 1994). However, intervening with families at-risk for future maltreatment is far

more complicated than assessing the needs of at-risk families, and keeping children safe and protected from their parents (Leschied, Chiodo, Whitehead, Hurley, & Marshall, 2003; Levenson & Morin, 2006; Shlonsky & Wagner, 2005). During brief interactions with families, practitioners must make decisions regarding the service needs of families, as well as the family's level of risk for future maltreatment by organizing risk and protective factors from an array of sources with varying degrees of reliability. In practice this is accomplished through the implementation of a variety of maltreatment assessment instruments with varying degrees of reliability and validity that support practitioner decision-making in determining the safety of children in the home, matching families with appropriate services to reduce risk, and ensuring the well-being of children and their families (Caldwell, Bogat, & Davidson, 1988; Cash, 2001; English & Pecora, 1994). Particularly within home visitation interventions, there is no consensus as to which assessment instruments best meet the needs of enrolled families, creating both methodological challenges in research, and trade-offs in practice in the utilization of instruments developed for alternative populations that are of little benefit to early childhood prevention programs serving at-risk children and their families.

Assessment of a family's future risk for maltreatment in home visitation has proven to be far more complicated than re-formulating existing maltreatment assessment instruments to meet the unique needs of an applied home visitation setting. The resulting landscape includes wide variation in instrumentation among early childhood home visitation programs. This was illuminated in a comprehensive review of home visitation programs that noted that over 100 different outcome variables were measured using over

22 different instruments during the course of home visitation practice (Gomby, 1999). Many of these assessment instruments used in home visitation are not relevant for use among populations enrolled in prevention programming, and were not designed for use in applied settings (Ogles, Lambert, & Fields, 2002). For instance, many assessment instruments currently used in home visitation to predict risk and measure outcomes were originally developed for use in the context of a child abuse investigation to predict future risk of maltreatment recurrence in the public child welfare system, and subsequently were not designed for populations involved in home visitation, where longitudinal assessment of needs, and prediction of the initiation of maltreatment are of primary importance. The voluntary strengths-based foundation of home visitation practice requires an assessment instrument that focuses on family strengths and utilizes non-judgmental language, measures culturally diverse risk and protective factors, provides immediately useful feedback to practitioners regarding the family's level of risk for future maltreatment, and identifies areas of family strengths, as well as contrary areas of need that require targeted intervention. In current practice, the most comprehensive instrument developed for this purpose in early childhood home visitation programs is the Healthy Families Parenting Inventory.

Healthy Families Parenting Inventory

The Healthy Families Parenting Inventory (HFPI) is a 63-item outcome assessment instrument developed by LeCroy & Milligan (2017) that was designed specifically for use in home visitation programs to detect individual change related to mitigating risks and increasing protective factors. Using strength-based language

important in home visitation programming, the Healthy Families Parenting Inventory uses a self-report approach to gather information pertaining to risk and protective factors related to risk for maltreatment. Designed to be administered at the time of program initiation and every six months thereafter, the information garnered from the instrument is used by the home visitor to facilitate a discussion of family strengths and needs immediately following completion of the inventory for use in guiding treatment plan decisions. Through rapport building during the assessment process, home-visitors who currently utilizing the Healthy Families Parenting Inventory in practice describe that the instrument allows them to focus on their work, provides opportunities for important conversations with families, and assists with creating individualized treatment plans (Krysik & LeCroy, 2012). The items in the inventory are organized into nine subscales including social support, problem solving, depression, personal care, mobilizing resources, role satisfaction, parent/child interaction, home environment, and parenting efficacy. These subscales were developed through review of empirical literature that identified key protective factors, risk factors, and optimal child development related outcomes important to the study of maltreatment and maltreatment prevention programming. The nine subscales have demonstrated construct and factorial validity, with mean alpha coefficients ranging from .76 to .92 (Krysik & LeCroy, 2012). The Healthy Families Parenting Inventory has demonstrated reliability and validity as an outcome measure that can provide important practice information directly to home-visitors related to a family's strengths and needs from an ecological perspective;

however, the instrument has not been validated as a measure to predict a family's risk for future maltreatment.

Purpose of the Current Study

Although a review of existing literature has uncovered a great deal of information about the factors predicting the likelihood of maltreatment, much less is known about how to identify which families in early childhood home visitation settings are at heightened risk for future maltreatment when risk factors are accumulating or interacting with other confounding factors, resulting in fluctuating levels of risk for future maltreatment (Moreland-Beagle, Dumas, & Hanson, 2010). In practice, no consensus has been reached regarding which instrument best meets the needs of home visitation populations to achieve this, resulting in a diverse landscape of instruments utilized to identify a family's treatment needs and risk for future maltreatment. As a result, practice and policy in this area are limited, leading to ineffective and inconsistent measurement practices, and lack of empirical evidence pertaining to the identification of intervention priorities when risk exists in multiple contextual areas of a family's environment. Empirical validation of a measure developed specifically for assessment in home visitation populations has the potential to improve practice and influence policy by providing validation of a standardized instrument, complementing the skillset of front-line practitioners by improving decision-making, guiding practice, and influencing policy by providing empirical guidance pertaining to how to prioritize services to families most at risk. Seeking to fill this gap in the literature, this study examines whether the widely administered Healthy Families Parenting Inventory can be effectively utilized to improve

predictive capacity in home visitation programs by determining a family's likelihood of future maltreatment.

This study expands the existing literature base by examining the capacity of an instrument developed specifically for home visitation, the Healthy Families Parenting Inventory, to predict a family's risk for future maltreatment. Through detailed analysis of families identified as at-risk for maltreatment, this dissertation examines the strength of the relationship between risk and protective variables within the Healthy Families Parenting Inventory at all levels of the developmental-ecological model, and subsequent occurrences of maltreatment investigations with the Arizona Department of Child Safety. Using moderation as a statistical tool, the study further explores the relationship between subscales of the Healthy Families Parenting Inventory and an investigation of maltreatment. Examining the influence of specific items and subscales within the inventory to predict future maltreatment has the potential to help shape practice at the programmatic level by guiding practitioners in developing individualized treatment plans that target reduction among specific risk factors, and promote enhancement of protective factors to optimally enhance child safety and improve child and family well-being.

Relevance to Social Work

Considering the emerging recognition of early assessment of risk and expansion of home visitation programs for at-risk families, discovering whether the Healthy Families Parenting Inventory can predict future maltreatment for children involved in home visitation programming can provide for research, policy, and practice implications across the field of child maltreatment prevention. Home visitation programs are designed

to improve outcomes for children by providing services to families most at risk for future child maltreatment. These families often present with risks across multiple psychosocial domains, creating a situation that presents as stressful and chaotic. These complicated, high-risk situations can easily overwhelm a home-visitor, resulting in ineffective assessment and intervention planning (Duggan et al., 2007; Tandon, Mercer, Saylor, & Duggan, 2008). The findings of this dissertation can assist home-visitors by providing guidance in better understanding levels of risk associated with intersecting maltreatment indicators, allowing for accurate identification of families most in need of intensive intervention. Moreover, the findings have the potential to improve prevention practice through identification of the most salient risk and protective factors among enrolled home visitation families, directing treatment planning that targets a family's most potent risks by building upon protective capacities within the family context. By examining risks within multiple contexts of the developmental-ecological theory, this dissertation aims to provide practitioners who work in prevention with tangible strategies to identify families at increased risk of future abuse and neglect. The validation of an assessment instrument to predict risk for maltreatment and identify service needs can provide home visitation professionals with a guide to decision-making in a system that is overwhelmed with families in crisis by providing opportunities for empirically driven treatment plan development. Future research stemming from this work includes exploration of risk assessment in prevention and community-based programs, enhanced development of prevention programming, as well as examination of the effect of risk at all developmental-ecological domains across family systems.

CHAPTER TWO

LITERATURE REVIEW

Specific examination of maltreatment risk assessment and the predictive validity of assessment instruments has been conducted primarily within the boundaries of the public child welfare system in studying the recurrence of maltreatment over the last decade. These studies have found that the predictive capacity of many maltreatment assessment instruments to predict a family's risk for future maltreatment is generally poor (Anglin, 2002; Gambrill & Shlonsky, 2000; Leschied et al., 2003; Wald & Woolverton, 1990), with the most fundamental concerns relating to the psychometric properties of commonly used instruments. Several threats to establishing reliability and validity of maltreatment assessment instruments have been identified in the literature that compromise the extent to which commonly used instruments can be used to improve the consistency and accuracy of decision-making; creating difficulty with empirical validation. These challenges are especially pronounced in the study of risk assessment in home visitation, as many frequently used instruments were not designed for use in prevention programming, and therefore have further limitations in accurately assessing a family's risk for maltreatment. Subsequently, risk for future maltreatment among home visitation settings is best conceptualized through the use of an instrument with strong psychometric properties that allows for ease of application in applied settings. Examining the predictive validity of a strengths-based instrument developed for use in home visitation programming aids in the exploration of risk and protective factors and the prediction of future risk of maltreatment in the absence of child welfare involvement.

Previous research on maltreatment assessment has left a gap in the study of risk assessment in applied home visitation settings. The purpose of this research, which focuses solely on at-risk families involved in home visitation programming, is to address that gap. To provide context for this work, first an in-depth discussion of the impact of child abuse and neglect is provided alongside a discussion of efficacious early childhood home visitation interventions. The connection of risk and protective factors measured through the lens of the developmental-ecological theory of child maltreatment is then discussed, followed by a presentation of existing literature in maltreatment risk assessment. Finally, the study of predictive validity in maltreatment assessment is then examined, followed by the presentation of the study aims.

The Problem of Child Maltreatment

The effects of maltreatment have grave consequences for a child's long-term development, as well as a broader financial impact on society in both direct and indirect costs (Fang, Brown, Florence & Mercy, 2012). In order to develop into healthy and productive adults, children must learn to regulate their emotions and behavior, to cultivate positive relationships with others, and develop a confident sense of self. Extant in the literature is a substantial amount of evidence that consistent and responsive parenting is significantly associated with a child's ability to master important developmental tasks (Bolger & Patterson, 2003; Fraser, Kirby, & Smokowski, 2004). In family systems experiencing maltreatment, inconsistent, inadequate, or abusive parenting often does not meet a child's basic needs for physical development, a sense of emotional security, or opportunities for positive social interactions (Thomlison, 2004). Instances of

inadequate or abusive caregiving expose children to a variety of difficulties over the course of their lives in regards to normal development, adjustment, and adaptation (Messman-Morre, Walsh, & DiLillo, 2010; Shin & Miller, 2012; Tarullo, 2012).

The period in utero and the preceding first three years of a child's life are uniquely characterized by rapid development in neural and physiological systems, as well as in achievement of cognitive, social, and emotional competencies (Lewandowski et al., 2013, Nelson, 2000; Thompson, 2001). The early sensitive years of neural and biological development occur in parallel with young children's psychosocial development, as both are highly reliant on transactional interactions within and between family and environmental contexts (Blair, et al., 2011; Noble et al., 2012; Sameroff, 1993). The first five years of a child's life remain remarkable for the progression through bio-psychosocial stages that form the building blocks for later life tasks. Empirical evidence suggests that normal child development proceeds through predictable stages, whereby young children are temporarily primed to master specific developmental tasks. Once this period of early childhood has passed, the child's behavioral and developmental patterns stabilize, and change becomes much more difficult to achieve at a later time (Center on the Developing Child, 2007; National Research Council and Institute of Medicine, 2000). This early mastery of critical developmental life competencies typically occurs in foundational areas including learning to respond to stimuli in the environment, to regulate emotions, to form attachments, to communicate in verbal and nonverbal ways, to relate to others, and to learn to ambulate (McCrory, DeBrito, & Viding, 2010; Thompson, 2001; Wilson, Hansen, & Li, 2011;). During these fundamental stages in very early child

development, a family's environment may serve to support the mastery of these tasks, or in the face of traumatizing or maltreating contexts, to shift behavioral trajectories, and alter brain structure and chemistry indefinitely (Hanson et al., 2010; Prado & Dewey, 2012; Shonkoff & Gardner, 2012).

Although early childhood holds the potential to shape positive developments for later in life, this period of stark vulnerability can equally pose risks for troubling later developments, particularly for the parent-child relationship to become characterized by abusive or neglectful interactions (Shonkoff & Gardner, 2012; Zurvain, Orme, & Hegar, 1994). Several national sources of data shed light on this heightened maltreatment risk in a child's earliest years. For instance, the National Child Abuse and Neglect Data System (NCANDS) data for 2015 shows that the first six years of childhood account for nearly half of all substantiated child maltreatment victims, in contrast to the teenage years only accounting for approximately 25.0% of child maltreatment victims. NCANDS data on physical abuse and neglect indicate that 27.7% of victims substantiated for physical abuse and neglect are age three and under, and the victimization rate is highest for children younger than one year, at a rate of 24.2 per 1,000 children in the population of the same age. Existing data suggests that the highest substantiation rates for child maltreatment occur in the earliest years of childhood, a rate that remains relatively stable into a child's school years (USDHHS, 2016a).

The Fourth National Incidence Survey (NIS-4) reported similar findings to NCANDS, with an inverse relationship in the rates of both physical child abuse and neglect from birth to the early school years, followed by a continued steadily decreasing

incidence rates as children grow and develop (Sedlak et al., 2010). The NIS-4 demonstrates the connection of young age and child maltreatment, with disproportionate increases in the incidence of maltreatment among very young children under the age of two. Empirical evidence by the NIS-4 study suggests that children's youngest years prior to enrollment in the public school system are characterized by higher rates of maltreatment than a child's school-age years, likely due to lack of community surveillance and monitoring, and limited developmental capabilities of young children to disclose abuse and neglect (English, 1999).

The most profound evidence that early childhood represents the highest risk period for maltreatment is data available on severe child maltreatment. Approximately one in four children entering foster care placement due to child maltreatment are under the age of one (USDHHS, 2016a), and studies have consistently shown that child fatality rates are disproportionally higher in the earliest years of childhood. Empirical research has shown that the younger the child, the higher the risk for severe or fatal child maltreatment (USDHHS, 2016b; Whitt-Woosley, Sprang, & Gustman, 2014). For example, the data reported to NCANDS in 2015 found that 75.0% of child maltreatment fatalities involved children age three and younger. That number is even more alarming among the youngest children, as 44.0% of all child maltreatment fatalities occur among children less than 1 year of age. Although these are startling, they are most likely an underestimate of the proportion of child maltreatment fatalities in the earliest years of life, given evidence indicating that early childhood fatalities are frequently misclassified and underreported (Schnitzer et al., 2008; U.S. Government Accountability Office, 2011).

Despite that fact that the number of fatalities due to maltreatment in infancy and young childhood remains somewhat imprecise, it is clear that such fatalities are disproportionate when compared to those occurring at other ages, demonstrating the stark vulnerability of infants and very young children.

With increasing recognition of the importance of intervening early in the lives of vulnerable children, programs that provide home-based services to young children and their families are receiving greater attention as mechanisms for promoting children's development and well-being. As a result, state and federal funding and support from private foundations for home visitation programs have grown steadily. These programs have further expanded after the passage in 2010 of the Federal Patient Protection and Affordable Care Act, which has provided financial support for significant expansion of early childhood home visitation programs across the country (National Governors Association, 2011; Health Resources & Services Administration, 2018). Through family engagement, education, and connection to resources and supports, home visitation programs show promise at the earliest period of infancy in protecting children and supporting at-risk families (Barlow et al., 2006; Dumont et al., 2008; Easterbrooks et al., 2012; Green et al., 2016; Kahn & Moore, 2010; LeCroy & Krysik, 2011; Olds et al., 2007; Sweet & Applebaum, 2004).

Preventing Child Maltreatment through Home visitation

Existing research on the cumulative and interrelated nature of risk for maltreatment and the threats it poses to healthy growth and development has lead researchers, practitioners, and policymakers to recognize the importance of implementing

prevention efforts early in children's lives (Avellar et al., 2014; Russell et al., 2007). Families at risk for child maltreatment are diverse, and experience multiple interacting problems within multiple domains (Giovannoni, 1970; Lynch & Cicchetti, 1998; MackKenzie, Kotch & Lee, 2011; Scannapieco & Connell-Carrick, 2005), resulting in the need for flexible and individualized service provision. Consequently, the landscape of early childhood home visitation programming is diverse, including formal services such as parent education classes, support groups, home visitation programs, and safety education for children (Avellar & Supplee, 2013; Azzi-Lessing, 2011; Guterman, Berg, & Taylor, 2014; Howard & Brooks-Gunn, 2009). In addition to formalized services, informal prevention efforts have a long-standing history in the United States with individuals and communities working together in partnerships to strengthen local systems and create neighborhoods and communities in which parents support one another in a collaborative effort to best protect children and strengthen families. Early childhood home visitation programs have received increased attention in the prevention literature in recent years due to their ability to offer directed and personalized services to families experiencing the multifaceted difficulties and disorganized lifestyles that lead to child maltreatment (Daro & Donnelly, 2002; Johnson, 2009; Roggman, Cook, Peterson & Raikes, 2008).

Early childhood home visitation programs grew out of a necessity to increase accessibility of early intervention programs, particularly for at-risk families who often experience barriers to seeking treatment, or may be unaware of when help is needed (Daro, 2000). There are several early childhood home visitation prevention models in

existence in the United States today, which all share common goals of providing parents of young children with education, emotional support, access to community services, and instruction on improving parent-child interactions (Gomby, 2000; Guterman, 2001; Howard & Brooks-Gun, 2009; Sweet & Applebaum, 2004). Service initiation in early childhood is a hallmark of home visitation programming, as early childhood is considered an important time-period for intervention. Recently developed knowledge in prevention science, early childhood, and family studies, has underscored that a window of opportunity may open during early childhood providing the potential for early preventative intervention to leverage long-lasting changes on behalf of the developing child and family (Cannon & Karoly, 2007; National Center for Children in Poverty, 2008; Shonkoff & Phillips, 2000). Home visitation programming most frequently begins by providing services prenatally, shortly before, or after the birth of a child; and has traditionally targeted a broad array of concerns young children and families face during early childhood. Some programs specifically seek to reduce birth weight and its consequences, or to promote cognitive gains for later childhood, while others aim to promote a broader spectrum of infant and maternal health and psychosocial outcomes, including child maltreatment. To avoid later child welfare intervention, early childhood home visitation programs target at-risk families with the aim to intervene soon enough and powerfully enough that the parent-child relationship trajectory will be altered away from a future of abuse or neglect, toward more positive interaction patterns over time (Azzi-Lessing, 2010).

The degree to which early childhood home visitation programs have the capacity to achieve meaningful and lasting outcomes for children and families encountering multiple and significant challenges, particularly domestic violence, substance abuse, and maternal depression, is not clear. Various risk and protective factors appear to mediate program impacts in complex ways that are not well understood (Duggan et al., 2004; Peacock et al., 2013). Further complicating the problem is lack of common criteria among problems for determining levels of risk, which poses a number of problems in understanding the efficacy of various models of early childhood home visitation (Azzi-Lessing, 2011). Although prevention programs are designed as strategies to prevent child abuse and neglect, few programs measure child maltreatment as an outcome of service provision, and even fewer have been able to successfully document significant effects (Avellar et al., 2014). However, recent large-scale trials evaluating the ability of home visitation programs to prevent maltreatment have increased in number and methodological sophistication in recent years, producing favorable conclusions regarding the effectiveness of home visitation programs in reducing maltreatment and other adverse outcomes (Duggan et al., 2004; DuMont et al., 2008).

One of the most popular and expansive home visitation programs in the United States is Healthy Families America. Nearly 100,000 families are served annually across 35 states in the United States, the District of Columbia, Canada, and 6 U.S. Territories (Healthy Families America, 2017). Healthy Families America promotes child well-being, and prevents child abuse and neglect in at-risk families through intensive-home visitation for the most vulnerable children under the age of five by building relationships

and empowering families to strengthen their entire family system. The approach utilized in the Healthy Families program is to serve families by targeting not only multiple domains of child competence, but also the broader contexts within which child development occurs, through the promotion of family well-being and community involvement (Fantuzzo, McWayne, & Bulotsky, 2003; Healthy Families America, 2017). Given the ability of the Healthy Families program to access a vulnerable population, and the sensitivity of the program's standards to meet the need for integrated delivery of a diverse range of components, the program has previously been identified as having the potential to reduce behaviors associated with maltreatment by positively altering parenting practices, enhancing child development, improving the quality of the home environment, and reducing challenging child behavior (Avellar et al., 2014; Caldera et al., 2007; Peacock et al., 2013).

Although most prominent home visitation programs target services toward low-income families with young children, there is likely to be wide variation in these families' levels of risk for future maltreatment. (Duggan et al., 2007; Sweet & Applebaum, 2004; Tandon et al., 2008). In order to optimize services to families in home visitation programming, more information is needed regarding the degree of risk experienced by families, and how risk levels among interacting factors across contextual domains impact the provision of services and outcomes for home visitation enrolled families. Several studies have identified common risk factors as powerful threats to the healthy development and well-being of young children, particularly when these risk factors co-occur (Graham-Bermann & Seng, 2005; Huang & Freed, 2006; Koblinsky,

Matthews, & Hussein, 2006; Whitaker et al., 2006). However, the multidimensional and transactional nature of child maltreatment has created complexity in measuring and addressing risk and protective factors, causing methodological and statistical challenges in the assessment of child maltreatment in early childhood home visitation practice and research. As maltreatment assessment has evolved over time, researchers and practitioners have increasingly identified ecological models as the most comprehensive approach in which to identify, assess, and treat child abuse and neglect (Belsky, 1993; Cicchetti & Lych, 1993; Cicchetti & Maughan, 2000; Hecht & Hansen, 2001; MacKenzie, Kotch & Lee, 2011; Wolfe, 1999).

Developmental-Ecological Theory of Child Maltreatment

Researchers have investigated multiple risk factors, and made both correlational and causal claims regarding their significance in predicting child abuse potential (Brown et al., 1998; Dubowitz et al., 2011; Slack et al., 2011; Stith et al., 2009). Overall, research suggests that maltreatment is not explained by any single factor, or by a limited group of risk factors, but that the accumulation of risk factors is more likely to predict a parent's child maltreatment potential (Appleyard, Egeland, Van Dulmen, & Sroufe, 2005; Ornduff, Kesley, Bursi, Alpert & Bada, 2002). Researchers examining characteristics of maltreated children and their families have moved away from the etiology of child abuse and neglect as an individual disorder, toward the conceptualization of maltreatment as a symptom of interactive struggles within the parenting environment. These individual struggles with parenting are identified as part of a larger context of other serious problems facing families such as poverty (Berger, 2005; Duggan et al., 2004), substance

abuse (Hogan, Myers & Elswick, 2006; Wolfe, 2011;), unmet mental health conditions (Ammerman et al., 2015; Gardner, Moore & Dettore, 2014; Stith et al., 2009), or domestic violence (Jouriles, McDonald, Slep, Heyman, & Garrido, 2008; Tolan et al., 2006), and are best explained by transactional processes within ecological models. This finding is not surprising, given that in child maltreatment, as in many other areas of social and behavioral research, it is extremely difficult to determine whether a specific characteristic is determining or contributing to the incidence of the phenomena under study. Due to support for an accumulation of risk factors, researchers have looked towards a broad developmental-ecological theory to understand maltreatment and the overlapping contributions that individuals, families, and the environment make to it. The developmental-ecological theory assumes that multiple levels of risk, from individual characteristics including the developmental context of the child, to larger socio-environmental factors, must be taken into account when attempting to understand the etiology of child maltreatment (Belsky, 1980; Cicchetti & Lynch, 1993; National Research Council, 1993).

Belsky's developmental-ecological theory used to organize risk and protective factors for maltreatment expands beyond traditional ecological-systems theories to provide a comprehensive framework for understanding the development and behaviors across the lifespan of individuals and families; taking the child's developmental context into consideration. The theory proposes that risk for child abuse and neglect is organized around three interactive, mutually nested contexts of maltreatment: the developmental-psychological context, the immediate context, and the broader context. The

developmental-psychological context within the developmental-ecological theory of child maltreatment involves behaviors and traits that children and parents bring with them to the relationship, and is concerned with individual characteristics of both the parent and child including histories of trauma, developmental level, understanding of normal child development, and their feelings towards the parent-child relationship (Belsky, 1980). Many of the factors that contribute to maltreatment at the developmental-psychological level cause disruptions in other aspects of family functioning at the immediate and broader contextual levels. The immediate context extends beyond the developmental-psychological context, in incorporating the environment in which maltreatment takes place, including the socio-demographic and household characteristics of the family system, the abusive or neglectful behavior, the interaction of parental and child characteristics, and neighborhood and community characteristics. The broader context is the next interactive level, which encompasses the imbedded individual and family processes within larger social structures that govern family and parent-child behaviors, available resources, and availability of support. Furthermore, this most distal context examines the manner in which the individual, their family, and their community, interact within the larger social norms as it pertains to cultural and societal values that permeate through interactive contexts, serving to both suppress and support individuals and their families, strengthening or deteriorating communities (Belsky, 1980).

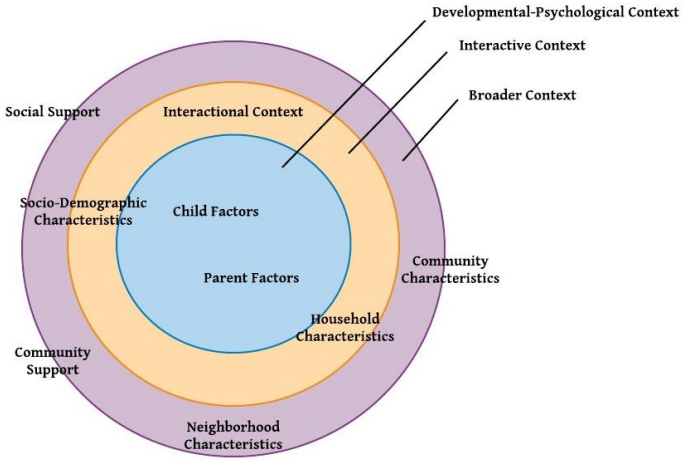
These nested contexts are interrelated and transactional, with individual risk and protective factors contributing to unique and significant contextual differences for children and their families, including the development of both positive and negative

behaviors. These positive and negative behaviors are translated in Belsky's model as resulting from a combination of interactive risk and protective factors which are divided into categories including a) parent factors b) child factors c) factors in the interactional context between parents and their children d) socio-demographic factors e) household factors and f) neighborhood and community characteristics and g) factors in the broader context such as social and community support (Belsky, 1980). The application of risk and protective factors into the developmental-ecological model creates two distinct categories of influence across interactive contexts, one that includes factors that increase the odds for maltreatment, and the other set of factors which buffer the impact of risk factors. Within these categories there are several known influences associated with the risk for maltreatment such as poverty, parental substance abuse, mental illness, social isolation, parental history of trauma, limited resources in the community, and neighborhood crime (Duffy, Hughes, Asnes, & Leventhal, 2014; Jonnson-Reid, Emery, Drake, & Stahlschmidt, 2010; Thornberry et al., 2014; Wolfe, 2011). However, most of these factors alone are sufficient to cause maltreatment. It is the additive and interactive nature of risk within a system that increases the propensity for maltreatment, while at the same time supportive factors operate protectively to reduce the likelihood of maltreatment in the presence of risk (Jensen & Fraser, 2016). Risk and protective factors are salient at different stages of development across the family's lifespan, nested in the context of family, school, neighborhood, and broader social influences that both impact and are impacted by these transactional factors (Belsky, 1980; Bronfenbrenner & Morris, 1998; Cicchetti & Lynch, 1993; Gelles, 2009). By imbedding a risk and protective factor

framework into ecologically nested contextual levels of analysis, child maltreatment can be understood across the spectrum of family functioning through the examination of reciprocal and interactive variables both within as well as between contexts, increasing and decreasing a family's level of risk for maltreatment over time.

Figure 1.1.

Developmental-Ecological Model



The Developmental-Psychological Context

The developmental-psychological context recognizes certain caregiver and child characteristics as important risk markers for child maltreatment. This context examines risk markers and divergent protective factors within the developmental-psychological domain, including factors that both the child and parent bring with them to the relationship. Specifically, the developmental-psychological context examines risk and protective factors including biological and psychosocial attributes that impact the individual parent or child in the system.

Parent Factors

Broadly, parent risk and protective factors are conceptualized as stressors or supports present in the parent's history such as exposure to violence or abuse in childhood, or in their current lives such as struggles with mental health concerns or substance abuse. Understanding the underlying origin of parent-level risk factors is important in assessing maltreatment, as existing literature suggests that many families who are considered at-risk for child abuse and neglect have complex trauma histories, have experienced multiple instances of trauma exposure, experience affective disturbances, and subsequently exhibit impairments to functioning, parenting, and cognitive processing (Ammerman et al., 2010; Berger, Paxon, & Waldfogel, 2010; Guterman, Lee, Taylor, & Rathouz, 2009). For instance, parents who engage in neglectful or abusive behavior are more likely to have a history of maltreatment in childhood (Ertem, Leventhal, & Dobbs, 2000; Hindley, Ramchandani, & Jones, 2006), are less satisfied with their children (Brown et al., 1998), and perceive parenting as more difficult (Brayden, Atlemeier, Tucker, Dietrich & Vietze, 1992). Psychological distress of the parent is a significant risk factor for maltreatment, including issues pertaining to low self-esteem, and affective disturbances such as mental health and substance abuse problems, including excessive reliance on others. Specifically, parental affective disturbances such as depression (Ammerman et al., 2015; Duggan et al., 2004; Stith et al., 2009), anger (Drake & Pandey, 1996; Gardner et al., 2014; Schumacher, Felfbau-Kohn, Smith-Slep, & Heyman, 2001), aggression (Milner & Dopke, 1997; Wu et al., 2003) and lack of impulse control (Chu, Pineda, DePrince, & Freyed, 2011; Counts, Buffington,

Chang-Rios, Rasmussen, & Preacher, 2010) have a direct and negative influence on parent-child dyad interactions.

Multiple variations of interactive protective factors at the parent level moderate risk for maltreatment among families, with the most important protective factors serving to reduce stress and inhibit aggression and violence through enhanced self-esteem and self-efficacy (Chu et al., 2011; Ridings, 2016). Additionally, individual protective factors including the ability to think critically and manage crises through coping and mood regulation reduce parental patterns of arousal and aggression (Leahy-Warren, McCarthy, & Corcoran, 2012). As protective factors enhance individual functioning, moderated temperaments are developed that aide the parent in displaying warmth and affection, subsequently gaining increased satisfaction in relationships with others; most importantly, their children (Li, Godinet, & Arnsberger, 2011; Runyan et al., 1998). Parental capacity to provide a consistent nurturing and engaging relationship with their child is directly related to positive child development. This bi-directional child-parent relationship that occurs during parenting activities underscores that children and adults are producers not only of their own development, but that their relationships and their contexts involve bidirectional exchanges. The transactional nature of parenting explains how maltreatment can occur when the parent-child relationship is significantly altered in families where a parent is struggling with individual risk factors such as substance abuse or depression, limiting their capacity to engage with their children and develop secure attachments, leading to lifelong difficulties (Belsky & Vondora, 1989; Crittenden & Ainsworth, 1989). On the contrary, when a parent is able to develop secure

attachments with their child, attachment supports the child by buffering the effects of stressors, leading to positive adaptation lasting into adulthood (Morton & Browne, 1998). In the transactional nature of parenting, the parent shapes the child, but part of what determines the ways in which parents do this is the child themselves.

Child Factors

In addition to individual parent level interactive influences, child level factors can also influence maltreatment within the family system. These factors associated with maltreatment at the level of the child can be thought of as biological and psychosocial attributes or characteristics. Biological risk factors include medical complications, prematurity (Hurme, Alanko, Antitla, Juven, & Swedstrom, 2008; Schumacher et al., 2001), low intellect, and developmental abnormalities or disabilities (Connell, Begeron, Katz, Saunders, & Tebes, 2007; Turner, Vanderminden, Finkelhor, Hamby, & Shattuck, 2011). Psychosocial risk factors include a child's temperament, behavior, and mood (Jaudes & Mackey-Bilaver, 2008; Scannapeico & Connell-Carrick, 2005). As a result of the reciprocal nature of parent-child interactions, temperamental, aggressive, and non-compliant child behaviors increase the risk for abusive and coercive parent-child interactions, particularly when parental beliefs promote the use of harsh, coercive physical discipline (Li, Godinet, & Arnsberger, 2011; Thornberry et al., 2014).

Existing literature consistently shows that enhancing the parent-child relationship through improvements in interactional processes such as increasing a parent's attachment and competency provides greater protection against child maltreatment than child characteristics alone (Cyr, Euser, Bakermans-Kranenburg, & Van Ljzendoorn, 2010;

Thornberry et al., 2014), however in the absence of parental competence, protective factors at the child level serve to buffer the impact of risk factors for vulnerable children. Children who are socially and cognitively advanced are at a lower risk for maltreatment when compared to their peers (Schultz, Tharp-Taylor, Hayiland, & Jaycox, 2009; Werner, 2000). Furthermore, high sociability and alertness, advanced problem solving and language skills, and low levels of distress protect children from maltreatment and reduce the risk of abusive or neglectful occurrences (Herrenkohl, Herrenkohl, & Egolf, 1994; Rutter, 2000). Parent-child attachment is hypothesized to be dyadic and reciprocal, with characteristics of the child, caregiver, and environment interacting to impact relationships (Crittenden & Ainsworth, 1989). These attachments are an important protective factor at the child, parent, and family levels, as children who are securely attached to their parents, are at lower risk for maltreatment and are known to function more adaptively over time (Belsky & Vondora, 1989; Crittenden, 1988).

Immediate Context

A central tenant of the developmental-ecological theory is that individual development is influenced by the on-going qualities of the social setting in which the child lives and participates, and the extent and nature of the interaction between these settings (Bronfenbrenner 1979, 1988). The immediate contextual level influences the system by examining risk and protective factors within interactional relationships, in addition to community and societal level influences. Specifically, the immediate context contains risk and protective factors at the parent-child interactional level, the socio-demographic domain, and household level.

Interactional Context between Parents and Children

Parenting involves bidirectional relationships between a parent and their child that extend through the respective lifespans of family members, engage all institutions within a family's culture, and are embedded within larger social influences. Incidents of child abuse and neglect within family systems are rarely isolated occurrences, and are often a part of a cycle in which maladaptive parent-child interactions both contribute to, and are intensified by, abusive or neglectful parenting behaviors (Wilson, Rack, Shi, & Norris, 2008). The quality of care provided within the parent-child dyadic relationship is a major reciprocal determinant of the quality of attachment, which can potentially be significantly disturbed in maltreating families as a result of difficulty in displaying warm, nurturing, and responsive parenting behaviors (Bowlby, 1980; Crittenden & Ainsworth, 1989; Crittenden, 1993; Morton & Browne, 1998). This interactive and bidirectional relationship shapes the quality of behavioral and psychological functioning of each member of the family, resulting in either adaptive or adverse outcomes. For instance, research has shown that abusive parents engage in fewer positive interactions with their children, are less response, and express less positive affection toward their children when compared to non-abusive parents (Borrego, Timmer, Urquiza, & Follette, 2004; Bousha & Twentyman, 1984; Wilson et al., 2008).

Within this reciprocal relationship, multiple variations of multidimensional protective factors moderate risk for maltreatment, with the most important protective factor relating to attachment in the parent-child dyad (Crittenden, 1988). Attachment is an important factor in the intergenerational transmission of child maltreatment, as early

attachment begins with a child's attachment to their parents, and later to their spouse, and their own children. A secure attachment in childhood buffers the effects of stressors, leading to positive adaptation lasting into adulthood (Morton & Browne, 1998). This interactional parent-child relationship is embedded within a larger community, society, and culture, which are continually changing over time. Parents provide the basis of child development not only through their direct effects on children but instead, on their embeddedness in this dynamic, multilevel system. As such, neither parents nor parenting are alone responsible for the development of children. These outside influences lying far beyond the child-parent dyad can significantly influence the relationship (Belsky, 1993; Bronfenbrenner, 1979).

Socio-Demographic Characteristics

Several socio-demographic characteristics such as maternal ethnicity, age, marital status, and family socio-economic status have been identified as contributors to child abuse potential (Stith et al., 2009). When investigating maternal ethnicity, studies have found that ethnicity is associated with the presence of documented child maltreatment, in that African American parents obtain more reports of child maltreatment occurrence than European-American and Latino parents (Russell, Russell, & Cooper, 2011; Hill, 2006). However, recent literature suggests that structural inequalities and discrimination tend to influence over-representation of minorities in the child welfare system, such that it is the underlying consequences of institutionalized racism and discrimination rather than ethnicity in isolation that serves as a risk factor for maltreatment (Cohen, Deblinger, Mannarino, & de Arrellano, 2001; Elliot & Urquiza, 2006; Sedlak et al.,

2010). Furthermore, single parenthood (Li et al., 2011; Wu et al., 2003; Zhou et al., 2006), early motherhood (Berlin, Appleyard, & Dodge, 2011; Sidebotham & Heron, 2006; Wu et al., 2003) and limited education (Murphey & Braner, 2000; Sidebotham & Heron, 2006; Wu et al. 2003) enhance the risk for maltreatment in the family system. Children living with a single parent are at a significantly greater risk of both physical abuse and neglect, most likely because of added stress, fewer resources and opportunities to share child-rearing burdens, and lower socioeconomic status than two parent homes (Turner, Finkelhor & Ormod, 2010). Additionally, maternal education is known to be a highly reliable predictor of maltreatment (Kotch et al., 1995; Murphey & Braner, 2000), because of the fewer resources available to support effective parenting, enhanced stress experienced by disadvantaged parents, and the challenges presented by declining and dangerous neighborhoods where these families typically reside (Brown et al., 1998; Merrit, 2009).

Several protective factors at the socio-demographic level moderate risk for maltreatment among families, with the most important protective factors serving to increase availability and access to economic resources, improve marital relationships, and promote positive parenting skills. Delaying motherhood has demonstrated to have a protective capacity against child maltreatment, as evidence suggests that maltreatment increases among very young mothers (DePanfilis, 2006; Slack, Holl, McDaniel, Yoo, & Bolger, 2004; Stier, Leventhal, Berg, Johnson, & Mezger, 1993). Furthermore, parental level of education and relationship status can serve as protective resources, as two-parent families in which parents have more than a high school diploma are more likely to have

access to necessary household resources to support effective parenting and moderate stress experienced by disadvantaged parents. For at-risk families, protective factors such as family cohesiveness and marital harmony decrease a family's risk of maltreatment as they are known to promote adaptive functioning and positive coping (Briere, Erickson, & Egeland, 1996). Moreover, parental employment among both single and two-parent households has been associated with lower rates of maltreatment (Renyolds, Mathieson, & Topitzes, 2009; Slack et al., 2011; Stith et al., 2009), as the stress and deleterious effects of poverty can negatively impact the trajectory for at-risk families.

Household Characteristics

The interactional parent-child relationship is embedded within a larger community, society, and culture, which are continually changing over time. Parents provide the basis of child development not only through their direct effects on children but instead, on their embeddedness in this dynamic, multilevel system. These outside influences lying far beyond the child-parent dyad can significantly influence the relationship (Belsky, 1993; Bronfenbrenner, 1979). For instance, conditions within the family system influence level of risk for maltreatment including quality of the marital relationship, limited social support networks, levels of conflict or violence, inadequate housing or material resources, rapid and stressful life changes, and overcrowded housing with a large number of children (Berger, 2007; Pecora & Harrison-Jackson, 2016; Scannapieco & Connell-Carrick, 2005). Unsafe and overcrowded household environments expose children to environmental toxins and crowding, creating an environment ripe for medical concerns, and inadequate stimulation (Rutter,

2000). Large family sizes with closely spaced births pose risk factors for child maltreatment as larger family sizes limit a parent's ability to divide scarce resources, provide appropriate supervision, and manage developmental tasks among multiple children; limiting the likelihood that others will be able to assist with the parenting or household management tasks (Aber, 1994; Berger, 2005; DePanfilis & Zuravin, 1999). The quality of the parental relationship poses risks for maltreatment, as marital difficulties including family conflict, domestic violence, and aggression towards other adults in the family's home present challenges for adequate caregiving in multiple domains, and is known to co-occur with many other known risk factors (Burton & Hardaway, 2012; McGuigan & Pratt, 2001; Rumm, Cummings, Krauss, Bell, & Rivera, 2000), resulting in these families experiencing higher levels of cumulative risk for maltreatment. Specifically, poverty and lack of material resources resulting from unemployment and prolonged economic stress are significantly associated with all types of maltreatment (Brooks-Gunn et al., 2013; Connell et al., 2007; Kahn & Schwalbe, 2010; Merrit, 2009; Palusci, 2011; Thompson & Wiley, 2009; Wolfe, 2011). For children living in poverty, stressful life events are numerous and compounded by adverse social and economic factors such as household disorganization, unemployment, overcrowding, and competition for scarce resources.

The multifactorial nature of child maltreatment includes multiple elements of a family's household environment that have the potential to moderate a family's risk for maltreatment. Protective factors such as safe and adequate housing, household structure, effective communication, family cohesion, household organization, and conflict

management lead to improved parenting quality (Gaudin, Polansky, Kilpatrick & Shilton, 1996; Shaw & Kilburn, 2009), and subsequent reduction in the risk for maltreatment. Families with organized households are likely to have established rules and structure, reducing the stress level in the home, creating an environment where children can safely develop autonomy. This serves as a protective role for young children, as parents who are able to maintain positive parenting in the face of social deprivation can protect their children from some of the deleterious effects of poverty. Families that experience familial and marital stability, including a significant other in the household system such as a father, partner, or sibling, can mediate the negative effects of a debilitated primary caregiver, as having one supportive adult in an otherwise hostile early environment has been identified consistently in the literature as a buffering factor in later developmental outcomes (Dubowitz et al., 2000; Hurd, Zimmerman, & Xue, 2009). Consistent employment and access to economic resources moderate the risk for maltreatment (Donohue et al., 2017; Schultz et al., 2009), as the stress of being poor combined with a lack of supports often conspires to increase harmful impacts on young children. Family cohesiveness and positive and caring interactions between family members mediate risk for maltreatment within a family system, as parents who are happy in their partner relationship are more likely to provide responsive, stimulating care to their children (Guterman, Lee, Taylor, & Rathouz, 2009).

Broader Context

An important aspect of the developmental-psychological theory is that it is presumed that the impact of major developmental influences, such as family functioning,

is dependent on the sociological characteristics in which the youth resides (Garbarino, 1992). The broader contextual domain influences the system through macro level influences at the most distal level of the system. Specifically, the broader contextual level contains risk and protective factors including neighborhood and community characteristics and support.

Neighborhood & Community Characteristics

Child maltreatment exists in the presence of interrelated development across all levels of the ecological system. As individuals and families grow and develop, communities, societies, and cultures change (Garbarino, 1992; Molnar, Beatriz, & Beardslee, 2016; Stith et al., 2009), and all are affected by alterations in the physical world that also changes (Bronfenbrenner, 1979). There are many community-level risk and protective factors such as socioeconomic status, social and community support, and institutionalized norms that directly influence family and individual processes, resulting from larger societal values and institutions that enhance or decrease their existence (Belsky, 1980; Aber, 1994; Cicchetti et al., 2000; Hussey, Chang, & Kotch, 2006). The neighborhood where a child lives is particularly important, as within at-risk families, existing research has clearly linked the role of poverty with all forms of maltreatment (Brooks-Gunn et al., 2013; Merrit, 2009; Palusci, 2011; Wolfe, 2011), as children and their families are embedded in larger social contexts which impact a parent's ability to provide optimal care for their child. For instance, neighborhoods with higher levels of employment and resources are found to be more cohesive and stable and are associated with lower rates of child maltreatment (Coulton, Crampton, Irwin, Spilsbury & Korbin,

2007; Garbarino, 1992). Social-environmental factors such as inaccessible and unaffordable health and child care reduce a parent's ability to seek preventative medical attention for their child and establish safe and stimulating alternative care during times of need. High rates of neighborhood crime and violence increase exposure to maladaptive community functioning, and limit opportunities for adequate housing, reduces interactions within neighborhoods, and heightens the level of social isolation and stress experienced by families (Coulton et al., 2007; Coulton, Korbin, & Su, 1999 Drake & Rank, 2009). For families in stressed and impoverished neighborhoods, community life is chaotic, disorganized, and violent, with families competing for limited resources (Coulton et al., 2007; Freisthler, Merrit & LaScala, 2006; Leventhal & Brooks-Gunn, 2003).

For children residing in high-risk neighborhoods, protective factors at the neighborhood level serve to reduce the risk for maltreatment, and include stable and cohesive neighborhoods, positive peer role models, and strong informal networks of social support, access to health care, education, employment, support services, and safe communities (Coulton et al., 2007). Strong and established neighborhoods with social and economic infrastructure including employment, effective schools, and sufficient resources have the potential to produce more social interaction, demonstration of positive parenting, and subsequently fewer incidents of child abuse and neglect (Garbarino, 1982; Hay & Jones, 1994; Li et al., 2011; Schultz et al., 2009). These sources of support provide positive parenting role models for young families, reinforce positive coping strategies, and provide opportunities for family involvement in safe and positive

activities. Literature suggests that the more resources parents believe are available to their family, and the more frequently parents utilize these services, serve as a moderator for risk, serving to reduce the occurrence of reported child maltreatment (Azzi-Lessing, 2011; Garbarino & Sherman, 1980).

Social and Community Support

The support that families receive outside their home, and their connections to society can be as important as the support they receive from within, as a family's need for social and community support changes as family members develop and grow over the life course. Similarly, communities, societies and cultures change (Garbarino, 1992; Molnar et al., 2016; Stith et al., 2009), and all are affected by alterations in the physical and social worlds (Bronfenbrenner, 1979). There are many community-level risk and protective factors such as availability of community resources, social and community support, and institutionalized norms that directly influence family and individual processes, resulting from larger societal values and institutions that enhance or decrease their existence (Belsky, 1980; Aber, 1994; Cicchetti et al., 2000; Hussey et al., 2005). For instance, in addition to practical resources, there is an abundance of evidence linking social isolation and child maltreatment, as maltreating parents have smaller peer networks (Brayden et al., 1992; Stith et al 2009), have less contact with and receive less help from their family of origin and other relatives (Polansky, Chalmers, Buttenweiser & Williams, 1981), feel lonely, and are socially isolated. Existing literature has linked lack of community resources, parental involvement in their neighborhoods, and access to social support with increased child abuse potential. As risk extends beyond the

neighborhood level into the community, risk factors that influence system-wide behaviors include societal and cultural values towards violence, expectations, and regulations about child discipline, the status of children in society, and institutionalized racism (Gil, 1970; Hobbs, 1974). Institutionalized values towards violence in the United States have systematically impacted expectations and regulations about child discipline, and the status of children in society as second-class citizens (Gil, 1970; Russell et al., 2011). The situation is even more disparaging for minority families, as the impact of institutionalized racism has led to the inequitable distribution of resources, education and employment opportunities (Coll et al., 1996; Rosenblatt 2014; Russell et al., 2011; Scannapieco & Connell-Carrick, 2005).

Protective factors at the community and societal level that reduce the risk for maltreatment are difficult to identify and even harder to operationalize. Commonly identified protective factors for maltreatment include stable and cohesive neighborhoods, positive peer role models, strong informal networks of social support, and access to health care, education, employment, support services, and safe communities (Chu, et al., 2011; Counts et al., 2010; Li et al., 2011). The availability of a caring and an emotionally supportive network of friends, families, and neighbors mediate stress within a family system (Finkelhor & Berliner, 1995; Rutter, 2000), and reduce the odds of maltreatment. Mothers receiving high levels of social support, both emotional and concrete, report low levels of emotional stress and depression (Proctor et al., 2012), that are known to negatively impact the parent-child interactional relationship. The availability of a caring and an emotionally supportive network of friends, family

members, and neighbors mediate stress within a family system (Fortin et al., 2012; Rutter, 2000), and reduce the likelihood of maltreatment. Strong and established neighborhoods with social and economic infrastructure have the potential to produce more social interaction, demonstration of positive parenting, and subsequently result in fewer incidents of abuse and neglect (Freishthler et al., 2006; Coulton et al., 2007; Pelton,1994). As parents and families navigate complex societal level influences, the presence of a strong racial identity and close attachment to the community can buffer risk factors for maltreatment (Pecora & Harrison-Jackson, 2014).

Application of the Developmental-Ecological Theory to Maltreatment Assessment

A developmental-ecological perspective has breadth and advantages compared to other prominent unidimensional theories, and thus is an ideal theoretical underpinning for use in understanding assessment of risk for child maltreatment during early childhood prevention or early intervention programming. This incorporated model provides a comprehensive framework for the understanding of multifaceted behaviors, which can be used to describe maltreatment (Belsky, 1980; Scannapieco & Connel-Carrick, 2005; Zhou et al., 2006). The utilization of the developmental-ecological theory in maltreatment assessment research allows behavior to be examined from a number of different levels of analysis at the individual, family, neighborhood, and community level; specifically taking the developmental level of the child within the family system into consideration in assessing a child's risk for future maltreatment. Within these nested contextual levels of analysis, child maltreatment can be understood across the spectrum

of family functioning through the examination of the interaction of risk and protective variables both within as well as between contextual levels of analysis.

In addition to organizing risk and protective factors for maltreatment, the developmental- ecological theory also recognizes the interrelatedness of contextual factors across the family and community systems (Belsky, 1993; Cicchetti et al., 2000). Assessing each of these many sources of influence allows researchers to integrate individual and contextual processes and to examine the interrelations among various systems. The use of the developmental-ecological theory as the foundation for maltreatment assessment allows for an enhanced understanding of risk and protective factors extending beyond the developmental-psychological and immediate contexts, in order to expand the understanding of maltreatment risk to the community and societal levels. Better identification of multidimensional risk and protective factors has the potential to build upon existing research by producing a better understanding of a family's overall functioning, and thus their risk for future maltreatment outcomes when compared to families with similar circumstances.

Risk assessment for maltreatment through a developmental-ecological theory lens expands existing practice in maltreatment assessment, as child welfare assessment instruments have been predominantly organized around risk criteria at the individual and family level, with limited focus on either broad or contextual level influences. Furthermore, many instruments lack integration of protective factors within interactional contexts that buffer risk. These limitations have resulted in assessment instruments with diminished capacity for understanding risk within families; narrowing opportunities for

intervention strategies to mitigate amenable dynamic risk factors at the community or societal level. The inclusion of protective factors into comprehensive maltreatment assessment at all contextual levels benefit both families and practitioners alike by building positive relationships between families and service providers and drawing on protective factors that contribute to long-term success and resilience (Child Information Gateway, 2016). For example, in addition to parent and child factors, the inclusion of the parent-child relational context and ability to identify and mobilize community resources into the assessment builds a more ecologically based model for identification of risk. The utilization of the developmental-ecological theory that incorporates a risk and protective factor lens has the potential to significantly alter outcomes for children and families at risk for child maltreatment through better identification during screening and assessment of family functioning at all contextual levels.

Screening and Assessment of Child Maltreatment

Given the life course nature of child maltreatment and the need to examine contextual details surrounding maltreatment and resulting risk and protective factors cumulatively, the assessment of risk for future maltreatment is a complex undertaking. During brief interactions with high-risk families, practitioners must observe, select, and organize risk factors from an array of sources presented to them during contact with families. The sheer volume of information that must be collected by practitioners during assessment, the complexity and multidimensionality of decisions that must be made, and the pressure to get it right, can all significantly influence the assessment of risk, and a practitioner's ability to effectively manage risk through

provision of appropriate services (Camasso & Jagannathan, 2000; Cash, 2001; English & Graham, 2000; Shlonsky & Wagner, 2005). Assessment instruments in practice support this decision making endeavor across the life of a family's involvement in child welfare services in determining the safety of children in the home, matching families with appropriate services to reduce risk, and ensuring the well-being of children and their families (Cash, 2001; English & Pecora, 1994). Standardized assessment instruments are frequently used in practice to assist practitioners in identifying family strengths, needs, resources, and challenges; and to determine whether supports, services, or additional interventions are necessary to support entire family systems, and adequately protect children. A determination of a family's level of risk is then made, subsequently identifying the type and intensity of intervention and supports needed. Enabling the practitioner to determine how services will impact youth and families through standardized assessment instruments allows the practitioner to monitor the progress achieved by the child and their family members (Baird & Wagner, 2000; Baird, Wagner, Healy & Johnson, 1999; DePanfilis, & Zuravin, 2001; Rycus & Hughes, 2003).

The use of child maltreatment assessment instruments across the spectrum of child welfare practice has gained considerable popularity in recent years as a systematic way to identify children most at risk for future maltreatment and manage limited resources in overburdened child welfare service delivery systems (Camasso & Jagannathan, 2000; Kaufman, McIntire, & Santos, 2006; Ruttenberg & McIntire, 2006). The use of risk assessments in practice promises increased prevention of child maltreatment, more accurate responsiveness of prevention and intervention programming,

more consistent referrals to appropriate services, and the reduction of entry or recidivism into the public child welfare system (Leschied et al., 2003; Rycus & Hughes, 2003). Risk assessment instruments are explicitly used to estimate the likelihood that a parent or caretaker will abuse or neglect their child in the future; those assigned a high-risk level are believed to be very likely to engage in future maltreatment, while those with a low-risk level are not as likely to engage in future maltreatment. The stakes are high at the point of initial contact with a family, as appropriately defined risk decisions can have a positive impact on ensuring the safety of children, and ensuring subsequent referral to appropriate services. When implemented properly, risk assessment instruments have the potential to facilitate more appropriate allocation of resources to families based on their level of risk. However, if risk is identified incorrectly; for example, labeling a family high risk when in actuality the family is at low risk for future maltreatment, the system can potentially have ethical and practical implications, including wasted financial resources, and continuation of the structural cycle of bias in existence for marginalized individuals and families (Daniel, Newberger, Reed, & Kotelchuci, 1978; Kotelchuck, 1982; Schwalbe, 2004).

The prediction of risk in child welfare assessment efforts is complicated by many disparate factors which are hard to detangle and difficult to measure accurately (Baldwin & Spencer, 2000; Begle, Dumas, & Hanson, 2010, Whitaker et al., 2006). Families at risk for child maltreatment are multi-dimensional with varying levels of contextual risk, with experiences that are dynamic across the lifespan. Victims are frequently born into complex family environments with multiple confounding risks (Coulton et al., 2007;

Gilbert, Widom, Browne, Fergusson, & Webb, 2009; Putnam-Hornstein, Wood, Fluke, Yoshioka-Maxwell, & Berger, 2013; Sith et al., 2009), however, no single risk or protective factor deterministically predicts or mediates maltreatment, complicating maltreatment assessment. Empirical evidence is clear that child abuse and neglect is not an all or nothing phenomena, as it encompasses a range of incidents, behavior, and harm along a continuum. Consequently, risk assessment instruments are developed utilizing a range of risk and protective factors known to be related to the maltreatment of children with variable reliability and validity, with instruments ranging from prioritization of clinical intuition to a focus on statistical precision.

Actuarial and Consensus-Based Models

Because of the fundamental importance of standardized instruments that predict future risk for adverse outcomes, a great deal of empirical investigation has been devoted to developing risk assessment measures in child welfare practice (Gottfredson & Snyder, 2005; Righthand, Kerr, & Drach, 2003). Broadly speaking, risk assessments in child welfare practice can be ascribed in one of two ways: consensus and actuarial risk instruments. In child welfare practice, these two models are easily discernible. Both involve a list of family or case characteristics believed to be associated with the risk of maltreatment. However, the two approaches differ in the processes used to identify factors for inclusion in the instrument, and how the instruments are ultimately implemented and utilized in practice.

Consensus risk assessment models, also known as clinical based assessment models, are compiled by experts in the field who draw upon a combination of empirical

research findings and clinical expertise to identify variables to be included during the development of assessment instruments (Austin et al., 2005; Baird & Wagner, 2000; Baumann, Law, Sheets, Reid, & Graham, 2005; Robinson & Moloney, 2010). Items selected for inclusion in consensus instruments are identified based upon various theories of child maltreatment, the research literature on abuse and neglect, and the opinions of other expert practitioners. It is common practice in child welfare to combine items from multiple instruments in consensus models, creating hybrid instruments that vary according to the needs and theoretical orientation of the practitioner. Sometimes factors are assessed numerically, and families are categorized by a total risk score, while other consensus instruments describe areas that are to be addressed by the practitioner, and the practitioner interprets the area identified and codes a family's risk level as high, moderate, or low risk based upon his/her clinical judgment (Baird & Wagner, 2000; Baumann et al., 2005; D'Andrade, Austin & Benton, 2008).

Actuarial assessments, on the other hand, are developed using empirical research to identify risk and protective factors that have strong statistical relationships to the targeted outcome. These instruments use statistical procedures to identify and weigh factors that predict future maltreatment in order to ensure that only valid variables are selected for inclusion in the instrument (Rycus & Hughes, 2003). Actuarial instruments tend to use fewer risk and protective factors than consensus models, and generally differentiate the prediction of abuse and neglect through the use of different variables for each type of maltreatment. Each factor within actuarial models is scored, and these scores summed into overall potential risk measurements. In some instances, families are

subsequently categorized into low, moderate, or high-risk groups, and services are provided to families based on their identified level of risk. In other instances, a family's composite score is utilized to determine a family's level of risk and determine subsequent service provision (D'Andrade et al., 2008; White & Walsh, 2006).

Regardless of the field in which the instrument is implemented, actuarial risk models have consistently demonstrated greater predictive validity and reliability than other types of assessments, including consensus-based assessment instruments, and unassisted clinical intuition (Baird et al., 1999; Dawes, Faust & Meehl, 1989; DePanfilis & Zuravin, 2001; Fazel, Singh, Doll, & Grann, 2012), and have the potential to provide the most objective and consistent assessment of child abuse and neglect among children and families (Baird et al., 1999; Fazel et al., 2012; Garb, 2001; Wald & Woolverton, 1990). Although actuarial models have the greatest potential to predict future risk of maltreatment, many researchers and practitioners argue that these models do not facilitate clinical judgment, and argue for the necessity of intangible human interaction and empathetic understanding that is the foundation of the helping relationship. Proponents of consensus-based models argue that it is unrealistic to suppose that social work practice can eliminate the intuitive element in practice; arguing that actuarial instruments can be valuable aids but cannot provide a satisfactory replacement for professional judgment (Camasso & Jagannathan, 2000; Cash, 2001; English & Graham, 2000).

A perfect risk assessment instrument in child welfare practice would provide the practitioner with information about the family system, correctly identify every child who would subsequently go on to experience maltreatment, and gather an adequate amount of

nuanced clinical information necessary for decision-making across the spectrum of practice. In child welfare however, neither censuses nor actuarial models can consistently achieve this to date. Consequently, when implemented in child welfare practice, effective risk assessments depend on balancing initial decision-making through statistical precision, followed by implementation of clinical expertise for service planning and rapport building (Doueck, Levine & Bronson, 1993; Fuller, Wells, & Cotton, 2001; Munro, 1999). Blending statistical expertise with clinical experience in child welfare practice allows for risk assessments to be implemented as decision aides to enhance upon clinical expertise, rather than a competing approach. As child welfare jurisdictions increasingly look towards implementation of actuarial and consensus-based approaches to risk assessment to enhance practice, empirical research has moved the field of child protection assessment forward through statistical validation of maltreatment assessment instruments.

Examination of Validity

The study of validity in the social sciences is concerned with the meaningfulness of individual components of an assessment instrument, and whether the instrument is measuring its intended construct. The three primary components important to the examination of validity include content validity, construct validity, and criterion validity. Content validity is concerned primarily with the content of the assessment instrument, and includes a subjective judgment of the operationalization of the construct being measured against existing literature, and whether the instrument fully represents the conceptual domain (Drost, 2011). The second type of validity, criterion validity, is

concerned with the instrument's ability to predict specified criterion, in addition to an examination of the instrument's convergence across similar instruments. The final component of validity, construct validity, examines how well a construct is operationalized in the instrument, and the degree to which inferences can be made from the operationalization in the study to the theoretical constructs in which these operationalizations were based (Trochim, 2006). In child welfare risk assessment research, the construct under examination is child maltreatment.

Important to the implementation of maltreatment assessment in child welfare practice is empirical validation. Despite wide implementation in practice, assessment instruments used in child welfare practice have varying degrees of empirical evidence pertaining to their validity, and limited confirmation of reliability testing prior to validation. Some studies examine important individual components of the reliability and validity of maltreatment assessment instruments; however, many are not comprehensively examined, and even fewer are published in the public domain. The following table summarizes previous empirical literature that examines reliability and validity of selected maltreatment assessment instruments used in both the public child welfare system and in early childhood home visitation programs. Further examination of relevant predictive validity studies of maltreatment assessment instruments is included in the following section of this chapter.

Table 1.1.

Selected Research on Child Maltreatment Instrument Reliability and Predictive Validity

Instrument	Study	Implementation	Reliability	Content Validity	Construct Validity	Criterion Validity
California Family Risk Assessment	Johnson (2004)	Public Child Welfare	Interrater Reliability		X	X
	Dankert & Johnson (2014)					X
	Johnson (2011)					X
	Baird, Wagner, Healy & Johnson (1999)		Interrater Reliability			X
Michigan Risk Assessment	Baird, Wagner, Caskey & Neundfelt (1995)	Public Child Welfare				X
	Baird & Wagner (2000)				X	X
	Baird, Wanger, Healy & Johnson (1999)		Interrater Reliability			
Alameda Physical Reabuse Assessment	Johnson & L'Esperance (1984)	Public Child Welfare	Interrater Reliability			X
	Johnson (1988)					
	Mark & McDonald (1989)					X
Alaska Risk Assessment	Baird (1988)	Public Child Welfare				X
Rhode Island Family Assessment	Squadrito, Neunfeldt & Fluke (1995)	Public Child Welfare				X
Washington Risk Assessment Matrix	Fluke et al. (1993)	Public Child Welfare	Interrater Reliability Internal Consistency			
	Marks & McDonald (1989)					X
	Camasso & Jagannathan (1995)				X	X
	English & Graham (2000)				X	
	Baird, Wagner, Healy & Johnson (1999)		Interrater Reliability			
Ontario Risk Assessment	Lescheid et al. (2003)	Public Child Welfare	Interrater Reliability			
Utah Risk Assessment	Nasuti & Pecora (1993)	Public Child Welfare	Internal Consistency			
Illinois CANTS 17B	Camasso & Jagannathan (1995)	Public Child Welfare			X	X
California Risk Assessment Model	Baird & Wagner (2000)	Public Child Welfare			X	X
Child Emergency Response Protocol	Fuller, Wells & Cotton (2001)	Public Child Welfare				X

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Instrument	Study	Implementation	Reliability	Content Validity	Construct Validity	Criterion Validity
Vermont Risk Assessment Instrument	Weedon, Torti, & Zunder (1988)	Public Child Welfare	Interrater Reliability Internal Consistency			X
Child at Risk Field System	Doueck et al. (1993)	Public Child Welfare			X	
	Fluke et al. (1993)		Internal Consistency			
	Kolko (1998)		Interrater Reliability		X	
Child Well-Being Scales/CPSRD	Gaudin, Polansky, & Kilpatrick (1992)	Public Child Welfare	Interrater Reliability		X	
	Fanshel, Finch & Grundy (1994)		Internal Consistency			X
Family Stress Inventory	Katzev, Henderson & Pratt (1997	Prevention Programming	Interrater Reliability			X
	Murphy et al. (1995)					X
Parent-Child Conflict Tactics Scale	Straus et al (1998)	Prevention Programming	Internal Consistency		X	X
	Bennett, Sullivan & Lewis (2006)					X
North Carolina Family Assessment Scale	Reed-Ashcraft, Kirk, & Fraser (2001)	Prevention Programming	Interrater Reliability Internal Consistency			
	Kirk et al. (2005)				X	X
Child Abuse Potential Inventory	Milner, Gold, Ayoub, & Jacewitz (1984)	Prevention Programming	Internal Consistency Test/Re-test			X
	Holden, Willis & Foltz (1989)				X	X
	Milner (1986)					
	Milner (1994)				X	X
	Chaffin & Valle (2003)					X
Parental Stress Index	Kelly (1998)	Prevention Programming	Test/Re-Test			X
	Haskett, Ahern, Ward & Allaire (2006)				X	X
	Abidin (1992)		Test/Re-Test Internal Consistency			
	Holden, Willis & Foltz (1989)				X	
Adult-Adolescent Parenting Inventory	Bavolek & Keene (2001)	Prevention Programming	Internal Consistency		X	X
	Lawson, Alameda-Lawson & Byrnes (2015)		Internal Consistency		X	X
	Conners et al. (2006)		Internal Consistency		X	

Predictive Validity

Selecting the appropriate assessment instrument for utilization in practice requires an examination of the reliability and validity of the instrument for use among the population of interest. Specifically, in determining an appropriate instrument to predict risk for child maltreatment, statistical validation is necessary. This analysis is known as the study of predictive validity, and refers to the capacity of an instrument to forecast future behavior from measurement taken at a single point in time (Kuhn & Johnson, 2013), and allows for the extrapolation of the results to a meaningful outcome of interest. In the study of child maltreatment assessment, the study of predictive validity empirically examines the degree to which an individual risk assessment instrument is capable of differentiating individuals who are likely to maltreat their children from those unlikely to engage in maltreatment (Camasso & Jagannathan, 2000; Grove & Meehl, 1996; Fazel et al., 2012; Johnson & L'Esperance, 1984). In predictive validity research, an instrument with strong predictive validity would demonstrate a statistically significant relationship between measures included in the assessment instrument and an outcome variable of interest, which in child welfare practice is child maltreatment. For example, at the most basic level, analytic results must show that families who are classified high-risk for maltreatment experience maltreatment at a significantly higher rate than those demonstrating a moderate risk, who in turn engage in maltreatment at a greater rate than families assigned to the low-risk category. Predictive validity research of maltreatment assessment instruments provides researchers and practitioners with important information

about the strategic imperatives to detect risk, protect children, and avoid intervention with families where it is not necessary.

Predictive validity is particularly important in assessment instruments used to predict maltreatment among at-risk families, as understanding a child's risk for future maltreatment is key to decision-making in determining the need for further intervention and identification of services appropriate for families at varying levels of risk. If a child is found to be at high risk for future maltreatment on an instrument with strong predictive validity, practitioners can have confidence that by not engaging in intervention that the child will continue to be at risk, facing potentially life-altering consequences. Conversely, if a child scores within the high-risk range on an instrument that lacks adequate predictive validity, erroneous conclusions may be made about the child's safety and the family's trajectory, ultimately mismanaging resources and subjecting the child and family to unnecessary services. Actuarial instruments lend themselves to predictive validity studies more so than consensus instruments because the standardized items collected in actuarial models are largely quantitative in nature, versus qualitative in consensus-based models, and can undergo robust statistical analytic testing to examine predictive validity (Kuhn & Johnson, 2009).

Assessing Predictive Validity

The predictive validity of risk assessments can be empirically examined through several different empirical analytic strategies. The most basic method to establish predictive validity is to determine sensitivity and specificity rates by comparing the rates of recurrence of maltreatment across groups. If the instrument works as intended,

families classified as high-risk should have a higher recurrence rate than families classified as moderate risk, and families classified as moderate risk should have a higher recurrence rate than families classified as low risk. Recurrence rates can be further used to identify rates of false positives ($\frac{FP}{FP+TP}$), where families misclassified as high risk experienced no subsequent maltreatment recurrence, and false negatives ($\frac{FN}{FN+TN}$), where families were misclassified as low risk, however experienced maltreatment recurrence (Lyman-Ott, & Longnecker, 2016).

Maltreatment assessment instruments utilize both continuous risk scores as well as empirically established risk classifications to establish a family's risk for maltreatment. Further analytic examination of predictive validity beyond sensitivity and specificity for each type of assessment instrument varies, however some analytic techniques can be used to examine the predictive capacity of both continuous scores and risk classifications. For instruments with classification schemes, many researchers use chi square tests (χ^2) to investigate if the observed values within classification groups are statistically different based on their likelihood of recurrence. To determine the strength of association between individual risk classification groups and recurrence, Cramer's V can be utilized as a subsequent analytic tool to measure effect sizes. For use with classification groups, logistic regression analyses can be used to examine the predictive capacity of the instrument. In logistic regression, by using the lowest risk category as a reference group, odds ratios (OR) or adjusted odds ratios (AOR) can estimate the likelihood of recurrence for each group in comparison to the lowest group. For instruments with predictive validity, the likelihood of recurrence for each group should increase as the family's risk

level increases. Logistic regression has enhanced the study of predictive validity in maltreatment research as the analysis allow for the control of confounding variables in the model such as intervention effects and demographic variables known to predict a family's risk for maltreatment.

To examine the predictive validity of an instrument's total composite score, some researchers use an independent t-test (t) to examine the difference in average risk score for families that experience maltreatment, versus families that do not experience maltreatment. Cohen's *d* can be used as a subsequent analytic tool to examine the effect size If there is a meaningful difference, the average risk score of the family that experiences maltreatment will be significantly higher than the average risk for the families that do not experience maltreatment. In addition to t-tests, the most commonly used bivariate analyses with composite scores include correlation coefficients (r^2) and point-biserial correlation coefficients (r_{pb}). These bivariate statistics are useful in the study of predictive validity, because researchers can test the relationship of the outcome variable to both the overall risk score as well as individual domain or subscale scores. A final statistical technique, the Receiver Operating Characteristic (ROC) Curve is frequently used in predictive validity research, however has recently begun to gain traction as a statistical method in the study of predictive validity in child maltreatment assessment instruments. The ROC curve measures discrimination, or the ability of the instrument to differentiate between families who experience recurrent maltreatment, and those that do not. The ROC curve is created by plotting the true positive rates ($\frac{\mathrm{TP}}{\mathrm{TP+FN}}$) against false positive rates ($\frac{\mathrm{FP}}{\mathrm{FP+TN}}$) at various threshold markers (Krzanowski & Hand,

2009). The area under the ROC curve (AUC) is then computed as an index of the discriminative utility of the instrument across the full range of cut-off points.

The study of predictive validity of maltreatment assessment instruments is complicated, and consequently, empirical validation of assessment instruments to predict future maltreatment has not consistently occurred in child welfare practice. Subsequently, existing evidence suggests that many instruments currently used in child welfare practice and early childhood home visitation programs lack empirical support for their use among at-risk families to predict risk for future maltreatment. Many studies that do exist are plagued by methodological challenges common to the study of predictive validity. Some of these challenges are difficult at best, although others are impossible to overcome, creating barriers in developing reliable and valid instruments for child maltreatment assessment across the public and private sectors.

Methodological Issues in Examining Predictive Validity of Child Maltreatment

Since the implementation of structured risk assessment into child welfare practice, several concerns and cautions in their use have been expressed, resulting from the scant theoretical and empirical support for many of these instruments (Baird & Wagner, 2000; Bennett et al., 2006; Camasso & Jaganathan, 1995; Korfmacher, 2000; Marks & McDonald 1991; Pecora, 1991; Wald & Woolverton, 1990; Whipple & Webster-Stratton, 1991). Most risk assessment models were developed and implemented with little or no research to establish validity or reliability (English, Aubin, Fine, & Pecora, 1993; McDonald & Marks, 1991; Pecora, 1991; Wald & Woolverton, 1990) and with little, if any, empirical validation (McDonald & Marks, 1991; Rycus & Hughes, 2003). In public

and private child welfare practice, several unique methodological challenges to determining predictive capacity of risk assessment instruments have been identified (Gambrill & Shlonsky, 2000). First, challenges in measuring and identifying predictor and outcome variables creates difficulty in the study of predictive validity, as factors incorporated into many risk assessment instruments were frequently selected on the basis of research studies differentiating maltreating from non-maltreating families (Wald & Woolverton, 199), and are not necessarily related to the occurrence or recurrence of maltreatment. Second, implementation and temporal issues create barriers, as instruments are often modified over time or adopted for use without adaptation of psychometric properties (Rycus & Hughes, 2003, McDonald & Marks, 1991), or are used for a variety of purposes for which they were not intended, and for which there is no empirical support (Wald & Woolverton, 1990). Third, variation in sensitivity and specificity rates vary between instruments as imperfect prediction instruments force methodological trade-offs during development in deciding thresholds and variables in decision-making in practice (Knocke & Trocme, 2005; Lyons et al., 1996; Wilson, Tumen, Ota, & Simmers, 2015). Finally, low base rates and difficulty with individual prediction create challenges in the study of predictive validity, as maltreatment is a relatively rare phenomenon, with measurement of occurrence and recurrence only being possible in the context of child maltreatment. Consequently, predictions of a family's risk for future maltreatment are made in the context of groups who present with similar risk factors (Gottfredson & Snyder, 2005), with the occurrence of maltreatment in the absence of public child welfare involvement remaining largely unknown.

Implementation Challenges

Risk assessment instruments have traditionally been implemented without adequate evidence to indicate that they accurately identify the children most likely to experience subsequent maltreatment. The study of predictive validity is complicated by implementation challenges common in practice, including limited practitioner training, inadequate supervisory support, and disinvested practitioners and administrations which compromise the integrity of risk assessment instruments (Shlonsky & Gambrill, 2014). Many programs and jurisdictions engage in widespread development of new tools in practice, many of which make use of existing measures on populations for which they have not been validated, or utilize components of multiple previously constructed measures without further empirical validation (English & Graham, 2000; Wolock, Sherman & Deldman, 2001). For instance, investigation into the use of risk assessment instruments in child welfare has found that different jurisdictions utilize the same risk assessment at different points in time as families move through the child welfare system, resulting in varying degrees of reliability and validity for the same instrument across jurisdictions (Camasso & Jagannathan, 2000; Wald & Woolverton, 1990). This practice reduces the predictive capacity of an assessment instrument, as literature suggests that there is variation among risk factors as a family progresses and transitions throughout the life course, and factors that predict maltreatment at one point such as at investigation and prior to service provision may not be the same as those that predict subsequent maltreatment at another point in time, such as during or after service provision (Fuller et al., 2001).

Issues pertaining to risk assessment implementation also plague home visitation practice, as assessment instruments commonly used in practice are often used for alternative purposes than for which they were developed and validated. For example, many early childhood home visitation programs have implemented assessment instruments that utilize proxy measures for maltreatment in isolation such as parenting stress, maternal depression, quality of the home environment, or parent-child dyad interactions, which are unlikely to be sufficient in capturing the multidimensional nature of risk for child maltreatment (Cicchetti & Manly, 2001). Still other practice settings experience difficulty in implementation as many instruments were designed to be implemented within the context of a child abuse investigation, resulting in difficulty during application to strengths-based prevention programming, where effective service provision addresses multidimensional interacting factors through a strong therapeutic alliance.

Predictor Variable Variation

Because the course of human development is complex and interactive with situational and environmental influences, risk assessment in cases of child abuse and neglect must consider multiple predictive factors. Historically, risk assessment instruments have emphasized two types of predictive factors in prediction models: static and dynamic. Although static factors are considered constant and unchanging, they are not amenable to interventions (Andrews, Bonta & Wormith, 2006; Levenson & Morin, 2006; Thompson & Wiley, 2009). In contrast, dynamic risk factors can change, and consequently, in theory, are amendable to intervention. Existing research has identified

both robust static (Schuck & Widom, 2005, Siporin, 2007; Wolfe, 1987) as well as dynamic (Chafflin, Kelleher & Hollenger, 1996; Kotch et al., 1995) factors that predict risk for future maltreatment. However, there is a growing body of literature in child welfare that suggests dynamic variables are equally if not more predictive of maltreatment than static variables, and provide opportunities for identification of amenable risk factors important to the implementation of meaningful interventions (Belsky, 1980; Cicchetti & Rizley, 1981; Cicchetti et al., 2000; Masten & O'Doughtery-Wright, 1998). As a result, assessment instruments are increasingly including dynamic risk factors to measure change over time as continuous constructs that vary along multiple dimensions within a family system, taking into consideration factors such as context, the origin of change, the causal change agent, and the degree of predictability associated with the change (MacKenzie, Kotch & Lee, 2011). Risk assessment instruments with high predictive validity include both static as well as dynamic variables, including several important static risk factors for maltreatment such as parental history of maltreatment as a child in addition to dynamic risk factors such as single parenthood as important predictors for maltreatment (Stith, 2009).

Outcome Variable Variation

Vague, transitional definitions of outcome measures make studying predictive validity in child abuse and neglect more difficult. In validation studies attempting to predict future abuse and neglect, definitional variations of maltreatment significantly impact an instrument's ability to measure the phenomenon of interest accurately. Methodological challenges involved in difficulty gaining access to public

child welfare data have resulted in several validation studies utilizing proxy measures for child maltreatment recurrence or confirmation including perception of maltreatment, confirmation from case file reviews, and self-report. Proxy measures for child maltreatment such as depression or parenting stress are ideal for outcome measurements, however do not provide a consistent and comprehensive identification of the recurrence or substantiation of maltreatment. As such, the identification of maltreatment through linkage with public child welfare system data is a more reliable and valid measure of maltreatment.

In studies predicting maltreatment using linkage to public child welfare data, studies examining the predictive validity of maltreatment assessment instruments in child welfare use either a new referral to the public child welfare system or court substantiated maltreatment as confirmation of the recurrence of child abuse and neglect. There has been some controversy in the field regarding which criterion is most appropriate for use in validation research due to issues pertaining to statistical power, measurement reliability, and low reporting rates. In defense of the use of substantiation data as an outcome variable, some researchers and practitioners have argued that substantiated cases meet a higher evidentiary standard, allowing practitioners to be confident that abuse or neglect occurred within a family system. However, others caution that the decision to substantiate a case of child maltreatment is an administrative decision that may not be an accurate index of whether or not maltreatment actually occurred due to lack of evidence, low reporting rates, and investigation bias (Chaffin, 2005; Drake 1996; English et al., 1999; Giovanni & Meezan, 1995; Zuravin, Watson & Ehrenschaft, 1987), which may

cause practitioners to underestimate or overestimate the prevalence of maltreatment within a family system (Eckenrode, Levine-Powers, Doris, Munsch, & Bolger, 1988; Drake, Lee, & Johnson-Reid, 2009). Despite disagreement among researchers pertaining to the use of substantiation data as an indicator for recurrent maltreatment in the study of predictive validity, without feasible alternatives in practice, the use of substantiation as an outcome remains the most accurate estimate of the number of families who experienced maltreatment severe enough to be detected by public child welfare systems and referred for court substantiation.

Maltreatment Base Rates

Empirical literature in the study of predictive validity has demonstrated that the variability of prediction is particularly difficult for phenomena with low base rates such as the occurrence of child maltreatment (Baird & Wagner, 2000), as the rarer the phenomenon is to be predicted, the more difficult it is to develop a risk instrument with an acceptable level of predictive accuracy (Gigerenzer 2002; Munro, 2004; Baird & Wagner, 2000). Child maltreatment is a relatively rare phenomenon, with levels of recurrence varying drastically across the field with estimates varying from 8.0% (Doueck et al., 1993) to 60.0% (Wolock et al., 2001), depending on the operational definition of recurrence adopted, and the time frame over which cases are monitored. Low base rates become particularly methodologically problematic with the use of substantiation data where the criterion of interest is severe harm, as national data suggests that national public child welfare systems substantiate between 12.7% and 34.0% of maltreatment reports investigated, which is a very small percentage of the total number of reports

received, and a fraction of the entire population (KIDS COUNT, 2018). In current child welfare research, base rates are inherently problematic, as the most reliable way to measure the predictive validity of maltreatment assessment instruments is to examine only families who have come to the attention of the child welfare system, therefore narrowing the ability of researchers to measure the actual rate of recurrence, and truly understand population wide maltreatment base rates. The resulting data frequently do not include the most severe instances of maltreatment where children are provided intrusive interventions to ensure their safety (Gambrill & Shlonsky, 2001), or families who go undetected by public child welfare systems. Due to the reactive nature of child welfare practice, many families become involved in interventions as serious risks or maltreatment have been identified in the family system, therefore most prediction is an estimate as to whether abuse or neglect will recur, with most predictive instruments based on shared characteristics of families who have already been abusive or neglectful (Dubowitz et al., 2011; Wald & Woolverton, 1990).

Temporal Issues

Temporal issues in the study of predictive validity can cause complications in the prediction of nonlinear phenomena such as child maltreatment. Specifically in the study of child abuse and neglect, predicting abuse over time is especially challenging, as neither development of children and behaviors of their parents are linear (Belsky, 1993; Bronfenbrenner, 1979). Literature has demonstrated that decreased predictive capacity of measures over time are not uncommon, as families change over the course of their lifespan, therefore responses provided on an assessment instrument at a single point in

time may no longer be pertinent several years later as the family system changes (Bronfenbrenner & Morris, 1998). These findings are consistent with existing child welfare research and theory, which indicate that across the lifespan, families move in and out of various levels of risk on a regular basis as they experience stressful life events (Belsky, 1993; Freisthler, Fraser, Richman, & Galinsky, 1999; Patterson, 1995). These experiences and the manner in which they influence individuals may change radically, subsequently influencing longitudinal predictive validity studies. Thus, dynamic parental behaviors will have a range of effects depending on a child's developmental needs (Cicchetti & Lynch, 1993).

Sensitivity & Specificity Issues

Related to the study of predictive validity research is an assessment of the degree which an assessment tool has acceptable levels of specificity and sensitivity (Kuhn & Johnson, 2013; Johnson & L'Esperanec, 1984; Royston, Moons, Altman & Vergouiwe, 2009), that provides information about an instrument's ability to detect risk and avoid intervening in the lives of families when it is not necessary (Mansell, Ota, Erasmus, & Marks, 2011). In studying the predictive validity of an instrument, examination of sensitivity and specificity designations in risk assessment instruments is important, as it provides critical information about the level of uncertainty in the risk screening trade-off, as establishment of these cutoffs has implications in measuring an instrument's ability to consistently and accurately predict risk of future maltreatment within a family system. In maltreatment assessment, sensitivity is the ability of an instrument to correctly identify families who experience recurrent maltreatment, which is known as the true positive rate.

Alternatively, specificity is the instrument's ability to correctly identify families who will not experience recurrent maltreatment, known as the true negative rate (Lyman-Ott & Longnecker, 2016). Varying degrees of a family's level of risk over time has implications for sensitivity and specificity determinations in longitudinal risk prediction in the misclassification of families. If assessment instruments are calibrated to assume that risk levels escalate after the initial assessment, false positive rates will likely be high as a result of low specificity, unnecessarily intervening with children and their families. Conversely, if it is assumed that risk levels will not escalate at the point of initial assessment, the number of false negatives might be high as a result of low sensitivity (Shlonsky & Gambrill, 2014). In child welfare practice, missing potentially recurrent instances of maltreatment is considered more problematic than misclassifying families as not at risk for recurrence, resulting in statistical approaches during instrument development which favor sensitivity over specificity.

Individual Prediction

Difficulty in explaining and predicting future behavior is not a challenge unique to child maltreatment research (Milner & Campbell, 2007; Pecora, 1991; Royston et al., 2009; Wilson et al., 2015). Human behavior is non-linear, therefore is extremely difficult to predict, and systematically classify. Individual prediction of human behavior cannot be achieved by any existing means with any certainty; consequently, predictions are made in the context of groups of individuals who are similar regarding some set of demographics or characteristics (Gottfredson & Snyder, 2005). Rather than predicting what will occur with a specific individual or family, classifying groups by degree of risk

serves the function of informing practitioners about what families are more likely than others to be at high levels of risk (Camasso & Jagannathan, 2000; Cash, 2001; D'Andrade et al., 2008; Shlonsky & Gambrill, 2014). While not stating with certainty that an individual child will be maltreated, a risk classification indicates that the likelihood of maltreatment is greater for one family than it is for others with at a future point in time (Siegel, 2013). Despite the inability to accurately determine individual risk, maltreatment risk assessment tools are developed with factors shown to have a correlation to maltreatment, therefore providing support for decision-making and opportunities for strategic interventions within family systems.

Risk Assessment as a Predictive Tool in Public Child Welfare Practice

Formalized risk assessment in public child welfare is a relatively new science, as it was not until the early 1980s with the development of the Child Abuse and Neglect Tracking System (CANTS-17B) in Illinois, that a risk assessment instrument was used to guide decision-making in child welfare systems (Cichinelli, 1995). After the introduction of this instrument, popularity of assessment instruments for use in public child welfare systems grew, as standardized measures were promoted as a means to systematically protect children and manage service demands among overwhelmed child welfare systems by allocating limited resources more effectively (Camasso & Jagannathan, 2000; DePanfilis & Zuravin, 2001, English & Pecora, 1994; Knocke & Trocme, 2005). However, haste to develop assessment tools quickly resulted in risk assessment instruments which were adopted or developed across the United States with very little

supporting theoretical or empirical research, including a lack of valid or reliable predictors of maltreatment.

Despite validity and reliability concerns, the implementation of standardized risk assessment models has expanded in the United States since the 1980s, with standardized assessment use confirmed in public child welfare jurisdictions in 50 states (Casey Family Programs & American Humane Association, 2009; Coohey, Johnson, Renner, & Easton, 2013). These models differ greatly from state to state and in some instances county to county in their scope, their stated purpose, the relative importance or weight assigned to various risk and protective factors, and the mechanics of gathering, organizing, and interpreting information (D'Andrade et al., 2008). This variance among jurisdictions in the use of standardized assessment instruments is driven by the needs of the specific child welfare jurisdictions, with several agencies utilizing multiple risk assessment instruments simultaneously in practice. These risk assessment instruments were developed across a wide continuum of practice, from the measurement of risk at a discrete point in time, to case management tools that promote attention to an overarching level of risk and safety across a wide variety of contexts at different decision-making points in the case planning and service delivery process (Milner, Murphy, Valle, & Tolliver, 1998). Many of these existing models have evolved over the last decade; however, have maintained fundamental characteristics of early risk assessment instruments. Some of the most commonly known instruments in use today in public child welfare practice fit into a classification scheme that includes the empirically based actuarial Structured Decision-Making instruments, the ecologically structured consensus instruments developed by

ACTION for Child Protection, consensus based matrix instruments such as the Washington Risk Assessment Matrix, and behaviorally structured instruments developed using fundamentals of the Magura and Moses (1986) Family Assessment Tools (Pecora, 1991). The following review summarizes relevant studies in child maltreatment research that examine the predictive capacity of several actuarial and consensus -based risk assessment instruments developed for use in public child welfare systems across the United States. These instruments are reviewed in Table 2.1.

Actuarial Models

Actuarial models of risk assessment in child welfare practice have gained popularity in recent years as instruments to facilitate accurate, less-biased decision-making through statistical precision. The most widely used assessment instruments among public child welfare jurisdictions in the United States include actuarial modeled instruments known as Structured Decision Making (Casey Family Programs & American Humane Association, 2009).

Structured Decision-Making

Structured Decision Making (SDM) instruments were originally developed by the Children's Research Center, with initial implementation in Alaska over 20 years ago. Since that time, SDM has been implemented by child welfare agencies in approximately twenty states and jurisdictions across the United States (Casey Family Programs & American Humane Association, 2009). Modeled after risk instruments in public health and juvenile corrections, these actuarial instruments typically consist of 10-15 items that can be easily scored, and include objective questions pertaining to caretaker

characteristics, parental expectations, parenting skills, and household dynamics that are found to predictive of substantiation or recurrence of maltreatment. During the assessment, a family receives a total risk score that is then transformed to classify the family as low, medium, high, or very high risk of abuse or neglect (Children's Research Center, 2011).

A number of studies have been conducted attempting to assess the predictive validity of the Children's Research Center (CRC) risk assessment instruments. Most recently, Dankert & Johnson (2014) of the Children's Research Center conducted a revalidation study of the California Family Risk Assessment. The study examined risk for future maltreatment retrospectively among 11,444 families from across several counties in California. The authors concluded that 16.9% and 31.3% of families classified as low and moderate risk experienced subsequent maltreatment. In contrast, 22.9% and 7.4% of families classified as high and very high experienced recurrent maltreatment over the 18-month follow-up period. When recurrent substantiation was examined, it was concluded that 17.8% and 22.9% of maltreatment cases classified as high to very high risk had new allegations of substantiated maltreatment over a follow-up period of 18 months. In contrast, 5.2% of families assessed as low risk, and 11.3% classified as moderate risk had subsequent incidences of substantiated maltreatment ($p <$ .05). These findings were consistent with a re-validation study conducted by Johnson (2004) that used logistic regression as an alternative statistical strategy to examine the predictive validity of the instrument. The study examined risk among 7,685 families across five counties in California prospectively from the point of initial investigation over

a follow-up period of 24-months. Johnson (2004) concluded that among families who received no post-investigation services, moderate risk families were 1.62 times (62%) more likely than low risk families to have substantiated incident of child maltreatment within two years of the initial report than were low risk cases (OR = 1.62; 95% CI = [1.33, 1.96], $p < .001$). High risk families were found to be 3.5 times (250%) more likely to have another substantiated maltreatment incident within two years than were low risk cases (OR = 3.50, 95% CI = [2.72, 4.49], $p < .001$), and very high risk families were found to be 5.10 times (410%) more likely than low risk families to have another incident of substantiated maltreatment (OR = 5.10; 95% CI = [2.72, 9.54], $p < .001$) over the 24-month follow-up period. The results remained significant among families who received post-investigative services. Families classified as moderate risk were found to be 1.64 times (64%) more likely than low risk families to have substantiated incident of maltreatment within 24 months of initial report than were low risk cases (OR = 1.64; 95% CI = [1.36, 1.97], $p < .001$). Furthermore, high risk families were found to be 3.33 times (233%) more likely to have another substantiated maltreatment incident within twenty-four months (OR = 3.33; 95% CI = [2.65, 4.19], $p < .001$), and very high risk families were found to be 5.11 times (411%) more likely than low risk cases to have another substantiated maltreatment incident (OR = 5.11; 95% CI = [3.33, 7.84], $p < .001$) during the 24-month follow-up period. When recurrent maltreatment was examined among all families in the sample, Johnson (2004) found that 7.8% and 13.3% of families classified as low and moderate risk experienced recurrent maltreatment, in contrast to 26.6% and 36.7% of families classified as high and very high risk. When future

maltreatment risk was examined as a continuous variable, for every unit increase in the family's risk score, families were 2.03 times (103%) more likely to experience recurrent maltreatment (OR = 2.03, 95% CI = [1.82-2.26], $p < .001$).

A second widely implemented Structured Decision-Making Model is the Michigan Risk Assessment. In an early prospective re-validation study of the Michigan Risk Assessment conducted by the Children's Research Center using a cohort of 1,896 families; Baird, Wagner, Caskey & Neundfeldt (1995) found that 29.0% and 41.0% of families classified as high and very high risk received a substantiated report of maltreatment during the 12-month follow-up period. In contrast, 8.0% of families identified as moderate and low risk experienced future substantiated maltreatment during the 12-month follow-up period ($p < .05$). When recurrent maltreatment was investigated, 12.0% and 20.0% of families classified as low and moderate risk experienced recurrent maltreatment, compared with 29.0% and 41.0% of families classified as high and very high risk ($p < .05$). These findings were further confirmed in a study by Baird & Wagner (2000) during a re-validation study of 1,400 families. This study retrospectively examined the predictive capacity of the Michigan Risk Assessment Instrument across four states in comparison to two consensus based instruments, the Washington Risk Assessment Matrix, and the California Risk Assessment System. The authors found that the incidence of court substantiated maltreatment increased with each risk level, as 28.0% of the families classified as high risk had new substantiations during an 18-month follow-up. In contrast, 7.0% of families classified as low risk, and 15.0% classified as moderate risk, had statistically significant subsequent incidents of substantiated maltreatment

during the follow-up period ($p < .05$). When recurrent maltreatment was examined, rates increased from 16.0% to 32.0% among low and moderate risk families, to 46.0% among high risk families as the risk level increased. These differences were all statistically significant ($p < .001$). The authors further utilized a supplemental statistical tool, the Dispersion Index for Risk (DIRF) to estimate the potency of the classification of system. The DIRF value for substantiation rates for the Michigan Risk Assessment Model was .522, indicating high levels of predictive potency (Silver & Banks, 1991). Overall, the authors concluded that the Michigan Family Risk Assessment produced substantially better risk classifications than either of the consensus based models in the study, including the Washington Risk Assessment Matrix and the California Risk Assessment.

A third widely implemented actuarial Structured Decision-Making model is the Alameda Physical Reabuse Assessment. The Alameda County instrument was empirically constructed using variables with the highest correlations with physical abuse recurrence derived from closed cases within the public child welfare system (Johnson & L'Esperance, 1984). The predictive validity of the Alameda Physical Reabuse Assessment Model was examined in an early re-validation study conducted by Johnson & L'Esperance (1984). This study examined 120 families retrospectively that were involved in the public child welfare system in one county in California who had received allegations of physical abuse. The authors found that the rate of false negatives of the Alameda County instrument was 30.4%, and the rate of false positives was 69.6%, after controlling for confounding variables including service provision, client and collateral contacts, and the amount of time a family's case had remained open since the point of

initial investigation. These findings were statistically significant *(p* < .05). Similar findings were discovered in a second retrospective re-validation study by Mark and McDonald (1989) utilizing a sample of 567 families previously examined in a validation study by Johnson and Clancy (1988). The authors examined whether the instrument's predictive capacity was more accurately assessed using enhanced methodological and statistical techniques including logistic regression. In an examination of the predictive validity of the instrument to predict discrete forms of maltreatment in isolation, the analysis found minimal differences in the capacity of the instrument to predict maltreatment when maltreatment type was stratified versus when maltreatment classifications were grouped together. Mark and McDonald (1989) discovered that the best overall model predicting all forms of maltreatment together (X^2= 42.37, p < .001) had a false positive rate of 76.6%, and a false negative rate of 2.4% (p < .05).

A fourth widely implemented actuarial Structured Decision-Making Model is the Alaska Risk Assessment Instrument. The Alaska Instrument is unique among the Children's Research Center Structured Decision-Making Models, as abuse and neglect are differentiated in distinct risk scales. The Alaska Risk Assessment Instrument was originally validated in a retrospective study by Baird (1988), using a sample of 550 randomly selected families from a single state child welfare jurisdiction. Baird (1988) found that during a 12-month follow-up period among children that were not removed at the time of initial investigation, 3.3% and 11.3% of families assessed as very low and low risk were experienced subsequent recurrent maltreatment. Among families rated moderate and high risk, 22.3% and 43.6% respectively experienced subsequent recurrent

maltreatment, compared to 83.3% of families rated as very high risk. The neglect scale demonstrated similarly statistically significant predictive capacity over a 12-month follow-up period, as 7.7% and 30.4% of families rated low and moderate risk experienced subsequent maltreatment, compared to 69.6% of families rated as high risk. All findings were statistically significant ($p < .05$).

The final Structured Decision-Making Model is the Rhode Island Family Assessment. The predictive validity of the Rhode Island Family Assessment was investigated in a pilot validation study presented at the Eighth National Roundtable on CPS Risk Assessment by Squadrito, Neunfeldt & Fluke (1995). The pilot validation study retrospectively examined child welfare cases in a single state jurisdiction during initial instrument implementation. The authors found that the families classified as highest risk were ten times more likely to engage in future maltreatment during a 24-month follow-up period than were families classified as low risk (OR = .10, $p < .05$). The instrument demonstrated statistically significant ($p < .05$) false positive rates of 37.0%, and false negative rates of 6.0%. In addition to prediction of maltreatment recurrence, the pilot study examined the capacity of the Rhode Island Family Assessment Instrument to predict serious injury requiring medical care or hospitalization. The instrument demonstrated an ability to differentiate between subsequent occurrences of medical treatment or hospitalization, as 27.0% of families assessed as high-risk were involved in a subsequent abuse or neglect incident in which a child required medical care or hospitalization, compared with 1.0% of families identified as low-risk ($p < .05$).

Consensus Models

Consensus based models in risk assessment are differentiated from actuarial models in their flexibility in data collection for purposes of treatment planning and facilitation of clinical expertise. In public child welfare practice, the most commonly utilized consensus models include matrix models, ecologically structured models, and behaviorally anchored instruments.

Matrix Models

Matrix models include instruments that utilize tables of empirically and clinically identified risk factors that are rated in terms of their severity. These tables consistent of 16-35 factors, and include variables such as parenting skills, demographic variables, and severity of abuse and neglect. These variables are rated using a (3-5) point scale that rank each item in terms of severity of risk to the child at low, moderate and high levels of risk. The ratings are summed, and the resulting composite score is used to guide decision-making pertaining to the family's overall classification of risk level (Milner et al., 1998). One of the earliest child maltreatment matrix instruments developed was the Illinois CANTS 17B, however versions of this instrument have been implemented in a number of states, including Washington and Florida.

The Washington Risk Assessment Matrix (WRAM) is widely implemented in child welfare jurisdictions across the United States. This instrument was designed for implementation at the point of initial investigation in public child welfare practice, and includes risk items that fit into seven theoretical domains including child characteristics, caretaker characteristics, caretaker/child relationship, socio-economic factors, and

perpetrator access. A family's level of risk is determined based on the perception of severity of each item on a five-point scale, and all individual scores are calculated to create an overall composite score. Pre-determined cut-off scores are then used to transform a family's composite score into low, moderate, or high risk categories (Palmer, 1988). The predictive validity of the WRAM was examined in a retrospective re-validation study by Baird & Wagner (2000) among a sample of 1,400 families across four states. The study examined the instrument's predictive capacity in comparison to the consensus-based California Risk Assessment System, and the actuarial Michigan Family Risk Assessment. Baird & Wagner (2000) found that families classified as low risk had a new substantiation rate of 16.0%. In contrast, 16.0% of families classified as moderate risk, and 21.0% of families classified as high risk experienced recurrent substantiated maltreatment. These findings were not statistically significant ($p > .05$). When recurrent maltreatment was examined in isolation, the difference in recurrent maltreatment between low and moderate risk (25.0% and 35.0% respectively) was significant ($p < .001$), but the difference in the recurrence rate between moderate and high-risk cases (39.0% versus 35.0%) was not significant ($p > .05$). As an additional statistical tool, the Dispersion Index for Risk (DIRF) was used to estimate the potency of the classification system. The DIRF value for substantiation rates for the WRAM was .156, indicating low levels of predictive potency (Silver & Banks, 1991). When compared to the Michigan Family Risk Assessment and the California Risk Assessment Model, the Washington Risk Assessment Matrix was out-performed by actuarial Michigan Family Risk Assessment, however out-performed the consensus California Risk Assessment Model. These

findings were consistent with a second predictive validity study of the Washington Family Risk Assessment by Camasso & Jagannathan (1995). This study utilized alternative analytic techniques including logistic regression and a Receiver Operating Curve (ROC) to compare the predictive capacity of the WRAM to another matrix model, the Illinois CANTS 17B. Using a retrospective sample of 239 families in a single state jurisdiction, the analysis discovered that the overall abuse severity score of the WRAM was negatively correlated with recurrent maltreatment (r = -.29, p < .05), indicating that the more severe the level of abuse identified, the less likely the parents were to maltreat again. The authors speculated this unexpected finding could have been a result of early invasive intervention on behalf of the child welfare agency resulting in removal of high-risk children. When examining each individual theoretical domain separately, the domains of child behavior (r = -.44, p < .05) and chronicity of abuse (r = .27, p < .05) were positively associated with recurrent maltreatment. None of the other five theoretical domains were found to be statistically significant in predicting recurrent maltreatment. In terms of predicting recurrent substantiated maltreatment, the child behavior (r = -.04), and chronicity of abuse or neglect (r = .27) subscales were positively associated with recurrent substantiated maltreatment (p < .05). The model demonstrated poor predictive power overall, measuring approximately 6.0% of the variability in outcome of recurrent maltreatment, and 7.0% of the variability in recurrent maltreatment substantiation. The Receiver Operating Characteristic (ROC) analysis uncovered an AUC value of .66, indicating poor predictive capacity. In further analysis, the Wilcoxon Rank-Sum probability was used to compare the predictive validity of the WRAM to the CANTS17B,

and found that the WRAM was an overall better predictor of case recidivism ($Z = 2.0$, $p < .05$), however neither outcome of case closing or substantiation were found to be statistically significant between the two models.

The California Family Assessment Factor Analysis Instrument (CFAFA) is a widely utilized consensus-based risk matrix assessment instrument. The CFAFA is a derivative of an instrument originally developed in Illinois, the Child Abuse and Neglect Tracking System or CANTS 17B. The CANTS 17B examines items that fit within five theoretical domains including the precipitating incident, child assessment, caregiver assessment, family assessment, and family-agency interaction. Each item is rated as low, moderate or high risk, and a sum of the number of items coded at each risk level determines the overall level of risk. The predictive validity of the CFAFA model was examined in conjunction with another consensus based instrument, the WRAM, and an actuarial instrument, the Michigan Family Risk Assessment in a retrospective study by Baird and Wagner (2000). The authors found that families classified as low risk had a future substantiation rate of 15.0%. In contrast, families classified as moderate or high risk both had recurrent maltreatment substantiation rates of 18.0%. When recurrent maltreatment was investigated in isolation, 28.0% of families classified as low risk experienced recurrent maltreatment, and families classified as moderate and high risk each had a recurrence rate of 38.0% ($p > .05$). As an additional statistical tool, the Dispersion Index for Risk (DIRF) was used to estimate the potency of classification of system. The DIRF value for substantiation rates for the CFAFA was .117, indicating low levels of predictive potency (Silver & Banks, 1991). These findings were supported a

second study by Camasso & Jagannathan (1995), using logistic regression and Receiver Operating (ROC) cure analysis as an alternative statistical technique to compare the CANTS 17-B, which is the foundation for the CFAFA model, and another consensus-based instrument, the Washington Risk Assessment Matrix (WRAM). The analysis utilized multivariate logistic regression analysis, entering four theoretical domains from the instrument including child characteristics, caretaker characteristic, family structure into the model to predict case recidivism, case closing, and case substantiation. In examination of maltreatment recurrence, none of the domains were statistically significant. In further analysis, recurrent maltreatment substantiation was examined, the domains of the child's age (r = .75), caretaker characteristics scale (r = .26) and family structure (r = .73) were predictive of future case substantiation ($p < .05$). Overall, the instrument had poor predictive power, explaining only 5.0% of the variability in the outcome in predicting future substantiated maltreatment, and 1.0% of the variability in predicting case recidivism. A Receiver Operating Characteristic (ROC) curve analysis was used as an additional statistical technique to examine the discriminating ability of the instrument across the entire spectrum of diagnostic cutoff points. The ROC analysis uncovered an AUC value of .66, indicating poor predictive validity.

The Child Emergency Response Assessment Protocol (CERAP) is a consensus matrix instrument developed by the Illinois Department of Child and Family Services, the American Humane Association, the University of Illinois, and field experts. The instrument consists of 14 items, and is used throughout the life of a child welfare case, measuring risk factors empirically known to the literature in addition to risk factors

identified through clinical expertise. The instrument is administered by indicating the presence or absence of each item, and if any item is present, a clinical decision is made as to whether the child is safe or unsafe. There has been one retrospective study conducted to examine the predictive validity of the CERAP by Fuller, Wells & Cotton (2001), using subsequent maltreatment recurrence within 60 days as an outcome measure. The study examined the use of the CERAP to predict maltreatment recurrence at initial investigation (n = 380) as well as within five days of case opening retrospectively (n = 350). At case opening, neither overall safety assessment score or number of factors identified were associated with subsequent referral within 60 days, either in chi-square bivariate or multivariate tests controlling for CERAP completion, prior reports, total number of caregiver problems, and service receipt. At five days after case opening in bivariate chi-square analysis, completion of the CERAP (X^2 = 23.68, df = 1, p < .001), number of safety factors identified for services (X^2= 33.30, df = 3, p < .001), and safety decision (X^2= 5.56, df = 1, p < .05) were associated with subsequent referral within 60 days. The only relationship that remained statistically significant in the logistic regression model after controlling for confounding factors was the completion of the CERAP (OR = 4.09, 95% CI = [2.49, 6.70], p < .001). To date, no validation studies examining the future predictive validity of the CERAP composite score have been conducted.

The final commonly implemented matrix risk assessment model is the Vermont Risk Assessment, which is implemented in public child welfare practice across the state of Vermont. The matrix is comprised of fourteen major factors with numerous traits including severity of abuse and neglect, caretaker characteristics, parent/child

relationship, previous abuse history, child characteristics, home environment, and social support. Each item is then weighed in terms of severity, and the family is then assigned to an overall risk level of low, medium, or high. The predictive validity of the Vermont Risk Assessment was examined in a study by Weedon, Torti, and Zunder (1988) using a sample of 147 families across a single state jurisdiction. The analysis showed that subscale factors including the child's age and ability ($r = .25$, $p < .001$), neglect severity ($r = .23$, $p < .01$), and accessible alternative care ($r = -.19$, $p < .05$) were related to recurrent maltreatment. In addition, the total composite score was shown to be related to future recurrent maltreatment ($r = -.17$, $p < .05$). Of families determined to be high risk, 61.0% experienced subsequent maltreatment, compared to 36.0% of those classified as moderate risk, and 24.0% of those classified as low risk. These findings were statistically significant ($p < .05$).

Ecologically Structured Models

Consensus-based ecologically structured risk assessments were developed by ACTION for Child Protection, and modeled after the Child at Risk Field (CARF) instrument. Ecologically structured models use an ecological approach, organizing factors into five areas including child, parent, family, maltreatment and intervention. A series of 14 open-ended questions and anchored rating scales are typically included in ecologically structured models that are used to facilitate the identification of "risk influences" that may be operating in the family situation (Holder & Corey, 1986). A family's level of risk is determined based on the perceived level of risk for each of the five domains. Instruments developed by ACTION for Child Protection are generally

considered to be the most comprehensive models of risk assessment in existence due to the breadth of areas assessed, and applicability of different types of child maltreatment assessment across the life of a child welfare case (English & Pecora, 1994; Milner et al., 1998).

The Child at Risk (CARF) Instrument is a consensus-based instrument developed by ACTION for Child Protection. The CARF instrument is used throughout the life of a child welfare case from intake to permanency, and includes fourteen items across the domains of child, parent, family, maltreatment and intervention. Four additional qualifiers are also considered during the analysis, including duration of a negative influence, pervasiveness of negative influence, acknowledgement of negative parental influence, and control of negative influence. Each item or qualifier is rated on a four-point scale, and the average of the fourteen items plus the average of the four qualifiers is calculated to arrive at the final composite risk score (Palmer, 1988). The most comprehensive predictive validity examination of the CARF was conducted by Doueck, Levine and Bronson (1993). In a retrospective study of 207 families in a single jurisdiction, the predictive validity of the instrument was examined with maltreatment recurrence as the outcome variable. Using t-tests as a statistical tool, the authors found a relationship approaching statistical significance between final risk ratings and the recurrence of a new report ($t(71) = 91$, $p = .06$) within 6 months of the instrument completion. In further analysis, the final risk rating was used, with the authors omitting cases of moderate risk. The analysis found that 72.0% of families identified as high risk did not experience subsequent maltreatment, and 5.0% of families identified as low risk

did not receive a subsequent report of maltreatment over the 6-month follow-up period. These findings were not statistically significant ($p > .05$).

Behaviorally Anchored Instruments

The final commonly utilized instrument in public child welfare practice falls into the category of consensus based models, and includes instruments that assess levels of child or parent functioning. These assessment scales typically use the "Child Well-Being" or "Family Risk" scales developed by the Child Welfare League of America (Magura & Moses, 1986). Primarily, instruments in this category are used to assess family functioning, rather than identify a family's risk of future maltreatment (Pecora, 1991). Behaviorally anchored instruments assess family functioning through the completion of multiple subscales covering areas of individual and family functioning including parenting role performance, familial capacities, child role performance, and child capacities. The ratings are then summed, and the composite score is used to guide decision-making pertaining to the family's overall level of risk (Palmer, 1988).

The Child Well-Being Scales instrument is prominently used in public child welfare systems in a number of jurisdictions (Magura & Moses, 1986). The instrument includes 44 items covering four subscales including role performance of the parents, family capacities, child role performance, and child capacities. The subscales are used to assist in identification of service needs and identify family functioning, therefore no total risk score is obtained from completion of the instrument. Similarly, the New York Child Protective Services Review Document (CPSRD) was developed from the foundations of the Child Well-Being Scales, and uses both categorical and narrative forms to assess

objective risk factors within the family system. The CPSRD gathers information for case planning and service provision by collecting information as to whether the family falls into a number of risk categories including the condition of the adult, condition of the child, and conditions that characterize the home environment. The predictive validity of the Child Well-Being Scales and the CPSRD were examined simultaneously in a validation study by Fanshel, Finch & Grundy (1994) using a sample of 72 families. In the study, the authors combined items in the Child Well-Being Scales and the CPSRD scales to create combined indices of household adequacy, parental disposition, economic deprivation, the family's prior interaction with related systems, impoverished family's lack of sanitation, child's academic progress and coping abilities, parental drug or alcohol involvement, and abusiveness to the child. The predictive capacity of the new indexes to predict perception of risk was retrospectively examined among a sample of 72 families. Two indexes including parental disposition ($r = .51$, $p < .001$) derived from the Child Well-Being Scales, and substance abuse ($r = .74$, $p < .005$), derived from the CPSRD were found to be significantly associated with worker's perception of risk to the child, and together explained 34.5% of the variance of the worker's perception ($p < .001$). No studies to date have been conducted examining the predictive capacity of the Child Well-Being Scales or the CPSRD utilizing data linkage to public child welfare system data.

Table 2.1

Selected Research on Public Child Maltreatment Instrument Predictive Validity

Instrument	Model Type; Classification	Study Type	Design	Dependent Variable	Statistical Analysis	Findings
California Family Risk Assessment	Actuarial Structured Decision-Making	Dankert & Johnson (2014) NCCD Evaluation	Retrospective; Quantitative; Correlational Design Sample: Public Child Welfare *N*=7,685 Time to Prediction: 18 Months	Recurrence Substantiation* Placement	Sensitivity & Specificity	*fp*=77.1%,*fn*=5.2% ($p < .05$)
California Family Risk Assessment	Actuarial Structured Decision-Making	Johnson (2004) NCCD Evaluation	Retrospective; Quantitative Correlational Design Sample: Public Child Welfare *N*=7,685 Time to Prediction: 24 Months	Recurrence Substantiation* Services	Sensitivity & Specificity Logistic Regression	*Range Across Sample* *fp*= 61.4%-74.7% *fn*=2.8%-8.3% OR=1.62-5.10 ($p < .001$)
Michigan Risk Assessment	Actuarial Structured Decision-Making	Baird, Wagner, Caskey & Neundfelt (1995) NCCD Evaluation	Prospective; Quantitative Correlational Design Sample: Public Child Welfare *N*=NR Time to Prediction: 12 Months	Recurrence Substantiation* Child Injuries Placement	Sensitivity & Specificity	*fp*=71%, *fn*=0% ($p < .05$)
Michigan Risk Assessment	Actuarial Structured Decision-Making	Baird & Wagner (2000) Peer Reviewed Journal	Prospective; Quantitative Correlational Design (Comparison of 3 Instruments) Sample: Public Child Welfare *N*=1,400 Time to Prediction: 12 Months	Recurrence Substantiation*	Sensitivity & Specificity DIRF	*fp*=72.0%, *fn*=7.0% ($p < .05$) DIRF= .522
Alameda Physical Reabuse Assessment	Actuarial Structured Decision-Making	Johnson & L'Esperance (1994) Peer Reviewed Journal	Retrospective; Quantitative Correlational Design Sample: Public Child Welfare *N*=120 Time to Prediction: 24 Months	Recurrence* (Physical Abuse)	Sensitivity & Specificity	*fp*=18.8%,*fn*=30.4 % ($p<.05$)

*= Dependent variable used in findings

Table 2.1

Selected Research on Public Child Maltreatment Instrument Predictive Validity

Instrument	Model Type; Classification	Study Type	Design	Dependent Variable	Statistical Analysis	Findings
Alameda Physical Reabuse Assessment	Actuarial Structured Decision-Making	Marks & McDonald (1989) NCCD Evaluation	Retrospective; Quantitative Correlational Design Sample: Public Child Welfare *N*= 567 Time to Prediction: 10-16 Months	Group Membership* (Physical Abuse)	Sensitivity & Specificity	*fp* =76.6%,*fn*=2.4% (*p* < .05)
Alaska Risk Assessment Instrument	Actuarial Structured Decision-Making	Baird (1988) APWA Evaluation Report	Retrospective; Quantitative Correlational Design Sample: Public Child Welfare *N*=550 Time to Prediction: 12 Months	Recurrence*	Sensitivity & Specificity	Abuse Scale *fp* = 22%, *fn* = 31% (*p* < .05) Neglect Scale *fp* = 26%, *fn* = 31% (*p* < .05)
Rhode Island Family Assessment Instrument	Actuarial Structured Decision-Making	Squadrito, Neundfeldt & Fluke (1995) Conference Presentation	Retrospective; Quantitative Correlational (Pilot) Sample: Public Child Welfare *N*=NR Time to Prediction: 24 Months	Substantiation* Serious Injury Services	Sensitivity & Specificity	*fp* = 37%, *fn* = 6% (*p* < .05)
Washington Risk Assessment Matrix	Consensus Matrix	Baird & Wagner, (2000) Peer Reviewed Journal	Retrospective; Quantitative Correlational Design (Comparison of 3 Instruments) Sample: Public Child Welfare *N*=1400 Time to Prediction: 12 Month	Recurrence Substantiation*	Sensitivity & Specificity DIRF	*fp* = 79%, *fn* = 16% (*p* > .05) DIRF = .156
Washington Risk Assessment Matrix	Consensus Matrix	Camasso & Jagannathan (1995) Peer Reviewed Journal	Retrospective; Quantitative Correlational Design (Comparison of 3 Instruments) Sample: Public Child Welfare *N*=23 Time to Prediction: 12 Months	Recurrence Substantiation* Case Closing	ROC Curve	AUC = .68

*= Dependent variable used in findings

Table 2.1

Selected Research on Public Child Maltreatment Instrument Predictive Validity

Instrument	Model Type; Classification	Study Type	Design	Dependent Variable	Statistical Analysis	Findings
Illinois CANTS 17B	Consensus Matrix	Camasso & Jagannathan (1995) Peer Reviewed Journal	Retrospective; Quantitative Correlational Design (Comparison of 2 Instruments) Sample: Public Child Welfare *N*=239 Time to Prediction: 12 Months	Recurrence Substantiation* Case Closing	ROC Curve	AUC= .66
California Risk Assessment Model	Consensus Matrix	Baird & Wagner (2000) Peer Reviewed Journal	Retrospective; Quantitative Correlational Design (Comparison of 3 Instruments) Sample: Public Child Welfare *N*=1400 Time to Prediction: 12 Months	Recurrence Substantiation*	Sensitivity & Specificity DIRF	*fp* = 82%, *fn* = 15% (*p* < .05) DIRF = .117
Vermont Risk Assessment	Consensus Matrix	Weedon, Torti, Zunder (1988) APWA Evaluation Report	Retrospective; Quantitative Correlational Design Sample: Public Child Welfare *N*=147 Time to Prediction: 12 Months	Recurrence*	Sensitivity & Specificity Correlation	*fp* = 39%, *fn* = 24%, (*Total Score*) *r* = .17 *p* < .05
Child Emergency Response Assessment Protocol	Consensus Matrix	Fuller, Wells, & Cotton (2001)	Retrospective; Quantitative Correlational Design Sample: Public Child Welfare *N*=730 Time to Prediction: 60 Days	Recurrence*	Logistic Regression	Instrument Completion (OR = 4.09, *p* < .001)
Child At Risk Field System	Consensus Ecologically Structured Scales	Doueck, Levine & Bronson (1993) Peer Reviewed Journal	Retrospective; Quantitative Correlational Design Sample: Public Child Welfare *N*=207 Time to Prediction: 6 Months	Recurrence*; Service Provision	Sensitivity & Specificity; t-test	*fp* = 72%, *fn* = 30.4% (*p* > .05) *t*(71) = 1.91 *p* = .06
Child Well-Being Scales/ CPSRD	Consensus Behaviorally Anchored	Fanshel, Finch & Grundy (1994) Peer Reviewed Journal	Prospective; Quantitative Correlational Design Sample: Public Child Welfare *N*=72 Time to Prediction: 72 Months	Perception of Physical Abuse Risk*	Logistic Regression	(Subscales) Parental Disposition (*r* = .74, *p* = .005) Substance Abuse (*r* = .51, *p* < .001)

*= Dependent variable used in findings

Risk Assessment as a Predictive Tool in Home visitation

Increasing awareness of child maltreatment, variation of risk levels among families, and a heightened demand for accountability in prevention programming, have led to an increase in an interest in structured risk assessment in early childhood home visitation programs. Through early identification of risk within a family system during the course of service provision, practitioners have the ability to link families with effective services and resources before problems erupt, resulting in costlier and invasive public child welfare intervention at a later point in time. In response to the increased need for maltreatment risk assessment in prevention programming, professionals within the field have drawn predominantly on research from public child welfare systems, and have developed modified practice models to assist practitioners in more reliably and accurately assessing a family's risk for future maltreatment. In order to meet the unique needs of practitioners and families involved in home visitation, recommended practice in assessment seeks to move beyond models that conceptualize maltreatment risk in terms of solely identifying or predicting maltreatment, toward a holistic approach that includes a focus on intervention, management, and treatment for decreasing a family's risk for child abuse and neglect.

Empirical evidence in the field suggests that families enrolled in early childhood home visitation programming present with wide variation in their levels of risk for future maltreatment (Duggan et al., 2007; Peacock et al., 2013). In order to effectively manage the variance among risk levels in home visitation populations, risk assessment instruments have been increasingly identified in prevention practice as a tool to determine

a family's risk for future maltreatment, while simultaneously assisting practitioners in developing service plans by identifying risk factors that are hypothesized to change in response to targeted treatment services (Shlonsky & Gambrill, 2014). Among at-risk families with multiple interacting contextual factors, assessment of risk among other pressing immediate needs that families may be facing is particularly challenging for home-visitors (Jack, Jamieson, Wathen & McMillian, 2008; Tandon et al., 2008). Consequently, it has increasingly become clear that assessment instruments that serve to both predict risk and identify family needs are needed in prevention programming to identify and address compounding risk factors that place children at increased risk for future maltreatment. However, increased pressure to utilize limited resources to target families most at risk in early childhood home visitation programming have led programs to utilize varying risk assessment instruments in practice, many of which have not been validated to assess risk for the occurrence of maltreatment, or to disentangle multiple risk factors. For instance, some instruments used in home visitation were originally designed to be administered in the context of a child abuse investigation and rely on highly sensitive questions, while others were developed for use in clinical practice and measure proxy constructs for maltreatment in isolation. Implementation difficulties in risk assessment are commonplace in prevention programming, as several instruments were developed to be administered by the practitioner or utilize deficit focused language, potentially breaking down the rapport building process, creating defensiveness on part of the parent, and reducing predictive capacity. For example, several instruments in particular, including the Child Abuse Potential (CAP) Inventory, Parenting Stress Index

(PSI), Family Stress Inventory (FSI), Adult-Adolescent Parenting Inventory (AAPI), the Parent-Child Conflict Tactics Scale (CTSPC), and the North Carolina Family Assessment Scale (NCFAC) have been widely used to as an assessment instrument to predict risk for future maltreatment during the course of home visitation programming. These instruments are reviewed in Table 2.2.

The most widely implemented assessment instrument to predict risk for future maltreatment in prevention programming is the Child Abuse Potential (CAP) Inventory that was originally developed for implementation in public child welfare settings to predict a family's risk for recurrence of child physical abuse (Milner, 1994; 2004). The resulting Child Abuse Potential Inventory is a self-report questionnaire that is answered in a forced-choice, agree-disagree format. The inventory contains a physical abuse subscale that includes descriptive factor scales including distress, rigidity, unhappiness, problems with child and self, problems with family, and problems with others. Two special subscales are also included in the instrument, including the ego-strengths scale, and the loneliness scale, that provide the practitioner implementing the instrument with supplemental clinical information pertaining to the respondent (Mazzucco, Gordon & Milner, 1989; Milner 2006). Once the measure is completed, the family is classified by level of future risk for physical abuse including low, moderate, and high from the total composite score obtained from the instrument. The predictive validity of the CAPI was examined in a retrospective study by Milner, Gold, Ayoub and Jacewitz (1984) with a sample of 200 families identified as at-risk of poor parenting, child abuse, or neglect. The researchers found a significant relationship ($r = .34$, $p < .0001$) between elevated

abuse scores and later child physical abuse in a group of at risk families, and a moderate relationship ($r = .19$, $p < .05$) was found between abuse scores and later confirmed child neglect over a 6-month follow-up period. The dependent variable used as a proxy for maltreatment confirmation included a review of child abuse and neglect reports made by the intervention staff, and confirmed by the members of the research team (SCAN). Similar findings were discovered in a re-validation study by Chaffin and Valle (2003) where both the static and predictive validity of the CAPI was examined retrospectively among a sample of 459 parents participating in prevention programming in a single state. The authors used a cox proportional hazards survival model as a statistical tool to account for time variation to maltreatment recurrence. The analysis demonstrated that the post-treatment Child Abuse Potential Inventory scores were found to have high static predictive validity as the model was significant, accounting for 15.0% of the variance in outcomes (Wald = 1.71, $p < .001$). The CAPI however failed to demonstrate statistically significant dynamic predictive validity, as there was no evidence to support changes in Child Abuse Potential Inventory scores corresponded to changes longitudinally.

In addition to the Child Abuse Potential Inventory, another popular instrument implemented in prevention programming is the Parenting Stress Index (PSI; Abidin, 1995; 1997; 2006). The PSI is a self-report measure that was developed to assess parent-child related stress in parents of young children that was originally designed as a screening and triage measure for evaluating parenting within the family system. However, the PSI has been used in home visitation practice as an instrument to not only determine program effectiveness, but also to predict a family's level of risk for future

maltreatment. The instrument focuses on three major domains of parenting stress including child characteristics, parent characteristics, and situational/demographic life stresses. After completion of the instrument, the respondent receives a score in two domains including the childbearing stress subscale, the personal distress subscale, and a total composite score. The predictive validity of the PSI was examined in a prospective study by Haskett, Ahern, Ward & Allaire (2010), where the PSI was administered to 240 families as part of a broader study on the social adjustment of young children. A logistic regression model was estimated to determine the extent to which the subscales uniquely predicted group status between physically abusive and non-abusive families. Only the childrearing stress scale was a significant predictor (B = 1.03, SE = .34, Wald $\chi 2$ = 9.72, p < .01) of occurrence of maltreatment, even after controlling for the personal distress subscale. Higher scores on the childrearing stress scale were associated with a significant increase in the odds of membership in the abuse group (OR = 2.80, 95% CI = [1.44-5.45], p < .05). These findings remained stable across studies. For example, in a predictive validity study conducted by Kelley (1998), the validity of the PSI was examined among a sample of 60 women with children, 30 of whom were known substance abusers, and 30 whom had no known history of substance abuse. A MANOVA and Chi-Square (χ^2) tests were used as statistical tools to examine within group differences. The study concluded that PSI scores differed significantly between group membership of substance abusing and non-substance abusing women (F(3, 58) = .48, p < .001). In further examination, a greater proportion of the substance-abusing mothers whom had been determined to have significantly higher PSI scores experienced historical substantiated maltreatment (X^2(1)

= 41.71, $p <$ .001). To date no studies have been conducted examining the predictive validity of the PSI to predict future maltreatment.

In addition to the Child Abuse Inventory and the Parenting Stress Index, another widely implemented instrument in early prevention programming is the Family Stress Inventory (FSI) (also known as the Kempe Family Stress Checklist, and the Carroll-Schmidt Parenting Checklist), that were developed to measure risk for parenting difficulties (Carrol, 1978; Kempe & Kempe, 1976). To accomplish this, the Family Stress Inventory assess multiple areas of family functioning including psychiatric history, criminal and substance abuse history, childhood history of care, emotional functioning, attitudes and perceptions of the child, discipline of the child, and level of stress in a parent's life (Korfmacher, 2000). A practitioner administers the Family Stress Inventory, and families are scored and subsequently classified by level of risk as low, moderate, or high for future maltreatment for purposes of risk identification and service planning. The predictive validity of the Family Stress Inventory was examined in a prospective study by Murphy, Orkow, and Nicola (1985). The sample included 587 pregnant women who were receiving pre-natal care in a single urban OB-GYN clinic. The women were then followed administratively through medical data for 24-30 months. A review of medical charts of 100 of the children whose mothers had been considered "at risk" based off of the Family Stress Inventory scores was conducted during the follow-up period to examine the capacity of the instrument to predict confirmed abuse identified in the child's medical record. The results of the validation study demonstrated a statistically significant ($p <$ .05) false-positive rate of 75.0%, and a false negative rate of 2.0%. Similar results

pertaining to low specificity and high sensitivity were found in subsequent validation studies (Korfmacher, 2000; Stevens-Simon, Nelligan, & Kelly, 2001). Most notably, a fourth retrospective predictive validity examination of the Family Stress Inventory by Katzev, Henderson, & Pratt (1997) examined a large sample of families involved in home visitation programming (N = 2,870), comparing maltreatment recurrence rates for families at different levels of risk. The analysis demonstrated a false positive rate of 79.0%, and a false negative rate of 3.0%. These findings were statistically significant ($p < .05$).

A further commonly implemented instrument, the Adult/Adolescent Parenting Inventory (AAPI-2), is a self-report measure that was developed to assess adult and adolescent attitudes and expectations with respect to children (Bavolek, 1984; 1989; Bavolek & Keene, 2001). The instrument was later revised and re-normed from the original version of the AAPI first developed in 1979 (Bavolek & Keene, 2001). The resulting Adult/Adolescent Parenting Inventory-2 instrument is comprised of 40 items, each using a five-point likert-type response scale among 5 subscales. The subscales of the instrument measure domains including parenting expectations of the child, parent empathy towards the child's needs, use of corporal punishment, parent-child family roles, and children's power and independence. Each subscale score is converted, and then used to classify parents into risk classifications for maltreatment (Bavolek & Keene, 2001). The initial validation study examining predictive validity of the AAPI was conducted by Bavolk & Keene (2010). In this retrospective examination of 174 families, the authors found a statistically significant difference between mean scores of abusive and non-

abusive parenting scores in each of the four parenting constructs: parental expectations ($F(1) = 8.05$, $p < .001$); empathy ($F(1) = 37.63$, $p < .001$), corporal punishment ($F(1) = 6.71$, $p < .01$), and role reversal ($F(1) = 44.30$, $p < .001$). A second retrospective predictive validity study examining the capacity of the AAPI-2 to predict future substantiated maltreatment reports was conducted by Lawson, Alameda-Lawson, and Byrnes (2015) among a sample of 2,610 parents with young children involved in a state-wide child abuse prevention program. The author's utilized t-tests (t) as a statistical tool to examine mean score differences between the AAPI-2 pre-post scores of parents whose children experienced future substantiated maltreatment and those that did not. These tests did not yield any statistically significant results. In further analysis, the authors tested the relationship between AAPI-2 and substantiated maltreatment by way of latent path analysis while controlling for demographic variables and length of program participation. The latent path model did not support a relationship between factor scores on the AAPI-2 and substantiated maltreatment (CFI = .99). The findings of the Lawson, et al. (2015) study concluded that "while the AAPI-2 has been marketed as a tool that can help social workers and other child welfare practitioners identify parents who are most at risk for abusing and neglecting their children, our results suggest that it should not be used for such a purpose (p. 13)."

Another commonly utilized instrument in prevention programming, the Parent-Child Conflict Tactics Scale, is a well-known self-report instrument that was revised from its original content to measure the prevalence of various forms of maltreatment including physical abuse, psychological maltreatment, and neglect (CTSPC; Straus,

Hamby, Finkelhor, Moore, & Runyan, 1998), rather than predict risk for future maltreatment. Instead of assessing child physical abuse risk factors, the Parent-Child Conflict Tactics Scale assesses for frequency of parental aggressive and non-aggressive tactics. The instrument includes 22-36 items that are included within the domains of nonviolent discipline, psychological aggression, minor physical assault, severe physical assault, very severe physical assault, and neglect. Each item is individually scored, contributing to individual subscale scores and an overall composite score that is used to classify families into risk groups. The predictive validity of the CTSPC was examined in a prospective study by Bennett, Sullivan & Lewis (2006). The study sample included 139 women in two groups, one of which had experienced historical substantiated maltreatment, and the other with no historical substantiated maltreatment. The authors examined sensitivity and specificity of the CTSPC to predict group membership pertaining to the absence versus presence of a substantiated maltreatment history. A logistic regression model was used as a statistical tool in addition to an examination of the instrument's specificity and sensitivity. The study revealed that the CTSPC had high specificity but poor sensitivity (*fp* = 68.4%, *fn* = 4.9%). The only subscale significantly predictive of historical maltreatment status was the neglect subscale ($\beta = .59$, OR = 1.80, $p < .05$). Further statistical analysis utilizing a Receiver Operating Curve (ROC) demonstrated an overall AUC value of .60 for the CTSPC, indicating overall poor predictive validity.

The final assessment instrument frequently implemented in prevention programming is the North Carolina Family Assessment Scale (NCFAS). The instrument

was developed to identify treatment needs of families referred for service in family preservation programming, and is designed to detect changes in family functioning during the course of service provision. The instrument provides ratings of family functioning on five domains including environmental, parental capabilities, family interactions, family safety, and child-well-being. Each of the domains of the instrument and associated subscales utilizes a six-point rating scale to identify problem areas for purposes of service provision. Each subscale is subsequently calculated to formulate a total risk composite score for the family. The predictive validity of the instrument was examined in a study by Kirk, Kim and Griffith (2005). The study retrospectively examined the capacity of the NCFAS to predict future child welfare involvement and subsequent out of home placement at case closure and at 12-months post case closure among a sample of 1,279 families involved in prevention programming. The analysis demonstrated that at intake, the NCFAS score was associated with out of home placement at case closure among several domains including environmental ($X^2(5) = 11.72$, $p < .05$), parental capability ($X^2(5) = 20.41$, $p < .01$), family safety ($X^2(5) = 11.65$, $p < .05$) and child well-being ($X^2(5) = 12.41$, $p < .05$). Intake scores however were not found to be predictive of public child welfare involvement and subsequent removal at one year, as only the environmental subscale ($X^2(5) = 19.64$, $p < .01$) was found to be statistically significant. When examining subscale scores at closure, the authors found that all five subscales were significantly ($p < .001$) related to out of home placement at closure. At one-year post-closure, all five subscales were significantly associated with subsequent public child welfare involvement and removal at the ($p < .01$) level.

Table 2.2

Selected Research on Community Child Maltreatment Instrument Predictive Validity

Instrument	Study	Instrument Purpose	Design	Dependent Variable	Statistical Analysis	Results
Child Abuse Potential Inventory	Milner, Gold, Ayoub & Jacewitz (1984)	Public Child Welfare Prediction of Maltreatment	Retrospective; Quantitative Sample: Child Abuse Prevention Correlational Design *N*= 200 Time to Prediction: 24 Months	Confirmed SCAN Report*	Correlation	Abuse: (r = .34, p <.001) Neglect: (r = .19, p <.05)
Child Abuse Potential Inventory	Chaffin & Valle (2003)	Public Child Welfare Prediction of Maltreatment	Retrospective; Quantitative Sample: Family Preservation Correlational Design *N*= 459 Time to Prediction: 24 Months	Recurrence*	Cox Regression	(Wald = 1.71, p < .001)
Parental Stress Index	Haskett, Ahern, Warn & Allaire (2006)	Parent-Related Stress	Prospective; Quantitative Correlational Design Sample: Public Child Welfare *N*=204 Time to Prediction: Group Membership	Group Membership	Logistic Regression	Child Rearing Stress Scale OR = .28 (72% decrease), p < .05
Parental Stress Index	Kelley (1998)	Parent-Related Stress	Prospective; Quantitative Sample: Substance Abusing & Control Women with Children Correlational Design *N*=60 Time to Prediction: Group Membership	Substance Abuse & Maltreatment*	MANOVA Chi Square	Between Groups: $F(3,58)$ =.48, p <.001 Group & Occurrence X^2 (df = 1) = 41.71, p <.001
Family Stress Inventory	Murphy, Orkow, & Nicola (1985)	Parenting Difficulties	Prospective; Quantitative Sample: Maternal Population Correlational Design *N*= 587 Time to Prediction: 24-30 Months	Confirmed Medical Record*	Specificity & Sensitivity	fp = 75%, fn = 2% (p <. 05)

*= Dependent variable used in findings

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Table 2.2

Selected Research on Community Child Maltreatment Instrument Predictive Validity

Instrument	Study	Instrument Purpose	Design	Dependent Variable	Statistical Analysis	Results
Family Stress Inventory	Katzev, Henderson & Pratt (1997)	Parenting Difficulties	Retrospective; Quantitative Sample: Child Abuse Prevention Correlational Design *N*= 2,870 Time to Prediction: 12 months	Recurrence*	Sensitivity & Specificity	*fn* = 3%, *fp* = 79% (*p* < .05)
Adult-Adolescent Parenting Inventory	Lawson, Alameda-Lawson & Byrnes (2015)	Adolescent Attitudes & Expectations	Retrospective; Quantitative Sample: Child Abuse Prevention Correlational Design *N*=1,339 Time to Prediction: Group Membership	Substantiation*	Descriptive Statistics Latent Path Model	Substantiated *M* = 40.1, *SD* = 14.5 Unsubstantiated *M* = 40.7, *SD* = 14.2 CFI: .99
Parent-Child Conflict Tactics Scale	Bennett, Sullivan & Lewis (2006)	Clinical Practice Prevalence of Maltreatment	Prospective; Quantitative Families with Substantiated Maltreatment Histories Correlational Design *N*= 139 Time to Prediction: Group Membership	Group Membership*	Sensitivity & Specificity ROC Curve Logistic Regression	*fp* = 68.4%, *fn* =4.9% (*p* < .05) AUC: .60 Neglect Subscale OR = 1.80, *p* < .05
North Carolina Family Assessment Scale	Kirk, Kim & Griffith (2005)	Family Functioning & Treatment Needs	Retrospective; Quantitative Child Abuse Prevention Program Correlational Design N=1,279 Time to Prediction: Intake, Case Closure & 12 Months	Out of Home Placement*	Chi Square	Intake Predicting to 12 Months: Environment Subscale: X^2 (*df* = 5) = 19.64, *p* < .05)

*= Dependent variable used in findings

Aim of the Study

The main purpose of the dissertation examines the predictive capacity of an assessment instrument used in home visitation programming, the Healthy Families Parenting Inventory. The predictive validity of baseline total composite score and risk classifications (Research Question 1) will be explored, along with the predictive validity of the nine individual subscale domains of the Healthy Families Parenting Inventory (Research Question 2), followed by an exploration the relationship between subscales of the Healthy Families Parenting Inventory and a maltreatment investigation with the Arizona Department of Child Safety (Research Question 3). The final research question explores the relationship between individual red flag and strength indicator items in the Healthy Families Parenting Inventory and the occurrence of a maltreatment investigation with the Arizona Department of Child Safety (Research Question 4). This dissertation examines maltreatment assessment in home visitation as a means to develop a comprehensive understanding of the interaction of risk and protective factors associated with the occurrence of maltreatment among at-risk families enrolled in early childhood home visitation programs. The developmental-ecological theory is used in this study to inform the research questions, methodology, implications, and potential future research in this area.

CHAPTER THREE

METHODOLOGY

The purpose of this third chapter is to provide a detailed description of the design and methods used to achieve the research aims posed at the end of the previous chapter. In order to answer these research questions, the Healthy Families Parenting Inventory was selected for examination of predictive validity, as this instrument was specifically developed for use in assessment within home visitation settings. This research is placed in the context of a home visitation setting, where the sample population includes families with young children identified as being at risk for maltreatment or other adverse outcomes. Subsequently, home visitation serves as the backdrop for participant inclusion, and sets the foundation for implications for the dissertation itself. This chapter is organized into three main sections related to the methodological approach taken. First, a discussion of the research design specific to the setting used is discussed, including sampling considerations, and data sources from both Healthy Families Arizona and the Arizona Department of Child Safety. This section closes with a discussion related to the specifics of record linkage methodology, followed by the presentation of four specific research questions and detail on the analytic methods of those research questions in section four.

Research Design

This study makes use of secondary data, utilizing a longitudinal cohort design to retrospectively examine the predictive validity of the Healthy Families Parenting Inventory. The utility of the Healthy Families Parenting Inventory to predict future occurrence of an investigation of maltreatment with the Arizona Department of Child

Safety was examined using a sample of families enrolled statewide in Arizona's Healthy Families Program who experienced an investigation with the Arizona Department of Child Safety, compared to socio-demographically similar children for whom no investigation of abuse or neglect occurred. Probabilistic matching was used to link child-level administrative data from Healthy Families Arizona home visitation programming and maltreatment data from Arizona's public child welfare system, the Department of Child Safety. The study utilized baseline Healthy Families Parenting Inventory assessment data from all families enrolled in Healthy Families Arizona statewide intervention during the 2012 and 2013 fiscal years from July 2011 until June 2013, and followed these families administratively for one year from the date of enrollment until June 2013 and June 2014 respectively through Department of Child Safety maltreatment data in measuring the occurrence of an investigation of abuse or neglect.

The heightened risk for maltreatment among families enrolled in home visitation is well established (Avellar et al., 2014; Harding et al., 2007; National Center for Children in Poverty, 2008). In examining the capacity of the Healthy Families Parenting Inventory to predict a family's potential for future child maltreatment, the study utilized an investigation of maltreatment generated by an investigation of abuse or neglect to the Arizona Child Abuse Hotline as an outcome variable to measure the occurrence of future child maltreatment. However, the occurrence of a maltreatment investigation is a rare event, limiting the statistical analyses that are possible in many validation studies. This study overcomes this limitation through the analysis of the full universe of children enrolled in Arizona's largest home visitation program, Healthy Families Arizona, over the course of two full fiscal years. This translates into over 2,000 enrolled families, a

disproportionately high share of whom go on to later experience an investigation of maltreatment compared to national averages (USDHHS, 2016a). The use of multi-year state-wide cohort sample and longitudinal methodology allow for rare event and base rate issues to be overcome through comprehensive identification of at-risk families, consequently reducing bias and enhancing the capacity for casual inference.

Setting

The home visitation setting, Healthy Families Arizona, sets the framework with implications for participant inclusion in the study. The study utilizes the Healthy Families Arizona program as a backdrop for participant selection. Healthy Families Arizona is based on the national Healthy Families America model, which operates in 35 states in the United States, and serves an average of 100,000 families a year (Healthy Families America, 2017). Healthy Families is well established in Arizona, and has been providing services to at-risk families for more than 16 years, with sites across the state of Arizona. The Healthy Families intervention works with prenatal and new parents to offer an array of services designed to improve child health and safety, increase knowledge of parenting practices, and enhance maternal health, self-sufficiency, and coping strategies. The program targets overburdened families with children at or near birth to the age of five to assist parents in building skills necessary for successful parenting during the most vulnerable periods of a child's life characterized by rapid bio-physiological development. Families are identified for participation after being screened and meeting cutoff scores that identify socio-environmental risk factors related to risk for future maltreatment and other adverse outcomes such as poverty, young maternal age, or single parenthood. Healthy Families Arizona takes a multifaceted approach to supporting at-risk families

through the utilization of a standardized curriculum during service provision, by increasing the parent's knowledge of child development, teaching parenting skills, promoting infant-parent bonding, strengthening important relationships with fathers and other family members, and building responsive networks through linkage to community resources. In addition, through the course of services, the home-visitor working with the family assists in helping new parents address personal issues such as substance abuse, domestic violence, or mental health issues by identifying and subsequently mobilizing available community resources. Hands-on modeling by the home-visitor is a critical component of service provision, as the home-visitor models positive parenting and attachment behavior, reviews the child's developmental progress, ensures the safety of the home, and provides emotional support as new parents attempt to adapt to the changing environment associated with new parenthood (Healthy Families America, 2017).

Participant Criteria

Participant families were identified for study inclusion as part of the Healthy Families Arizona recruitment process during fiscal years 2012 and 2013 after being referred to Healthy Families Arizona. Families were referred to Healthy Families Arizona after routine screening in a community setting such as a hospital, determined that the family may be at risk for maltreatment or other adverse outcomes as a result of low income, single parent status, or household instability (Healthy Families America, 2017). The primary participants in the Healthy Families Arizona intervention are overwhelmingly female, however any primary caregiver is considered eligible for the program. Once the referral by the community professional was received by Healthy

Families Arizona, an intake worker from Healthy Families Arizona completed the second tier screening process, which consisted of the completion of the standardized Parent Survey. The Parent Survey (Korfmacher, 2000) is a brief instrument based on the Family Stress Inventory that measures risk for child maltreatment or caregiving difficulties for children of all ages. This survey is implemented through a semi-structured interview, which asks parents about stress, parent's childhood history, potential for violence, household stressors, parental expectations, and other areas. The instrument is completed and scored by Healthy Families Arizona staff, and a risk threshold must be met in order for the family to continue to meet criteria for program inclusion.

Once participating families were determined eligible for services, staff from Healthy Families Arizona made contact with the family to complete the initial assessment, which included the completion of the Healthy Families Parenting Inventory. The Healthy Families Parenting Inventory is typically completed within the first one-to-two home-visits, however programmatic guidelines require its completion within 60 days of service initiation. Participant inclusion in the study was determined solely by completion of the baseline Healthy Families Parenting Inventory, rather than total length of time enrolled in the intervention. A small percentage of families who initially agreed to participate in services declined participation at the time of the first home-visit, or very early on in programming before the baseline Healthy Families Parenting Inventory was completed. These families who did not participate in the Healthy Families Arizona program long enough to complete the baseline Healthy Families Parenting Inventory were excluded from the study.

Timeframe

The dissertation window spans the calendar years from 2012 to 2014, capturing the full cohort of children and their families enrolled continuously in Arizona's Healthy Families statewide program during the 2012 and 2013 fiscal years from July 2011 until June 2013. These families were then followed administratively through public child welfare data from the Department of Child Safety from the family's initial engagement in the Healthy Families Arizona intervention for one year. Consequently, for the 2012 fiscal year cohort, these families were followed administratively until July 2013, and for the 2013 fiscal year cohort, these families were followed administratively until July 2014. Because the outcome variable, an investigation of maltreatment with the Arizona Department of Child Safety, is a rare event, the one-year time frame available retrospectively to follow families administratively in Arizona's public child welfare database was desirable to shorter follow-up periods in order to increase the power of this study, and mitigate the occurrence of false positives or negatives (Sabol, Coulton, & Polousky, 2004; Sedlak et al., 2010). Furthermore, the one-year follow-up period was selected for purposes of this study due to the variability in risk factors between infancy and subsequent contextual developmental periods. By limiting the study to a one-year follow-up period, the dissertation focuses specifically on risk and protective factors for maltreatment identified during infancy on the Healthy Families Parenting Inventory that are subsequently identifiable and malleable during the Healthy Families home visitation intervention.

Data Sources

This dissertation uses secondary data that was compiled from two different sources. First, the Healthy Families Arizona database was used to gather information pertaining to demographic information of participants in addition to family's Healthy Families Parenting Inventory total composite and individual subscale scores. Second, data on the occurrence of a maltreatment investigation was obtained from the Arizona Department of Child Safety. Both of these data sources are discussed in further detail below. See Table 3.1 for description of study variables.

Healthy Families Arizona

The first component of data collection required that information be extracted from the Healthy Families Arizona electronic data system for each participating family. The data collected from this database included demographic information, the Healthy Families Parenting Inventory total composite score, data on the nine Healthy Families Parenting Inventory subscale scores, and individual red flag and strength indicator values for each participating family. Demographic variables for participants were collected including the zip code where the family resides, length of program participation, intervention dosage, ethnicity/race of the family, total family income, marital status, and age of the participating mother. Additional demographic variables specifically relating to the child whom was the target of services were collected including their gender assigned at birth, birth weight, and occurrence of known birth defects at birth.

Arizona Department of Child Safety

The second component of data collection required official Arizona Department of Child Safety data pertaining to the occurrence of a maltreatment investigation with the

agency. The permission and partnership with the Arizona Department of Child Safety allowed this portion of the data collection to be possible through a download of an aggregate file containing information pertaining to the both the occurrence of maltreatment among all children living in the family's home. Information pertaining to a family's involvement with the Arizona Department of Child Safety included maltreatment investigation data from July 2011 until June 2014, allowing for families to be followed administratively for one year after their enrollment date with Healthy Families Arizona. Instances of maltreatment investigations with the Arizona Department of Child Safety reported prior to the family's enrollment with the Healthy Families intervention were excluded from the analysis. In total, reports of maltreatment suggesting a maltreatment investigation that occurred between July 2011 and June 2014 with specific consideration to each individual family's enrollment date with Healthy Families Arizona were included in the analysis.

Table 3.1

Study Variables

Variable	Variable Type	Linkage Database
Residential Zip Code	Nominal	Healthy Families Arizona Department of Child Safety
Total Family Income	Interval/Ratio	Healthy Families Arizona
Ethnicity/Race	Nominal	Healthy Families Arizona
Marital Status	Nominal	Healthy Families Arizona
Mother's Age	Interval/Ratio	Healthy Families Arizona
Child's Birth Weight	Interval/Ratio	Healthy Families Arizona
Known Birth Defects	Nominal	Healthy Families Arizona
Program Dosage	Interval/Ratio	Healthy Families Arizona
Length of Program Involvement	Interval/Ratio	Healthy Families Arizona
HFPI Total Composite Score	Interval/Ratio	Healthy Families Arizona
HFPI Subscale Scores	Interval/Ratio	Healthy Families Arizona
Red Flag Indicators	Interval/Ratio	Healthy Families Arizona
Strength Indicators	Interval/Ratio	Healthy Families Arizona
Maltreatment Investigation	Nominal	Department of Child Safety

Linkage Methodology

Probabilistic record linkage was used to link the Department of Child Safety records to the Healthy Families Arizona study population data. Probabilistic record matching, used widely in epidemiology and demography research, assumes that no comparison between fields common to either source database will link an individual's records with complete confidence. Instead, the method determines that the two records belong to the same person by matching as many pieces of identifying information as possible from each database. This strategy has become increasingly sophisticated over the last decade, and has been verified as a superior method for linking families that do not have a common unique identifier (Winkler, 1995). Since the two data sources lacked a consistent common unique identifier, and contained non-unique identifiers that had not been verified, probabilistic matching was selected as the most appropriate data linkage methodology. Families included in the analysis were matched on variables including mother's name, mother's date of birth, mother's social security number, the family's primary address, the child's name whom is identified as the target of the Healthy Families intervention, and the child's date of birth.

The process of probabilistic record matching was used for this study, as information obtained by Healthy Families Arizona and the Department of Child Safety was not consistently accurate, or in many instances was not known. For instance, the first and last name of the child whom is the target of the Healthy Families Arizona intervention was not always consistent across both databases, as a child in the family home may not have been the target of the Healthy Families Arizona program, however may be identified as a victim of child abuse or neglect by the public child welfare system.

Furthermore, circumstantial barriers to accurate data collection including name changes over the life course as a result of marriage, as well as reluctance to provide confidential information pertaining to social security numbers limited available data linkage methodologies.

The matching process occurred by matching records using the mother's social security number, mother's first and last name, mother's date of birth, targeted child of the Healthy Families Arizona intervention's first and last name, and the family's recorded zip code. If the mother's social security number, and first name were equivalent, the record was considered a match. If the mother's social security number was not equivalent, however the mother's first name, last name, date of birth, and victim child's first and last name were equivalent across databases, this was considered a match. If a mother's social security number and last name were not equivalent, however mother's first name, date of birth, and victim child's first and last name were equivalent across databases, this was considered a match. Lastly, if a mother's social security number, mother's last name, and victim child's name were equivalent, however if the mother's first name, date of birth, and zip code were equivalent, it was considered a match. Figure 4.1 describes minimum probabilistic matching requirements across databases.

Figure 4.1

Matching Fields and Methods for Record Linkages

Match Field	Match Methods	Healthy Families Arizona Variable		Department of Child Safety Variable	Match Decision
Mother's Social Security Mother's First Name	EXACT NAME-FIRST	SOCM MOTHERFIRST	<–>	PERS-SOC PER-FIRST	Confirmed Match
Mother's First Name Mother's Last Name Mother's Date of Birth	NAME-FIRST NAME-LAST DATE	MOTHERFIRST MOTHERLAST DOBM	<–>	PERS-LAST PERS-FIRST PER-DOB	Confirmed Match
Mother's First Name Mother's Date of Birth Child's First Name	NAME-FIRST DATE NAME-FIRST	MOTHERFIRST DOBM CHILDFIRST	<–>	PERS-FIRST PER-DOB VICTIM-FIRST	Confirmed Match
Mother's First Name Mother's Date of Birth Family's Zip Code	NAME-FIRST DATE EXACT	CHILDFIRST DOBM ZIPCODE	<–>	CHILD-FIRST DOBM ZIPCODE	Confirmed Match

Dependent Variables

Broadly speaking, the outcome measure for the dissertation was the occurrence of maltreatment, which was measured through identification of an investigation of abuse or neglect with the Arizona Department of Child Safety for any child within the family system. The dissertation utilized a family's score on multiple components of the Healthy Families Parenting Inventory to predict to any occurrence of a maltreatment investigation, including instances of physical abuse, sexual abuse, emotional abuse, and neglect. New investigations, whether substantiated or unsubstantiated were used as an outcome measure, as these instances of maltreatment, while less reliable than substantiation data, are better indicators of future developmental and behavioral outcomes of children (Hussey et al., 2005) in that they are risk indicators of all maltreatment reporting, and by implication, future danger to children. A broad approach to maltreatment prediction that incorporates all forms of maltreatment for all children

within the family context is utilized in the study to comprehensively assess maltreatment risk, and allow for holistic treatment plan development.

Specifically, the analyses used in the dissertation predict to the occurrence of maltreatment investigation as an outcome variable among all of the children identified by the Department of Child Safety as having a parent-child relationship with a parent enrolled in the Healthy Families intervention during the 2012 and 2013 fiscal years. The dissertation expands beyond examining child maltreatment solely against the targeted child of the Healthy Families Arizona intervention, to include all siblings residing in the home. In instances where multiple investigations of maltreatment exist among multiple children for the same incident, only one instance of maltreatment will be counted for purposes of the analysis to avoid duplication. The methodological decision to include all children within the family system at-risk for child abuse and neglect allows for an examination of the family's risk for child maltreatment comprehensively, incorporating risk from across ecological contextual levels. Because maltreatment impacts various levels of the interactive family system, examining maltreatment among all children in the home allows for a complete understanding of maltreatment occurrence across the family system. Utilizing this approach aligns the study with both the developmental-ecological theory and programmatic theory in home visitation that targets reduction in risk factors for maltreatment within the family's household. The analysis utilized one dichotomous variable as the outcome variable (yes/no) indicating the occurrence of an investigation with the Arizona Department of Child Safety for any child within the family home. Although some families may experience multiple allegations of maltreatment in multiple

incidents against multiple children, the investigation was dichotomized as the occurrence of a maltreatment investigation during the one-year follow-up period.

Independent Variables

The independent variables that were included in the analyses were derived from demographic variables for participating families, in addition to individual scores on the Healthy Families Parenting Inventory collected during the course of typical service provision with the Healthy Families Arizona intervention. Specifically, demographic variables, individual total baseline composite score, subscale scores, and individual red flag and strength indicator items on the Healthy Families Parenting Inventory were utilized as independent variables in the examination of predictive validity of the Healthy Families Parenting Inventory.

Demographic Information

Demographic information for participants involved in the study were collected from the Healthy Families Arizona database gathered during provision of services in the Healthy Families Arizona program. For this dissertation, existing demographic data was used to examine whether inclusive groups of participants stratified by socio-demographic characteristics. Specifically, risk variables known in the literature that are associated with maltreatment were examined in the bivariate analyses including parental age, gender of the targeted child, length of program participation, intervention dosage, ethnicity/race of the family, total family income, geographic location, and marital status. Significant demographic variables were subsequently controlled for as covariates in the regression analyses. The utilization of significant demographic variables in the analyses allowed for an examination of the relationship between Healthy Families Parenting Inventory scores

and the occurrence of a maltreatment investigation while controlling for socio-demographic variables that may have potentially influenced the relationship.

Healthy Families Parenting Inventory

The overall total composite score of the Healthy Families Parenting Inventory is the summed value of the 63 individual risk items arranged into nine successive blocks of questions with total composite scores ranging from 63 to 315. The nine successive blocks are measured using an ecological systems theory lens, and are grouped into nine subscales: 1) social support 2) problem solving/coping 3) depression 4) personal care 5) mobilizing resources 6) role satisfaction 7) parent/child interaction 8) home environment and 9) parenting efficacy. All items are scored using a likert scale, including "rarely or never, a little of the time, some of the time, a good part of the time, and always or most of the time". The total score on the Healthy Families Parenting Inventory is calculated by adding all 63 items to obtain a total composite score. Scores among the nine individual subscales are calculated by adding the value of all items in the scale. Low scores are determined within each of the subscales, along with seven "red flag" questions across two subscales designed to necessitate specialized intervention on part of the home-visitor. In contrast, ten items across five subscales on the inventory suggestive of strengths, referred to as "strength indicators" are outlined for home-visitors to provide reference in building individualized service plans. A family's total composite score on the Healthy Families Parenting Inventory is calculated with particular attention paid to individual subscale scores, "red flag" items, and "strength indicators," that are used in practice to provide further clinical direction to practitioners (See Table 5.1). All nine subscales of the Healthy Families Parenting Inventory have dynamic properties, and are intended for use

in identification of family risk factors and strengths during the course of service provision and treatment plan development. Each subscale presents individual risk and protective factors for future maltreatment within ecological contexts independently, however it is the interaction between multiple subscales that is theorized to predict a family's risk for future maltreatment (See Figure 2.1). In this section, each domain is discussed, and the risk and protection items contained within each subscale are identified.

Table 5.1

Healthy Families Parenting Inventory Reliability

Subscale	*Item Range*	*Low Scores*	*Red Flag Indicators*	*Strength Indicators*	*Chronbach's alpha*
Social Support	1-5	17	No	Yes	.84
Problem Solving	6-11	19	No	Yes	.92
Depression	12-20	33	Yes	Yes	.79
Personal Care	21-25	16	No	No	.76
Mobilizing Resources	26-31	18	No	No	.86
Role Satisfaction	32-37	21	Yes	No	.76
Parent/Child Interaction	38-47	40	No	No	.77
Home Environment	48-57	33	No	Yes	.76
Parenting Efficacy	58-63	22	No	Yes	.87

Social Support is the first subscale of the Healthy Families Parenting Inventory, and is comprised of five questions that measure the family's availability and reliability of their social support system within the immediate and broader contexts of the developmental-ecological theory. Total scores in this domain contain values ranging from five to twenty-five utilizing likert scale measurement for individual questions, with individual item values ranging from one to five. The risk factor identified in this subscale is limited social support within the family system, with the identified protective factor being a robust and available social support system. This subscale is included in the instrument in order to determine the level and availability of the family's support system

during times of need. The subscale includes two strength questions "I feel others care about me" and "if I have trouble, there is always someone I can turn to for help." Scores of four or five on either of these items indicate areas of strength for the family for purposes of assessment and treatment planning.

The second subscale *is Problem Solving/Coping.* This domain is comprised of six items that measure a family's ability to solve problems, manage adversity, and persevere through difficult situations within the developmental-psychological and immediate contexts of the developmental-ecological theory. Total scores in this subscale contain values ranging from six to thirty utilizing likert scale measurement for individual questions, with individual item values ranging from one to five. The risk factor identified in this subscale is inadequate problem solving/coping skills, with the protective factor identified as the ability to manage stress and engage in effective problem solving and healthy coping strategies. The subscale includes two strength questions "when I have a problem, I take steps to resolve it" and "I remain calm when new problems come up." Scores of four or five on either of these questions indicate areas of strength for the family for purposes of assessment and treatment planning. The purpose of this domain is to determine a family's ability to cope with difficult situations, and identify difficulties in parenting and household management.

Depression is the third subscale, which contains nine items related to the caregiver's self-esteem, outlook on the future, feelings of hope, and level of happiness within the developmental-psychological and immediate contexts of the developmental-ecological theory. Total scores in this subscale contain values ranging from nine to forty-five utilizing likert scale measurement for individual items, with values ranging from one

to five. The risk factor identified for this subscale is elevated feelings of depression, and the protective factor identified for this subscale is feelings of happiness, and hope for the future. The purpose of this measure is to determine the caregiver's risk for depression including four reverse coded "red flag" questions, including "I feel sad", "I feel unhappy about everything", "I feel hopeless about the future", and "I have so many problems I feel overwhelmed by them." Scores of 4 or 5 on any of these red flag questions indicate that immediate intervention on behalf of the home-visitor may be necessary. In addition, the subscale has one strength question "I feel positive about myself." Scores of 4 or 5 on this item indicate areas of strength for the family for purposes of assessment and treatment planning. The purpose of this subscale is to identify problematic levels of depression, which may interfere with a parent's ability to provide safe and consistent care to their child.

The fourth subscale, *personal care*, contains five items measuring the caregiver's ability to engage in self-care, and participate in activities designed to be re-energizing within multiple ecological domains. Total scores in this subscale contain values ranging from five to twenty-five utilizing likert scale measurement for individual items, with values ranging from one to five. The risk factor for this subscale is disengagement in self-care activities, with the protective factor identified for this subscale being effective household management strategies and engagement in effective self-care activities. The inclusion of this subscale in the instrument is to identify the caregiver's ability to manage household and parenting responsibilities in a manner that allows them to take time for themselves, and maintain a positive sense of self.

Mobilizing Resources is the fifth subscale, which contains six items related to a caregiver's ability to mobilize necessary community resources for their family within the immediate and broader contexts of the developmental-ecological theory. Total scores in this domain contain values ranging from six to thirty utilizing likert scale measurement for individual questions, with values ranging from one to five. The risk factor for this subscale is limited connection and utilization of community resources; with the protective factor being identified as skillful precision in identifying and accessing necessary community resources. The inclusion of this subscale in the overall instrument is to identify the caregiver's knowledge of community resources, and their level of comfort in seeking these services should needs arise within the family system.

The sixth subscale, *role satisfaction*, contains six measures of a caregiver's satisfaction in their role as a parent within the developmental-psychological and immediate contexts of the developmental-ecological theory. Total scores in this domain contain values ranging from six to thirty utilizing likert scale measurement for individual items, with values ranging from one to five. The risk factor for this subscale is negative perception towards parenting, with the protective factor identified as satisfaction with the parental role. This subscale contains three "red flag" items including "I feel trapped by all the things I have to do for my child", "I feel drained dealing with my child", and "I feel frustrated because my whole life seems to revolve around my child." Scores of four or five on either of these red flag questions indicate that immediate intervention on behalf of the home-visitor may be necessary. The inclusion of this subscale is to identify the caregiver's perceptions of the impact of parenting, levels of tolerance pertaining to parenting activities, and the parent's ability to cope with stressful parenting situations.

Parent/Child Interaction is the seventh subscale that contains ten measures of the caregiver's ability to meet the needs of their child, manage their child's challenging behaviors, and engage in positive parenting activities within the developmental-psychological and immediate contexts of the developmental-ecological theory. Total scores in this subscale contain values ranging from ten to fifty utilizing likert scale measurement for individual items, with values ranging from one to five. The risk factor identified for this subscale is negative parent/child interactions, with the protective factor identified as positive parent/child interactions and strong attachment. The subscale includes one strength question "I can remain calm when my child is upset." A score of four or five on this question indicates areas of strength for the family for purposes of assessment and treatment planning. The purpose of this measure is to determine a family's ability to cope with difficult situations, and identify difficulties in parenting and household management. The purpose of this subscale is to identify the caregiver's perception of their ability to manage their child's challenging behaviors, predict and respond effectively to their needs, engage in positive behaviors that promote strong attachment, and cope with difficult parenting situations.

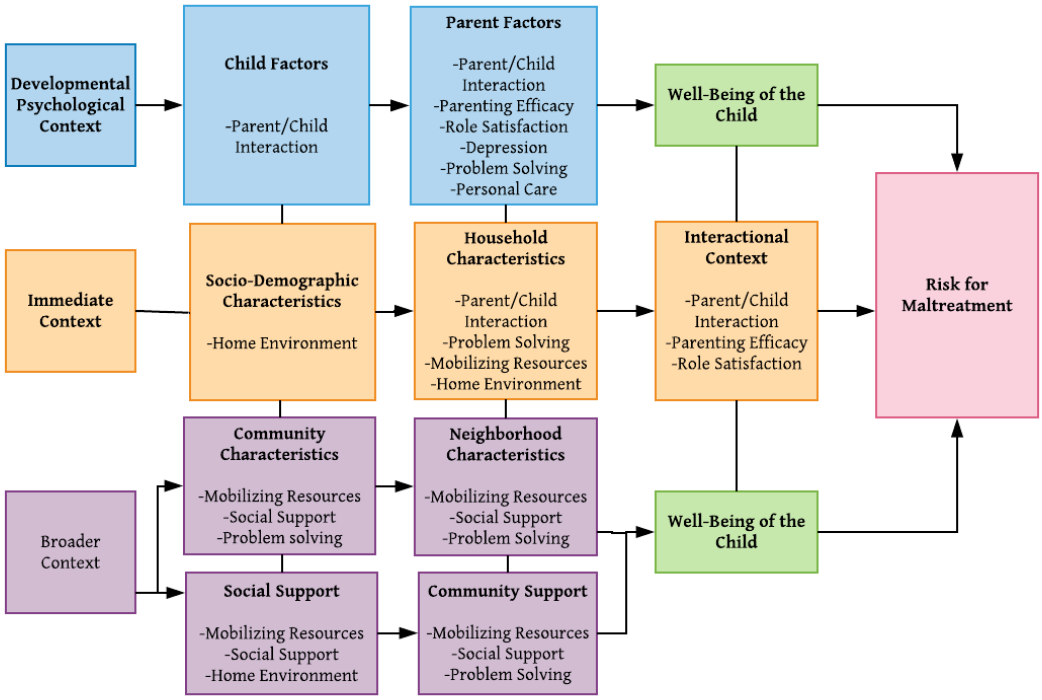
The eighth subscale, *home environment,* contains ten items pertaining to the caregiver's ability to establish a safe and structured home environment for their child within the developmental-psychological, immediate, and broader contexts of the developmental-ecological theory. Total scores in this subscale contain values ranging from one to fifty utilizing likert scale measurement for individual items, with values ranging from one to five. The risk factor identified for this subscale is an unsafe and unstable home environment, with the protective factor being safe and secure housing and

consistent and stable household structure. The subscale includes two strength questions including "I have organized my home for raising my child" and "I plan to do a variety of activities with my child every day." Scores of four or five on either of these questions indicate areas of strength for the family for purposes of assessment and treatment planning. The purpose of this subscale is to identify the caregiver's ability to create an environment which is developmentally appropriate for their child, engage in regular meaningful activities, and establish structure and limits within the family setting.

The final subscale contains six questions that assess the caregiver's *parenting efficacy* within the developmental-psychological, immediate, and broader contexts of the developmental-ecological theory. Total scores in this domain contain values ranging from 6 to 30 utilizing likert scale measurement for individual questions, with values ranging from 1 to 5. Each of the five items in the subscale are scored through likert scales, and are designed to measure a parent's sense of parenting strength. The subscale contains two strength questions including "I am proud of myself as a parent" and "I learn new parenting skills and use them with my child." Scores of four or five on these questions indicate areas of strength for the family for utilization in assessment and service provision. The risk factor for this subscale is poor parenting efficacy, with a protective factor identified as confidence and readiness for participation in a parental role. The interaction of the nine subscales of the Healthy Families Parenting Inventory from a developmental-ecological lens is illustrated in Figure 2.1.

Figure 2.1

HFPI Embedded within the Developmental-Ecological Theory of Child Maltreatment



Research Questions

This study proposes the following research questions with respect to examining the predictive validity of the Healthy Families Parenting Inventory in Table 6.1 below:

Table 6.1

Study Research Questions

Research Question 1: Do baseline total composite scores from the Healthy Families Parenting Inventory have a statistically significant predictive relationship with the occurrence of a maltreatment investigation?
Research Hypothesis 1.1: Families who experienced an investigation of maltreatment with the Arizona Department of Child Safety will have an overall lower mean Healthy Families Parenting Inventory total composite score than families that did not.

Research Hypothesis 1.2: Baseline Healthy Families Parenting Inventory total composite scores have a statistically significant predictive relationship with the occurrence of a maltreatment investigation with the Arizona Department of Child Safety.

Research Hypothesis 1.3: Empirically established risk classifications of the Healthy Families Parenting Inventory have a statistically significant predictive relationship with the occurrence of a maltreatment investigation with the Arizona Department of Child Safety.

Research Question 2: Do any of the nine baseline subscales within the Healthy Families Parenting Inventory have a statistically significant predictive relationship with the occurrence of a maltreatment investigation?

Research Hypothesis 2.1: Families who experienced an investigation of maltreatment with the Arizona Department of Child Safety will have overall lower mean scores on all nine of the Healthy Families Parenting Inventory subscale domains than families that did not.

Research Hypothesis 2.2: When examined individually, all nine subscales of the Healthy Families Parenting Inventory have a statistically significant predictive relationship with the occurrence of a maltreatment investigation with the Arizona Department of Child Safety.

Research Hypothesis 2.3: When examined collectively, all nine subscales of the Healthy Families Parenting Inventory have a statistically significant predictive relationship with the occurrence of a maltreatment investigation with the Arizona Department of Child Safety.

Research Question 3: How do the baseline Healthy Families Parenting Inventory subscales interact in predicting the occurrence of a maltreatment investigation?

Research Hypothesis 3.1: The social support, problem solving, home environment, parent/child interaction, and parenting efficacy subscales moderate the relationship between depression and the occurrence of a maltreatment investigation with the Arizona Department of Child Safety.

Research Hypothesis 3.2: The social support, problem solving, home environment, parent/child interaction, and parenting efficacy subscales moderate the relationship between role satisfaction and the occurrence of a maltreatment investigation with the Arizona Department of Child Safety.

Research Question 4: Do baseline red flag and strength indicator items on the Healthy Families Parenting Inventory predict the occurrence of a maltreatment investigation? When examined collectively, do the red flag and strength indicator items have a predictive relationship with the occurrence of a maltreatment investigation?

Research Hypothesis 4.1: Families that experienced an investigation of maltreatment with the Arizona Department of Child Safety will have overall lower mean scores on the reverse coded "red flag" items of the Healthy Families Parenting Inventory than those did not.

Research Hypothesis 4.2: Families that did not experience an investigation of maltreatment with the Arizona Department of Child Safety will have overall higher mean scores on the "strength indicator" items of the Healthy Families Parenting Inventory than those that did not.

Research Hypothesis 4.3: The seven risk factor items classified as red flag items in the depression and role satisfaction subscales have a significantly predictive relationship with the occurrence of a maltreatment investigation with the Arizona Department of Child Safety.

Research Hypothesis 4.4: When examined collectively, the red flag indicator questions on the Healthy Families Parenting Inventory will have a significantly predictive relationship with the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety.

Statistical Analyses

This study uses several different analytic techniques to examine the predictive validity of the Healthy Families Parenting Inventory. To answer the research questions guiding this dissertation the following analytic techniques were used:

Research Question 1

To answer the first research question, the total composite Healthy Families Parenting Inventory scores collected at baseline were investigated as the independent variable in predicting the occurrence of a maltreatment investigation with the Arizona Department of Child Safety. First, a point-biserial correlation coefficient (r_{pb}) was used to examine the strength of the relationship between the total composite score of the instrument and the occurrence of a maltreatment investigation. Next, a t-test (t) was used to explore the difference in the average total Healthy Families Parenting Inventory composite score between those that received an investigation of maltreatment, and those

that did not. The final analysis included a logistic regression model to predict the occurrence of a maltreatment investigation from a family's total baseline composite score on the Healthy Families Parenting Inventory while controlling for covariates.

Next, risk classification cut-points were established using percentile rankings from the total composite score of the Healthy Families Parenting Inventory. Once an optimal classification cut-point was established, chi-square analyses (X^2) were used to examine the relationship between Healthy Families Parenting Inventory risk classifications and occurrence of a maltreatment investigation. Finally, a logistic regression was modeled to examine the predictive validity of the Healthy Families Parenting Inventory risk-classification cut-off scores and the occurrence of a maltreatment investigation while controlling for covariates.

Research Question 2

To answer the second research question, the nine individual subscale domain scores of the Healthy Families Parenting Inventory collected at baseline were investigated as independent variables in predicting the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety. First, t-tests (t) were used to examine the difference in the average total subscale scores of the nine Healthy Families Parenting Inventory subscale domains between families who received an investigation of maltreatment, and those that did not. Next, nine logistic regression models were used to predict the occurrence of a maltreatment investigation from each of the individual subscales of the Healthy Families Parenting Inventory while controlling for covariates. Finally, a tenth logistic regression was modeled with all nine subscale scores entered into

the model simultaneously to examine the predictive capacity of each subscale score while controlling for other subscale scores and covariates.

Research Question 3

To answer the third research question, the exploratory analyses included logistic regression models to investigate the capacity of individual subscale scores of the Healthy Families Parenting Inventory to mediate the role satisfaction and depression subscale domain scores in predicting the occurrence of a maltreatment investigation with the Arizona Department of Child Safety. First, interaction terms were created between the depression and role satisfaction subscale domains of the Healthy Families Parenting Inventory and the remaining subscales. The analyses included three regression models for each relationship between the independent variable and dependent variable for each potential moderating variable.

Pertaining to the examination of the moderating effect of the social support, problem solving, home environment, parent/child interaction and parenting efficacy subscales on the relationship between role satisfaction and an investigation of maltreatment, the analyses included 21 logistic regression models. The first set of seven regression models included covariates, the role satisfaction subscale score, and the identified moderating variable. The second set of seven logistic regression models included covariates, the role satisfaction subscale domain score, the identified moderating variable, and the interaction term variables. The third set of seven logistic regression models included covariates, the role satisfaction subscale domain score, the identified moderating variable, the interaction term variables, and covariate variable interaction terms. Simple slope calculations were then used to probe significant interactions.

Pertaining to the examination of the moderating effect of the social support, problem solving, home environment, parent/child interaction, and parenting efficacy subscales on the relationship between the depression subscale domain and an investigation of maltreatment with the Arizona Department of Child Safety, the analyses included 21 logistic regression models. The first set of seven regression models included covariates, the depression subscale score, and the identified moderating variable. The second set of seven logistic regression models included demographic variables, the depression subscale score, the identified moderating variable, and the interaction term variables. The third set of seven logistic regression models included demographic variables, the depression subscale domain score, the identified moderating variable, the interaction term variables, and the covariate variable interaction terms. Simple slope calculations were then used to probe significant interactions.

Research Question 4

To answer the final research question, seven individual red flag items and ten strength indicator questions on the Healthy Families Parenting Inventory collected at baseline were investigated as independent variables in predicting the occurrence of a maltreatment investigation with the Arizona Department of Child Safety. First, t-tests (t) were used to examine the differences in the average total mean scores on the item between families who received an investigation of maltreatment, and those that did not. Next, individual red flag and strength indicator items were included in two logistic regression models to predict the occurrence of an investigation of maltreatment. The final analysis involved operationalizing the strength indicator items and red flag indicator items into two new subscale domains. These subscales were then analyzed using two

binary logistic regression models controlling for covariates to predict the occurrence of an investigation of maltreatment.

Effect Sizes

Effect sizes were measured using several measures to quantify the differences between groups of families that experienced a maltreatment investigation with the Arizona Department of Child Safety and those that did not. First, Rice and Harris's (2005) standards for effect sizes were used to interpret point-biserial (r_{pb}) correlation coefficients as well as the area under the ROC curve (AUC). Specifically, point-biserial correlations coefficients (r_{pb}) were interpreted as "small" (r_{pb} = .100), "medium" (r_{pb} = .243), and "large" (r_{pb} = .371). Pertaining to the area under the ROC curve, AUC values were interpreted as "no discrimination" (AUC = .5); "acceptable" (AUC = .7 - .8); "excellent" (AUC = .8 - .9); and "outstanding" (AUC = .9). Further, Pearson's *r* values were determined as "small" (*r* = .10), "medium (*r* = .25), and "large" (*r* = .40); and Cohen's *d* values were determined as "small" (*d* = .20); "medium" (*d* = .50); and "large" (*d* = .80) (Cohen, 1988). In interpretation of Odds Ratios (OR) in logistic regression, Cohen's (1998) determination was used measured as "small" (OR = 1.5), "medium" (OR = 2.5), and "large" (OR = 4.5). Finally, using Rea and Parks (1992) interpretation, Cramer's V effect sizes were determined as "negligible" (0 - .10); "weak" (.10 - .20); "moderate" (.20 - .40); "relatively strong" (.40 - .60); "strong" (.60 - .80) and "very strong" (.80 - 1.0).

CHAPTER FOUR

RESULTS AND FINDINGS

This chapter presents the findings from the data collection and analytic plan described in Chapter Three. The chapter begins by first presenting descriptive statistics specific to the sample. Descriptive statistics relative to the Healthy Families Parenting Inventory including frequencies will then be presented. The findings from the four research questions are presented in the following order: 1) Overall predictive validity of the overall Healthy Families Parenting Inventory total composite score and risk classifications in relation to the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety (Research Question 1); 2) Predictive validity of the nine subscales of the Healthy Families Parenting Inventory in relation to the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety (Research Question 2); 3) Examination of the interaction between the nine individual subscales of the Healthy Families Parenting Inventory and the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety (Research Question 3); and 4) Predictive validity of the red flag and strength indicator items of the Healthy Families Parenting Inventory in relation to the occurrence of a maltreatment investigation with the Arizona Department of Child Safety (Research Question 4). Discussion and interpretation of these analyses is predicated on a thorough description of the findings for each research question. The analyses for the study took into account the assumptions required for each test including normality, sample size, independence, linearity, and missing data. Residual statistics (i.e., standardized residuals, deviance statistics, Cooks Distance, DFBeta, and leverage statistics) of the models were conducted,

indicating that no cases had undue influence on the models. Unless specifically noted, these assumptions were not violated, nor were corrections needed to these analyses. Chapter Five provides a detailed summary and discussion of the results presented in this chapter.

Description of the Sample

Descriptive statistics in the form of means, standard deviations, frequencies, minimums, and maximums were calculated for this sample in terms of program dosage of the Healthy Families Arizona intervention, family income, marital status, maternal age, maternal ethnicity and education, number of household members, residential zip code, gestational age, birth weight, gender, and birth defects of the targeted child of the Healthy Families Arizona intervention. These data were collected by Healthy Families Arizona staff during the course of provision of the Healthy Families Arizona intervention. The total number of participants in the Healthy Families Arizona intervention during the 2012 and 2013 fiscal years that were included in the study was (N = 2088). The sample included families with both maternal and paternal involvement with the Healthy Families Arizona intervention, however Healthy Families Arizona identifies the mother as the default primary familial participant. Subsequently, socio-demographic information presented is limited to only maternal participants. With respect to the descriptive data, there were minimal missing data obtained from Healthy Families Arizona. The frequencies of the categorical socio-demographic characteristics of the participants are summarized in Table 7.1; however, not all socio-demographic data was obtained, and subsequently is recorded as "unknown."

According to the five-digit zip code prefixes collected by the Healthy Families Arizona intervention, the participants resided in zip codes across the state of Arizona. Approximately half of the participating families (*n* = 1053, 50.4%) lived in the Phoenix Metropolitan area including the cities of Phoenix, Glendale, Mesa, Avondale, Buckeye, Chandler, Gilbert, Goodyear, Tempe, Scottsdale, El Mirage, Peoria, Surprise, Apache Junction, and Maricopa. The second largest group (*n* = 363, 17.4%) resided in the Tucson area including the cities of Tucson, Casa Grande, and Coolidge. A smaller group (*n* = 333, 15.9%) resided in the southern Arizona areas of Benson, Douglas, Eloy, Sierra Vista, Rio Rico, Somerton, Safford, Tombstone, Thatcher, Yuma, Dateland, Nogales, and San Luis. The remainder of participants resided in Flagstaff, Kingman, Prescott, Tuba City, Lake Havasu, Parker, Fort Mohave or Bullhead City (*n* = 328, 15.7%). The ethnicity of the participants was predominantly White/Hispanic (*n* = 1634, 77.8%). The other participants who provided demographic data belonged to minority ethnic/racial groups defined as Mixed/Other (*n* = 160, 7.7%), Native American (*n* = 150, 7.2%), African American (*n* = 121, 5.8%), or Asian American (*n* = 18, 0.9%). Pertaining to marital status, over two thirds of the participants (*n* = 1415, 66.3%) reported that their marital status was single. The second largest group at approximately one quarter of the enrolled participants (*n* = 560, 26.8%) reported that they were married. The remainder (*n* = 106, 5.1%) reported that they were either separated, divorced, or widowed. In terms of education, the participant's highest level of education ranged from elementary school to more than high school. The most frequent level of education (*n* = 1417, 67.9%) was completion of grades 10 to 12 (high school), followed by grades 7 to 9 (middle school) (*n* = 274, 13.1%). A small percentage of the sample had education above grades 10 to 12

(college) (*n* = 175, 8.4%), as well as completion of grades 1 to 6 (elementary school) (*n* = 81, 3.4%). Slightly more targeted children of the Healthy Families Arizona intervention were male (*n* = 1076, 51. 53%), with the vast majority of the children (*n* = 2042, 97.8%) born healthy without any identified birth defects. Descriptive statistics for the socio-demographic characteristics of the participants measured using continuous variables are summarized in Table 7.2.

Table 7.1

Sample Socio-Demographic Characteristics (Categorical Variables)

Characteristic	*Category*	*n*	*Percent*
Location	Phoenix/Avondale/Buckeye/Goodyear	660	31.6
	Scottsdale/Tempe/Mesa/Apache Junction	192	9.5
	Chandler/Gilbert/Maricopa	52	2.5
	Glendale/Peoria/El Mirage/Surprise	149	7.1
	Casa Grande/Coolidge	45	2.2
	Tucson	318	15.2
	Safford/Tombstone/Thatcher	60	2.9
	Sierra Vista/Douglas/Eloy/Benson	61	2.9
	Nogales/San Luis/Somerton/Rio Rico	123	5.9
	Yuma/Dateland	89	4.3
	Flagstaff/Prescott/Parker	171	8.2
	Lake Havasu City/Kingman	78	3.7
	Tuba City/Fort Mohave/Bullhead City	79	3.8
	Unknown	11	0.5
Mother's Ethnicity/Race	White/Hispanic	1624	77.8
	Native American	150	7.2
	African American	121	5.8
	Asian American/Mixed/Other	178	8.5
	Unknown	15	0.7
Marital Status	Single	1416	67.8
	Married	560	26.8
	Separated	61	2.9
	Divorced/Widowed	45	2.1
	Unknown	6	0.3
Mother's Education	Grades 1-6 (Elementary)	81	3.9
	Grades 7-9 (Middle School)	274	13.1
	Grades 10-12 (High School)	1417	67.9
	Above High School	175	8.4
	Unknown	141	6.8
Child's Gender	Male	1076	51.53
	Female	1011	48.42
	Unknown	1	0.00
Birth Defects	Yes	20	0.9
	No	2042	97.8
	Unknown	26	1.2

The ages of (n = 2081) participating mothers ranged from 12 to 54 years (M = 25.42, Mdn = 25.00). The total family income reported by all the participants varied greatly from $0 to $94,000.00 per year ($M$ = 12,870.00, Mdn = $10,200.00). According to the U.S. Census Bureau, the average household income of Arizona families was $48,510.00 in 2013 (U.S. Census Bureau, 2014). Consequently, on average, the families who participated in this study reported that they had a relatively low socio-economic status. Participating family sizes varied, ranging from 2 to 15 individuals (M = 4.75, SD = 1.96). The gestational age of the child targeted by the Healthy Families Arizona intervention (n = 2062) ranged from 23 to 42 months (M = 38.30, Mdn = 39.00), with birth weights (n = 2073) ranging from 2 to 13 pounds (M = 6.54, Mdn = 7.0). The program dosage defined as the number of home-visits received by the family (n = 1162) during the 12-month follow-up period, ranged from 1-27 home-visits (M = 16.12, Mdn = 17.00).

Table 7.2

Sample Socio-Demographic Characteristics (Continuous Variables)

Characteristic	*N*	*M*	*Mdn*	*SD*	*Min*	*Max*
Mother's Age (Years)	2081	25.42	25.00	6.21	12.00	54.00
Total Family Income	2075	12870.24	10200.00	13808.14	0.00	94000.00
Household Membership	2077	4.75	4.00	1.96	2.00	15.00
Child's Birth Weight	2060	6.54	7.00	1.35	2.00	13.00
Child's Gestational Age	2059	38.30	39.00	2.43	23.00	42.00
Program Dosage	1162	16.12	17.00	4.66	1.00	27.00

The wide ranges of socio-demographic characteristics summarized in Tables 7.1 and 7.2 revealed that the sample reflected a heterogeneous cross section of the population enrolled in the Healthy Families Arizona intervention. Although the Healthy Families

Arizona intervention targets homogenous families at risk for maltreatment, the question arises as to whether associations existed between the socio-demographic characteristics of the participants and whether or not the family had received an investigation of maltreatment with the Arizona Department of Child Safety within twelve months of program enrollment.

Table 7.3 presents the results of Pearson's Chi-Square (χ^2) tests for independence, indicating that whether the participants had received an investigation of maltreatment with the Arizona Department of Child Safety (n = 272, 13.0%) or did not receive an investigation of maltreatment (n = 1816, 86.9%), was significantly different dependent on the marital status of the participant (χ^2 (5) = 26.07 p < .001, Cramer's V = .11), as well as the ethnicity/race of the participating mother (χ^2 (4) = 11.08 p = .02, Cramer's V = .08).

Table 7.3

Pearson's Chi-Square (χ^2) tests for Categorical Socio-Demographic Characteristics and Maltreatment

Characteristic	*Pearson's* χ^2	*df*	*p*	*Cramer's V*
Location	26.77	23	.266	.11
Mother's Ethnicity/Race	11.08	4	.019*	.08
Marital Status	26.07	5	.000***	.11
Mother's Education	3.32	3	.345	.04
Child Gender	1.77	1	.193	.03
Child Birth Defects	0.08	1	.784	.01

*p < .05, *** p < .001

Table 7.4 presents the results of independent samples t-tests (t), indicating significant differences (p < .05) between participating families who received a report of maltreatment and those that did not with respect to their continuous level socio-demographic characteristics. The analysis revealed that the mean values between the two groups were significantly different with respect to the family's total income (t (2073) =

2.33, p = .02; Cohen's d = .16); the birth weight of the targeted child of the Healthy Families Arizona intervention (t (2058) = 2.68, p = .007; Cohen's d = .17); and the gestational age of the targeted child of the Healthy Families Arizona intervention (t (2005), = 2.58, p = .01; Cohen's d = .11). Effect sizes were evaluated using Cohen's d standards for minimum effect sizes: small (d = .2); medium (d = .5); and large (d = .8) (Cohen, 1969). The Cohen's d values for the analyses were less than .2 for all continuous socio-demographic variables.

Table 7.4

t-tests between Continuous Socio-Demographic Characteristics and Maltreatment

Characteristic	*Maltreatment*	*n*	*M (SD)*	*Mdn*	*t*	*p*	*Cohen's d*
Family Income	No Maltreatment	1803	12913 (13304)	10800.00	2.33	.021*	.16
	Maltreatment	272	10937.07 (11906)	8388.00			
Mother's Age	No Maltreatment	1811	25.41 (6.23)	25.00	-0.14	.891	.01
	Maltreatment	270	25.47 (6.14)	25.00			
Birth Weight	No Maltreatment	1794	6.56 (1.34)	7.00	2.68	.007**	.17
	Maltreatment	266	6.33 (1.33)	6.00			
Gestational Age	No Maltreatment	1747	38.61(1.73)	39.00	2.58	.010*	.11
	Maltreatment	260	38.41(1.96)	39.00			
Household Size	No Maltreatment	1807	4.75 (1.95)	4.00	0.23	.821	.01
	Maltreatment	270	4.73 (1.96)	4.00			
Program Dosage	No Maltreatment	1593	24.81 (12.32)	28.00	0.56	.582	.04
	Maltreatment	241	24.34 (12.52)	27.00			

*p < .05, ** p < .01

The significant associations between the socio-demographic characteristics of the participants and whether or not they received an investigation of maltreatment with the Arizona Department of Child Safety implies that the items contained in the Healthy Families Parenting Inventory described in the following sections were not the only factors associated with the participants receiving an investigation of maltreatment with the Arizona Department of Child Safety. The relationships between the Healthy Families

Parenting Inventory scores and receiving an investigation of maltreatment was not a simple bivariate relationship, but was confounded by multiple socio-demographic factors. Subsequently, many of these sample characteristics are used as control variables in the regression models.

Descriptive Analysis of Healthy Families Parenting Inventory

Table 8.1 lists the estimates of Cronbach's alpha for the total Healthy Families Parenting Inventory scores and the nine Healthy Families Parenting Inventory sub-scale domain scores as well as a description of the internal consistency and reliability of the Healthy Families Parenting Inventory total composite score and the Healthy Families Parenting Inventory subscale domains. The internal consistency reliability was good for the total Healthy Families Parenting Inventory Score (Cronbach's alpha = .94), as well as for the nine subscale domains of the Healthy Families Parenting Inventory (Cronbach's alpha = .74 to .83). These results confirm the previously established reliability of the Healthy Families Parenting Inventory (Krysik & LeCroy, 2012), and justify the addition of selected item scores in the subsequent statistical analyses. Because the sample size was high (N = 2088), the central limit theorem was applicable. Thus, parametric statistical methods assuming normality were justifiable.

Table 8.1

Internal Consistency and Reliability of the HFPI

Subscale Domains	*Instrument Items*	*Cronbach's alpha* [1]
Social Support	1, 2, 3,4, 5	.82
Problem Solving	6, 7, 8, 9, 10,11	.81
Depression	12, 13, 14, 15, 16, 17, 18, 19, 20	.81
Personal Care	21, 22, 23, 24, 25	.77
Mobilizing Resources	26, 27, 28, 29, 30, 31	.80
Role Satisfaction	32, 33, 34, 35, 36, 37	.74
Parent/Child Interaction	38, 39, 40, 41, 42, 43, 44, 45, 46, 47	.79
Home Environment	48, 49, 50, 51, 52, 53, 54, 55, 56, 57	.79
Parenting Efficacy	58, 59, 60, 61, 62, 63	.83
Total HFPI Score	Items 1-63	.94

[1] Note: Chronbach Alpha Scores of .7 and above are considered within acceptable range

Table 8.2 presents the descriptive statistics for the Healthy Families Parenting Inventory including the total composite score, the nine subscale domains, and the 63 individual items. The higher the Healthy Families Parenting Inventory scores on individual items, subscale domains and the composite score, the more favorable the participating family's conditions, reflecting strong parenting skills and behaviors that may be associated with a low level of potential for child abuse and neglect. The ranges in the scores for the Healthy Families Parenting Inventory total composite score as well as each subscale domain were high, but normality was indicated by the closeness of the mean (*M*) and median (*Mdn*) scores, reflecting the central tendencies of the *f* distributions. This finding however is expected and consistent with existing literature due to the strengths based nature of the inventory. Healthy Families Parenting Inventory subscale scores below the cutting scores indicated unfavorable family conditions, reflecting weak parenting skills and behaviors that may increase a family's risk for the occurrence of child abuse and neglect.

Table 8.2

Descriptive Statistics for Healthy Families Parenting Inventory Items

Variables	*Scale*[1]	*Mean*	*S.E.*	*Range*
Domain 1: Social Support		21.41	0.08	5-25
I feel supported by others	(0-5) Likert Scale	4.36	0.02	1-5
I feel that others care about me	(0-5) Likert Scale	4.42	0.02	1-5
I discuss my feelings with someone	(0-5) Likert Scale	3.86	0.03	1-5
If I have trouble, I feel there is always someone I can turn to for help	(0-5) Likert Scale	4.33	0.02	1-5
I have family or friends who I can turn for help	(0-5) Likert Scale	4.43	0.02	1-5
Domain 2: Problem-Solving		23.67	0.09	6-30
I learn new ways of doing things from solving problems	(0-5) Likert Scale	4.25	0.02	1-5
I deal with setbacks without getting discouraged	(0-5) Likert Scale	3.70	0.02	1-5
When I have a problem, I take steps to solve it	(0-5) Likert Scale	4.23	0.02	1-5
When I am faced with a problem, I can think of several solutions	(0-5) Likert Scale	4.09	0.02	1-5
I am good at dealing with unexpected problems	(0-5) Likert Scale	3.73	0.02	1-5
I remain calm when new problems come up	(0-5) Likert Scale	3.69	0.02	1-5
Domain 3: Depression		39.09	0.12	9-45
I feel sad*	(0-5) Likert Scale	4.07	0.02	1-5
I feel positive about myself	(0-5) Likert Scale	4.11	0.21	1-5
The future looks positive for me	(0-5) Likert Scale	4.30	0.02	1-5
I feel unhappy about everything*	(0-5) Likert Scale	4.53	0.02	1-5
I feel hopeless about the future*	(0-5) Likert Scale	4.66	0.02	1-5
There isn't much happiness in my life*	(0-5) Likert Scale	4.54	0.02	1-5
I have so many problems I feel overwhelmed by them*	(0-5) Likert Scale	4.08	0.02	1-5
It is hard for me to get in a good mood*	(0-5) Likert Scale	4.42	0.02	1-5
My life is fulfilling and meaningful*	(0-5) Likert Scale	4.38	0.02	1-5

[1] = (1= Rarely or Never, 2 = A Little of the Time, 3 = Some of the Time; 4 = Good Part of the Time, 5 = Always or Most of the Time)

* = Reverse Coded (5 = Rarely or Never, 4 = A little of the Time, 3 = Some of the Time, 2= Good Part of the Time, 1 = Rarely or Never)

Table 8.2

Descriptive Statistics of the Healthy Families Parenting Inventory

Variables	*Scale*[1]	*Mean*	*S.E.*	*Range*
Domain 4: Personal Care		19.12	0.08	5-25
I find ways to care for myself	(0-5) Likert Scale	4.27	0.02	1-5
I take care of my appearance	(0-5) Likert Scale	4.11	0.02	1-5
I get enough sleep	(0-5) Likert Scale	3.24	0.03	1-5
I am a better parent because I take care of myself	(0-5) Likert Scale	4.27	0.02	1-5
I take time for myself	(0-5) Likert Scale	3.25	0.03	1-5
Domain 5: Mobilizing Resources		23.38	0.11	6-30
I know where to find resources for my family	(0-5) Likert Scale	3.94	0.03	1-5
I know where to find important medical information	(0-5) Likert Scale	4.28	0.02	1-5
I can get help from the community if I need it	(0-5) Likert Scale	3.86	0.03	1-5
I am comfortable in finding the help I need	(0-5) Likert Scale	4.15	0.02	1-5
I know community agencies I can go to for help	(0-5) Likert Scale	3.68	0.03	1-5
It is hard for me to ask for help from others	(0-5) Likert Scale	3.48	0.03	1-5
Domain 6: Role Satisfaction		25.81	0.09	6-30
Because I'm a parent, I've had to give up much of my life*	(0-5) Likert Scale	3.69	0.03	1-5
I feel trapped by all the things I have to do for my child*	(0-5) Likert Scale	4.53	0.02	1-5
I feel drained dealing with my child*	(0-5) Likert Scale	4.33	0.02	1-5
There are times my child gets on my nerves*	(0-5) Likert Scale	4.38	0.02	1-5
I feel controlled by all the things I have to do as a parent*	(0-5) Likert Scale	4.16	0.03	1-5
I feel frustrated because my whole life seems to revolve around my child*	(0-5) Likert Scale	4.73	0.02	1-5

[1] = (1= Rarely or Never, 2 = A Little of the Time, 3 = Some of the Time; 4 = Good Part of the Time, 5 = Always or Most of the Time)

* = Reverse Coded (5 = Rarely or Never, 4 = A little of the Time, 3 = Some of the Time, 2= Good Part of the Time, 1 = Rarely or Never)

Table 8.2

Descriptive Statistics of the Healthy Families Parenting Inventory

Variables	*Scale*	*Mean*	*S.E.*	*Range*
Domain 7: Parent/Child Interaction		44.68	0.12	10-50
I have a hard time managing my child*	(0-5) Likert Scale[1]	4.56	0.02	1-5
I can be patient with my child	(0-5) Likert Scale[1]	4.50	0.02	1-5
I respond quickly to my child's needs	(0-5) Likert Scale[1]	4.70	0.01	1-5
I do activities that help my child grow and develop	(0-5) Likert Scale[1]	4.41	0.02	1-5
When my child is upset, I'm not sure what to do*	(0-5) Likert Scale[1]	4.08	0.02	1-5
I use positive words to encourage my child	(0-5) Likert Scale[1]	4.68	0.02	1-5
I can tell what my child wants	(0-5) Likert Scale[1]	4.29	0.02	1-5
I am able to increase my child's good behavior	(0-5) Likert Scale[1]	4.31	0.02	1-5
I can remain calm when my child is upset	(0-5) Likert Scale[1]	4.40	0.02	1-5
I praise my child every day	(0-5) Likert Scale[1]	4.74	0.01	1-5
Domain 8: Home Environment		40.61	0.14	10-50
My child has favorite things to comfort him/her	(0-5) Likert Scale[1]	4.48	0.02	1-5
I read to my child	(0-5) Likert Scale[1]	3.40	0.03	1-5
I plan and do a variety of activities with my child everyday	(0-5) Likert Scale[1]	3.89	0.03	1-5
I have made my home exciting and fun for my child	(0-5) Likert Scale[1]	4.11	0.02	1-5
I have organized my home for raising a child	(0-5) Likert Scale[1]	4.24	0.02	1-5
I check my home for safety	(0-5) Likert Scale[1]	4.49	0.02	1-5
My child has a schedule for eating and sleeping in my home	(0-5) Likert Scale[1]	4.02	0.03	1-5
I set limits for my child consistently	(0-5) Likert Scale[1]	3.69	0.03	1-5
I make plans for our family to do things together	(0-5) Likert Scale[1]	4.15	0.02	1-5
I set rules for behavior in my home	(0-5) Likert Scale[1]	4.13	0.03	1-5
Domain 9: Parenting Efficacy		25.94	0.08	6-30
I feel I'm doing an excellent job as a parent	(0-5) Likert Scale[1]	4.34	0.02	1-5
I am proud of myself as a parent	(0-5) Likert Scale[1]	4.49	0.02	1-5
I am more effective than most parents	(0-5) Likert Scale[1]	3.98	0.02	1-5
I have set goals about how I want to raise my child	(0-5) Likert Scale[1]	4.54	0.02	1-5
I am a good example to other parents	(0-5) Likert Scale[1]	4.09	0.02	1-5
I learn new parenting skills and use them with my child	(0-5) Likert Scale[1]	4.50	0.02	1-5
Total Healthy Families Parenting Inventory Composite Score		263.78	0.62	63-315

[1] = (1= Rarely or Never, 2 = A Little of the Time, 3 = Some of the Time; 4 = Good Part of the Time, 5 = Always or Most of the Time)

* = Reverse Coded (5 = Rarely or Never, 4 = A little of the Time, 3 = Some of the Time, 2= Good Part of the Time, 1 = Rarely or Never)

Table 8.3 presents the cumulative proportions of individual participants who scored below the previously established Healthy Families Parenting Inventory cutting scores for each of the nine subscale domains. The subscale domain with the highest cumulative proportion of participants scoring below the cutting score was parenting efficacy (17.9%); followed by parent/child interaction (17.8%); mobilizing resources (17.6%); depression (16.3%); and social support (15.7%). The subscale domains with the smallest cumulative proportions of participants scoring below the cutting scores included the subscale domains of home environment (15.6%); problem solving (14.9%); role satisfaction (14.1%); and personal care (12.0%). These findings suggest that the study population is consistent with the previous validation study sample that found most cutting scores will identify approximately 20% of the population (Krysik & LeCroy, 2012). The implications are that the sample used in this study was approximately representative of the Arizona sample used in the initial validation in terms of unfavorable family conditions, reflecting weak parenting skills and behaviors that may increase child abuse and neglect.

Table 8.3

Cumulative Proportions of Participants Less than or Equal to HFPI Classification Scores

HFPI Subscale	*Cutting Score* [1]	*Cumulative Percent (%)*
Social Support	≤ 17	328 (15.7)
Problem Solving	≤ 19	311 (14.9)
Depression	≤ 33	340 (16.3)
Personal Care	≤ 16	251 (12.0)
Mobilizing Resources	≤ 18	368 (17.6)
Role Satisfaction	≤ 21	294 (14.1)
Parent/Child Interaction	≤ 40	371 (17.8)
Home Environment	≤ 33	326 (15.6)
Parenting Efficacy	≤ 22	374 (17.9)

[1] HFPI subscale scores less than or equal to the cutting scores indicate unfavorable family conditions, reflecting weak parenting skills

Table 9.1 presents the frequencies of the participants who scored below the cutting score on the four red flag items on the depression subscale domain. Low cutting scores for these items indicated that participants were at risk in the particular subscale area, and in need of immediate intervention. The red flag indicators were identified in the depression subscale domain as reversed scores of either 1 = "Always or most of the time", or 2 = "Good part of the time". The most frequent red flag indicator (obtained by summing the numbers of participants who scored 1 or 2) was "I feel hopeless about the future" (*n* = 249, 11.9%); followed by "I feel sad" (*n* = 169, 8.0%); "I have so many problems I feel overwhelmed by them" (*n* = 167, 7.8%); and "I feel unhappy about everything" (*n* = 99, 4.8%).

Table 9.1

Red Flag Indicators in the Depression Subscale Representing Risk Factors [1]

Item	Score = 2 (Reversed from 4)		Score = 1 (Reversed from 5)		Score = 1 & 2	
	n	*Percent*	*n*	*Percent*	*n*	*Percent*
12. " I feel sad"	124	5.9	45	2.2	169	8.0
18. "I have so many problems I feel overwhelmed by them"	109	5.2	58	2.8	167	7.8
15. "I feel unhappy about everything"	68	3.3	31	1.5	99	4.8
26. "I feel hopeless about the future"	165	7.9	84	4.0	249	11.9

[1] Red Flag indicators include individual item values of 1 or 2 after reverse coding

Table 9.2 presents the frequencies of the participants who scored below the cutting scores on the four red flag items on the role satisfaction subscale. Low reverse scores for these red flag items identified participants who were at risk, and in need of immediate intervention. These red flag indicators were identified as reversed scores of either 1 = "Always or most of the time", or 2 = "Good part of the time". The most frequent red flag indicator items in the role satisfaction subscale were "I feel drained dealing with my child" (*n* = 119, 5.7%); followed by "I feel trapped by all the things I have to do for my child" (*n* = 93, 4.4%); and "I feel frustrated because my whole life seems to revolve around my child" (*n* = 39, 1.9%).

Table 9.2

Red Flag Indicators in the Role Satisfaction Subscale Representing Risk Factors [1]

Item	Score = 2 (Reversed from 4)		Score = 1 (Reversed from 5)		Score = 1 & 2	
	n	*Percent*	*n*	*Percent*	*n*	*Percent*
34."I feel drained dealing with my child"	87	4.2	32	1.5	119	5.7
33."I feel trapped by all things I have to do for my child"	60	2.9	33	1.6	93	4.4
37."I feel frustrated because my whole life seems to revolve around my child"	18	0.9	21	1.0	39	1.9

[1] Red Flag indicators include individual item values of 1 or 2 after reverse coding

Table 9.3 presents the frequencies of the vast majority of the participants who had individual strength indicator scores above cutting values based on the ten items that represented areas of strength in the social support, problem solving, depression, parent and child interaction, home environment, and parenting efficacy subscale domains. Specifically, the strength indicator items identified protective capacities within multiple domains of family functioning and parenting that potentially could serve to buffer the impact of red flag indicator items. The Healthy Families Parenting Inventory strength indicator items included scores of either 4 = "Good part of the time" or 5 = "Always or most of the time" on 10 items across 6 subscale domains, indicating a particular area of strength for the family. The most frequent strength indicator items (identified by 80% of the sample population or higher scoring above the cutting score) were individual items in the parenting efficacy, social support, problem solving, and parent/child interaction subscale domains. Specifically, the individual items most commonly identified were "I learn new parenting skills and use them with my child" (*n* = 1878, 89.94%); "I am proud of myself as a parent" (*n* = 1830, 87.64%); "I can remain calm when my child is upset" (*n* = 1806, 86.49%); "I feel others care about me" (*n* = 1774, 84.96%); "If I have trouble, I feel there is always someone I can turn to for help" (*n* = 1772, 82.47%); and "When I have a problem, I take steps to solve it" (*n* = 1701, 81.47%). The least frequent individual "strength indicator" items (identified as below 80% of the sample population scoring above the cutting score) included items in the problem solving, home environment, and depression subscale domains. Specifically, the least common items identified by the sample population were "I have organized my home for raising my child" (*n* = 1666, 79.78%); "I feel positive about myself" (*n* = 1591, 76.19%); "I plan to

do a variety of activities with my child every day" (*n* = 1387, 66.42%); and "I remain calm when new problems come up" (*n* = 1252, 59.96%).

Table 9.3

Strength Indicator Items Representing Protective Factors [1]

Item	Score = 4		Score = 5		Score = 4 & 5	
	n	*Percent*	*n*	*Percent*	*n*	*Percent*
Social Support Subscale						
2. "I feel others care about me"	439	21.0	1335	63.9	1774	84.96
4. "If I have trouble, I feel there is always someone I can turn to for help"	497	23.8	1225	58.7	1772	82.47
Problem Solving/Coping Subscale						
8. "When I have a problem, I take steps to solve it"	755	36.2	946	45.3	1701	81.47
11."I remain calm when new problems come up"	737	35.3	515	24.7	1252	59.96
Depression Subscale						
13. "I feel positive about myself"	696	33.3	895	42.9	1591	76.19
Parent/Child Interaction Scale						
46. "I can remain calm when my child is upset"	638	30.6	1168	55.9	1806	86.49
Home Environment Subscale						
50. "I plan to do a variety of activities with my child every day"	549	26.3	838	40.1	1387	66.42
52. "I have organized my home for raising a child"	589	28.2	1077	51.6	1666	79.78
Parenting Efficacy Subscale						
59. "I am proud of myself as a parent"	504	24.1	1326	63.5	1830	87.64
63. "I learn new parenting skills and use them with my child"	559	26.3	1319	63.2	1878	89.94

[1] Protective Factor items include individual item values of 4 or 5

Research Question 1:

The primary research question for this dissertation is concerned with the overall predictive validity of the Healthy Families Parenting Inventory. It is hypothesized that the Healthy Families Parenting Inventory scores predict the occurrence of maltreatment investigation with the Arizona Department of Child Safety utilizing both a total inventory composite score, and by grouping families into two distinct groups based on maltreatment investigation rates (e.g., not at-risk, at-risk). To test this hypothesis, the predictive validity of the Healthy Families Parenting Inventory was examined through

several analytic techniques grouped into two broad categories 1) analyses of the Healthy Families Parenting Inventory total composite score and 2) analyses of the Healthy Families Parenting Inventory risk levels

Analyses of Healthy Families Parenting Inventory Total Scores

The next set of analyses focused on the relationships between the occurrence of maltreatment and the total composite score generated by the completion of the Healthy Families Parenting Inventory. Similar to the analyses reported above on the established risk classifications, these sets of analyses are intended to address the Healthy Families Parenting Inventory's predictive validity from the instrument's total composite score. The hypothesis for this section of the results proposes that a family's total composite score on the Healthy Families Parenting Inventory will be lower overall for families who experienced a maltreatment investigation with the Arizona Department of Child Safety than for families who did not. Additionally, it is hypothesized that a family's total composite score on the Healthy Families Parenting Inventory has a significantly predictive relationship with the occurrence of a maltreatment investigation with the Arizona Department of Child Safety. Table 10.1 presents the percentiles of the Healthy Families Parenting Inventory total scores corresponding to the occurrence of a maltreatment investigation with the Arizona Department of Child Safety and the absence of an investigation of maltreatment. Consistent with the hypothesis, the Healthy Families Parenting Inventory total composite scores of the sample were greater for the families who did not experience a maltreatment investigation (*Mdn* = 268.00) than for the families who experienced a maltreatment investigation (*Mdn* = 263.00). Therefore, families who did not receive an investigation of maltreatment with the Arizona Department of Child

Safety tended to consistently have higher Healthy Families Parenting Inventory total composite scores than families who received a maltreatment investigation.

Table 10.1

Percentiles of the HFPI Total Score versus Maltreatment Investigation

	Percentiles						
	5th	*10th*	*25th*	*50th*	*75th*	*90th*	*95th*
No Maltreatment Investigation	214	224	246	268	286	298	305
Maltreatment Investigation	203	214	235	263	283	297	301

Table 10.2 presents a *t*-test (t) of significance for independent samples that examined the differences in average Healthy Families Parenting Inventory total composite scores for families that received a maltreatment investigation with the Arizona Department of Child Safety versus families that did not. Based on the analysis, the average Healthy Families Parenting Inventory total composite scores for families that did not receive a maltreatment investigation were significantly higher (M = 264.49 SD = 27.81) than the average Healthy Families Parenting Inventory total composite scores for families that received a maltreatment investigation (M = 258.97, SD = 30.72). A statistically significant difference between groups on a family's total average Healthy Families Parenting Inventory total composite score was revealed by the analysis (M = 5.53; 95% CI [1.97, 1.65], t (340.82) = 2.80, p = .005). Taken together, these results supported the hypothesis that the families with higher Healthy Families Parenting Inventory total composite scores would be less likely to receive a maltreatment investigation than those families with lower scores. The effect size for this analysis based on Cohen's d was (d = .19).

Table 10.2

t-tests for Independent Samples Regarding HFPI Total Scores and Maltreatment Investigation

	N	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	264.49 (27.81)	2.80	.005**	1.97	1.65	.19
Yes	272	258.97 (30.72)					

**$p < .01$

The next part of this analysis included a point-biserial correlation (r_{pb}) to measure the strength of the relationship between the continuous total composite score and maltreatment. The point-biserial correlation (r_{pb}) revealed that the family's total composite score on the Healthy Families Parenting Inventory was significantly associated with the occurrence of a maltreatment investigation with the Arizona Department of Child Safety (r_{pb} (2088) = -.066, p = .003). The final analysis included estimating a logistic regression model to predict the occurrence of a maltreatment investigation with the Arizona Department of Child Safety controlling for covariates (e.g., total family income, maternal ethnicity, marital status, birth weight and gestational age of the targeted child of the Healthy Families Arizona intervention) from a family's total composite score on the Healthy Families Parenting Inventory. The logistic regression model was statistically significant (χ^2 (6) = 38.09, p = .001), indicating that 3.6% of the variation in the occurrence of a maltreatment investigation was explained by the model (Nagelkerke R^2). The adjusted odds ratios for the Healthy Families Parenting Inventory total composite score predicting the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety are presented in Table 10.3. Three variables in the analysis were statistically significant at ($p < .05$), specifically the family's total composite

score on the Healthy Families Parenting Inventory (β = -.01, Wald χ^2 = 8.29; *p* = .004), the family's total income as defined as (low/high) at the sample median split (β = -.28, Wald χ^2 = 3.94; *p* = .047), and the family's marital status (not married/married) (β = -.63, Wald χ^2 = 11.96; *p* = .001). The adjusted odds ratios (AOR) indicated that the likelihood of the occurrence of receiving a maltreatment investigation with the Arizona Department of Child Safety relative to the occurrence of not receiving a maltreatment investigation (a) decreased by 1.0% (AOR = 0.99, 95% CI = 0.98, 0.99) when a family's total composite score on the Healthy Families Parenting Inventory increased by one unit, (b) decreased by 24.0% (AOR = 0.76, 95% CI = 0.57, 0.99) when a family's income changed from low to high, and (c) decreased by 47.0% (AOR = 0.53, 95% CI = 0.57, 0.99) when a family's marital status changed from not married to married.

Table 10.3

Binary Logistic Regression to Predict the Odds of Maltreatment Using HFPI Total Composite Scores

Variable	β	Wald χ^2	*df*	*p*	*OR*	95% CI	
Total Family Income [a]	-.28	3.94	1	.047*	0.76	0.57	0.97
Maternal Ethnicity [b]	-.12	0.51	1	.476	0.89	0.65	1.22
Marital Status [c]	-.63	11.96	1	.001**	0.53	0.37	0.76
Birth Weight	-.07	1.09	1	.296	0.93	0.82	1.06
Gestational Age	-.07	2.17	1	.141	0.94	0.86	1.02
HFPI Total Score	-.01	8.29	1	.004**	0.99	0.99	0.99

Reference Category: a = low income (below median split), b = White/Hispanic, c = not married
*$p < .05$, ** $p < .01$

The conclusion based on these results is that the hypothesis that families with a lower Healthy Families Parenting Inventory total composite score were more likely to experience a maltreatment investigation with the Arizona Department of Child Safety was supported. An independent samples t-test (t) revealed that families who experienced

an investigation of maltreatment with the Arizona Department of Child Safety had significantly lower scores than families who did not experience an investigation of maltreatment. The effect size for this analysis based on Cohen's *d* was (*d* = .16). In further analysis, the hypothesis that a family's total composite score on the Healthy Families Parenting Inventory has a significantly predictive relationship with the occurrence of a maltreatment investigation with the Arizona Department of Child Safety was supported. When controlling for covariates, the binary logistic regression analysis revealed that the overall Healthy Families Parenting Inventory total composite score produced by the Healthy Families Parenting Inventory instrument was significantly predictive of the occurrence of a maltreatment investigation. Specifically, the findings showed that a family's risk for a maltreatment investigation decreased as their total composite score on the Healthy Families Parenting Inventory increased. Research Question 2 examines the predictive validity of individual subscale domains of the Healthy Families Parenting Inventory in further detail.

Analyses of the HFPI Risk Levels

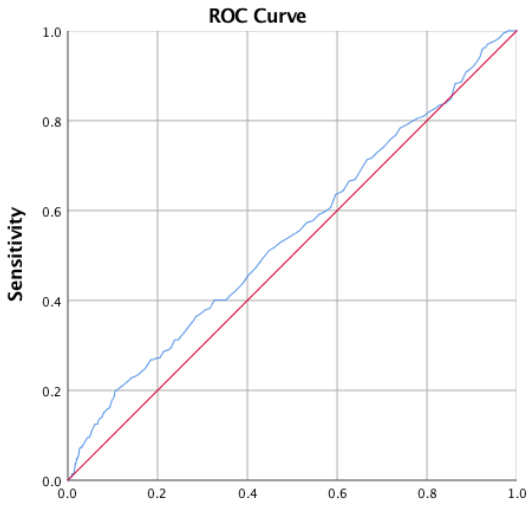
The general hypothesis for this section of the results proposes that families above the identified cut-point classification receive investigations of maltreatment with the Arizona Department of Child Safety at a lower rate than families scoring below the cut-point. Further, it is hypothesized that these groups are significantly different based on rates of maltreatment investigations. Using a Receiver Operating Characteristic (ROC) curve, sensitivity values, specificity values, positive predictive values, and negative predictive values of the total Healthy Families Parenting Inventory total composite score were used to identify an optimal cut-point for purposes of classification (See Figure 3.1).

Sensitivity is the probability that a test will be positive when the condition (i.e. maltreatment investigation) is present (true positive rate) ($\frac{a}{a+b}$). Specificity is the probability that a test result will be negative when the condition is not present (true negative rate) ($\frac{d}{c+d}$). However, because this information is not known when the instrument is completed at baseline, it is necessary to understand the predictive value of the test for each individual family. Two types of probability were used to describe the predictive value of an instrument test: the positive predictive value (PPV) $\left(\frac{a}{a+c}\right)$ and the negative predictive value (NPV) ($\frac{d}{b+d}$).

The ROC curve reflected that sensitivity increased approximately linearly with respect to 1-specificity. The curve was not obviously asymptotic (i.e., there was no flattening of the ROC curve at the higher values of 1-specificity, with no clear inflexion point reflecting a difference between the at-risk cases that experienced a maltreatment investigation with the Arizona Department of Child Safety, and cases not at-risk with no occurrence of a maltreatment investigation). The coordinates of the ROC curve (AUC = .46) indicated that the Healthy Families Parenting Inventory total cut-point equal to or greater than 188.00 was equivalent to assuming that every family experienced a maltreatment investigation with the Arizona Department of Child Safety, whilst a Healthy Families Parenting Inventory total score equal to 316.00 was equivalent to assuming that no family experienced a maltreatment investigation.

Figure 3.1

ROC Curve of Healthy Families Parenting Inventory Total Composite Score



Because the ROC curve was linear, and not asymptotic, a cut-point classification could not be identified from the curve. Subsequently, sensitivity values, specificity values, positive predictive values, and negative predictive values were calculated at the 25th, 50th and 75th percentiles of the total Healthy Families Parenting Inventory total score to aide in the determination of an optimal cut-point. The analysis revealed that at the 25th percentile (cut-point of 245) the sensitivity value was .16, and the specificity was .88. The positive predictive value of this test at the 25th percentile was 31.25%, and the negative predictive value of the test was 76.21%. The overall accuracy of the test was 70.35%. At the 50th percentile, or median (cut-point of 267), the sensitivity value was .14, and specificity was .88. The positive predictive value of this test was 54.41%, and the negative predictive value was 50.17%. The overall accuracy of the test was 50.72%. At the 75th percentile (cut-point of 286), the sensitivity value was .14, and the specificity was .89. The positive predictive value of this test was 78.31%, and the negative predictive value was 26.05%. The overall accuracy was 32.85%.

When testing is being performed for a condition where the consequences for missing the condition are severe, such as in child maltreatment detection, it is important to maximize the sensitivity of the instrument, sacrificing specificity if necessary to ensure that maltreated children do not go undetected. Subsequently, sensitivity was prioritized over specificity in identification of a cut-point, with the selection of the 25th percentile (245) as the cut-point to differentiate between families at-risk and not at-risk for receiving an investigation of maltreatment with the Arizona Department of Child Safety. This cut-point value maximized sensitivity and overall accuracy of classifying families by rates of true positive and true negatives (70.35%). The sensitivity and specificity values for the 25th, 50th, and 75th percentiles are summarized in Table 11.1

Table 11.1

Sensitivity and Specificity Values of the Healthy Families Parenting Inventory Cut-Point Values

	25th Percentile		50% Percentile (Median)		75% Percentile	
	Value	95% CI	Value	95% CI	Value	95% CI
Sensitivity	16.44%	13.35-19.92	14.06%	12.01-16.30	13.69%	12.02-15.50
Specificity	88.10%	86.29-89.66	88.02%	85.88-89.94	88.91%	85.93-91.45
Positive Likelihood Ratio	1.38	1.09-1.75	1.17	0.94-1.47	1.23	0.94-1.62
Negative Likelihood Ratio	0.95	0.91-0.99	0.98	0.94-1.01	0.97	0.94-1.01
Maltreatment Prevalence	24.76%	22.92-26.67	50.43%	48.26-52.60	13.03%	72.59-76.38
Positive Predictive Value	31.25%	26.41-36.54	54.41%	48.86-59.86	13.69%	73.36-82.56
Negative Predictive Value	76.21%	75.44-76.97	50.17%	49.34-50.99	88.91%	25.36-26.74
Accuracy	70.35%	68.34-72.31%	50.72%	48.55-52.88%	32.85%	30.84-34.92%

Based on the sample of (n = 2088) participants assessed using the Healthy Families Parenting Inventory, families were categorized into two risk classifications: at risk n = 517 (24.8% of the sample); and not at-risk n = 1384 (66.3% of the sample).

Table 11.2 provides results from the chi-square test of independence ($\chi 2$) conducted to compare the maltreatment investigation rates across the two classification levels. Consistent with the identified hypothesis, families within the at-risk categories received a report of maltreatment at a greater rate than families categorized as not at-risk. Specifically, 16.4% of the families classified as at-risk received an investigation of maltreatment within the one-year follow-up period, followed by 11.9% of the families classified as not at-risk. The chi-square test of independence ($\chi 2$) results also indicated that the established risk classification groups were significantly different ($\chi 2$ (2) = 7.07, p = .006, Cramer's V = .06).

Table 11.2

Maltreatment Rates and Chi-Square Test of Independence

Risk Level	**Maltreatment Occurrence**
	n (%)
Not At-Risk (*n*=1384)	187 (11.90)
At-Risk (*n* = 517)	85 (16.44)
	$\chi 2(2) = 7.07$*

** $p < .05$

The final part of this analysis involved estimating a logistic regression model to predict the occurrence of a maltreatment investigation with the Arizona Department of Child Safety controlling for covariates (e.g., total family income, maternal ethnicity, marital status, and birth weight and gestational age of the targeted child of the Healthy Families Arizona intervention) from a family's risk classification. The adjusted odds ratios (AOR) for the at-risk category predicting the occurrence of a report of maltreatment to the Arizona Department of Child Safety is presented in Table 11.3. The logistic regression model was statistically significant (χ^2 (7) = 36.81, $p < .001$), indicating that 1.8% of the variation in the occurrence of a maltreatment investigation was explained

by the model (Nagelkerke R^2). Two variables in the model were statistically significant at ($p < .05$), specifically the at-risk classification ($\beta = .39$, Wald χ^2 (1) = 7.17; $p = .007$), and the marital status of participating mothers (not married/married) ($\beta = -.63$, Wald χ^2 (1) = 11.83; $p = .001$). The adjusted odds ratios (AOR) indicated that the likelihood of the occurrence of a maltreatment investigation with the Arizona Department of Child Safety relative to no occurrence of a maltreatment investigation (a) increased by 48.0% when a family's risk classification changed from not at-risk to at-risk (AOR = 1.48, 95% CI = 1.11, 1.92), and (b) decreased by 47.0 % (AOR = 0.53, 95% CI = 0.37, 0.76) when the family's marital status changed from not married to married.

Table 11.3

Binary Logistic Regression to Predict the Odds of a Maltreatment Investigation Using HFPI Risk Levels

Variable	β	Wald χ^2	*df*	*p*	*AOR*	95% CI	
Income [a]	-.27	3.73	1	.053	0.76	0.58	1.00
Maternal Ethnicity [b]	-.13	0.63	1	.427	0.88	0.64	1.21
Marital Status [c]	-.63	11.83	1	.001**	0.53	0.37	0.76
Birth Weight	-.07	1.08	1	.298	0.93	0.82	1.06
Gestational Age	-.07	2.21	1	.137	0.94	0.86	1.02
Risk Level (At-Risk) [d]	.39	7.17	1	.007**	1.48	1.11	1.98

Reference Category: a = low income (below median split), b = White/Hispanic, c = not married, d = not at risk
*$p < .05$, **$p < .01$

The conclusion based on these results is that the hypothesis that relationships between the two risk classifications and the occurrence of a maltreatment investigation increased when a family was classified as at-risk compared to not at-risk was supported. The chi-square test of independence ($\chi 2$) revealed a statistically significant relationship between the at-risk classification and the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety. The effect size for the chi-square test of

independence ($\chi 2$) using Cramer's V was .06. Further, the hypothesis that the empirically established risk classifications have a statistically predictive relationship with the occurrence of a maltreatment investigation with the Arizona Department of Child Safety was supported. When controlling for covariates, the binary logistic regression analysis revealed that when compared to families classified not at-risk, the at-risk classification was significantly predictive of the occurrence of a maltreatment investigation. Specifically, the findings showed that families scoring below the cut-point (classified as at-risk) were more likely to receive a report of maltreatment with the Arizona Department of Child Safety than families scoring above the cut-point (classified as not at-risk).

Research Question 2

The secondary question for this dissertation is concerned with the overall predictive validity of the nine individual subscale domains of the Healthy Families Parenting Inventory including social support, problem solving, depression, personal care, mobilizing resources, role satisfaction, parent/child interaction, home environment, and parenting efficacy. The hypothesis for this section of the results proposes that families who experienced a maltreatment investigation with the Arizona Department of Child Safety will have lower scores on each of the nine individual Healthy Families Parenting Inventory subscale domains than families who did not experience a maltreatment investigation. Further, it is hypothesized that when examined both individually and collectively, the nine subscale domains of the Healthy Families Parenting Inventory have a significantly predictive relationship with the occurrence of a maltreatment investigation with the Arizona Department of Child Safety.

Table 12.1 presents the percentiles of the nine Healthy Families Parenting Inventory subscale domains corresponding to the occurrence of a maltreatment investigation with the Arizona Department of Child Safety, and the absence of an investigation of maltreatment. Consistent with the study hypothesis, six of the nine Healthy Families Parenting Inventory subscale domains were greater for families who did not experience a maltreatment investigation with the Arizona Department of Child Safety than for families who experienced a maltreatment investigation. Specifically, families who received an investigation of maltreatment with the Arizona Department of Child Safety consistently had higher Healthy Families Parenting Inventory subscale domain scores on the social support, problem solving, depression, personal care, role satisfaction, and parenting efficacy Healthy Families Parenting Inventory subscale domains than families who did not receive an investigation of maltreatment

12.1

Percentiles of the HFPI Subscales versus Maltreatment Investigation

HFPI Item	Outcome	Percentiles						
		5th	*10th*	*25th*	*50th*	*75th*	*90th*	*95th*
HFPI Subscales								
Social Support	No Maltreatment Investigation	14.0	16.0	20.0	23.0	25.0	25.0	25.0
	Maltreatment Investigation	13.0	15.0	19.0	22.0	24.0	25.0	25.0
Problem Solving	No Maltreatment Investigation	17.0	18.0	21.0	24.0	27.0	29.0	30.0
	Maltreatment Investigation	15.0	17.3	20.0	23.0	26.0	28.0	30.0
Depression	No Maltreatment Investigation	28.0	31.0	36.0	41.0	44.0	45.0	45.0
	Maltreatment Investigation	26.0	29.0	34.0	40.0	43.0	45.0	45.0
Personal Care	No Maltreatment Investigation	12.0	14.0	17.0	20.0	22.0	24.0	25.0
	Maltreatment Investigation	11.7	13.0	16.0	19.0	21.0	23.0	24.0
Mobilizing Resources	No Maltreatment Investigation	14.0	16.0	20.0	24.0	27.0	30.0	30.0
	Maltreatment Investigation	13.7	17.0	21.0	24.0	28.0	29.0	30.0
Role Satisfaction	No Maltreatment Investigation	18.0	20.0	24.0	27.0	29.0	30.0	30.0
	Maltreatment Investigation	16.0	19.0	23.0	26.0	29.0	30.0	30.0
Parent/Child Interaction	No Maltreatment Investigation	36.0	38.0	42.0	46.0	49.0	50.0	50.0
	Maltreatment Investigation	34.0	36.0	42.0	45.0	48.0	50.0	50.0
Home Environment	No Maltreatment Investigation	29.0	31.0	36.0	41.0	46.0	49.0	50.0
	Maltreatment Investigation	29.0	31.0	35.0	42.0	46.0	49.0	50.0
Parenting Efficacy	No Maltreatment Investigation	19.0	21.0	24.0	27.0	29.0	30.0	30.0
	Maltreatment Investigation	17.0	19.0	23.0	26.0	29.0	30.0	30.0

The following section presents findings for the independent samples t-tests (t) for the nine subscales of the Healthy Families Parenting Inventory that examined the differences in the average Healthy Families Parenting Inventory subscale domain scores for families that received an investigation of maltreatment with the Arizona Department of Child Safety versus families that did not. The analyses revealed a statistically significant difference between families based on the family's average scores on the social support, problem solving, depression, personal care, role satisfaction, and parenting efficacy subscale domains of the Healthy Families Parenting Inventory. Further, point-biserial correlations (r_{pb}) between the six significant continuous subscale domain scores of the Healthy Families Parenting Inventory and the binary maltreatment investigation measure revealed that a family's subscale domain score was significantly associated with the occurrence of a maltreatment investigation with the Arizona Department of Child Safety with point-biserial correlation coefficients ranging from (r_{pb} = .023 to .080). Further analysis of these six subscales included estimating binary logistic regression models to predict a maltreatment investigation with the Arizona Department of Child Safety controlling for covariates (e.g., total family income, maternal ethnicity, marital status, birth weight and gestational age of the targeted child of the Healthy Families Arizona intervention).

Social Support Subscale Domain

Pertaining to the social support subscale domain, the independent samples t-test (t) (see Table 13.1) revealed that the average Healthy Families Parenting Inventory social support subscale domain score was lower for families that received a maltreatment investigation with the Arizona Department of Child Safety (M = 20.88, SD = 3.97) than

for families that did not receive a maltreatment investigation (M = 21.49, SD = 3.76). A statistically significant difference between groups on the family's total social support subscale domain score was revealed by the analysis (M = 0.61, 95% CI = [0.13, 1.09]; t (2086) = 2.48, p = .013). The effect size for this analysis based on Cohen's d was (d = .16).

Table 13.1

t-test for Independent Samples Regarding HFPI Social Support Scores and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	21.49 (3.76)	2.48	.013*	0.13	1.09	.16
Yes	272	20.88 (3.97)					

*p < .05

In further analysis, the binary logistic regression model examining the capacity of the social support subscale domain to predict the occurrence of a maltreatment investigation (see Table 13.2) revealed a significantly predictive relationship between the individual social support subscale domain and the occurrence of a maltreatment investigation ($\chi 2$ (6) = 35.82, p = .001), indicating that 3.4% of the variation in the occurrence of a maltreatment investigation was explained by the model (Nagelkerke R^2). Three variables were found to be statistically significant at (p < .05); specifically the social support subscale score (β = -.04, Wald $\chi 2$ = 6.17, p = .013), the family's income as defined (low/high) at the sample median split (β = -.28, Wald $\chi 2$ = 3.88, p = .049), and the family's marital status (not married/married) (β = -.63, Wald $\chi 2$ = 11.85, p = .001). The adjusted odds ratios (AOR) indicated that the likelihood of a maltreatment investigation relative to no occurrence of a maltreatment investigation (a) decreased by

4.0% (AOR = 0.96, 95% 95% CI = 0.93, 0.99) when a family's score on the social support subscale domain increased by one point, (b) decreased by 24.0% (AOR = 0.76, 95% CI = 0.58, 0.99) when a family's income changed from low to high, and (c) decreased 47% (AOR = 0.53, CI = 0.37, 0.76) when the family's marital status changed from not married to married.

Table 13.2

Binary Logistic Regression to Predict the Odds of Maltreatment Using the Social Support Subscale Domain

Variable	β	Wald χ^2	*df*	*p*	*OR*	95% CI	
Total Family Income [a]	-.28	3.88	1	.049*	0.76	0.58	0.99
Maternal Ethnicity [b]	-.11	0.51	1	.477	0.89	0.65	1.22
Marital Status [c]	-.63	11.85	1	.001**	0.53	0.37	0.76
Birth Weight	-.07	1.11	1	.293	0.93	0.82	1.06
Gestational Age	-.07	2.14	1	.143	0.94	0.86	1.02
Social Support Subscale	-.04	6.17	1	.013*	0.96	0.93	0.99

Reference Category: a = low income (below median split), b = White/Hispanic, c = not married
*p < .05, **p < .01

Problem Solving Subscale Domain

As it relates to the problem solving subscale domain, the independent samples t-test (t) (see Table 14.1) revealed that the average Healthy Families Parenting Inventory problem solving subscale domain scores were lower for families that received a maltreatment investigation with the Arizona Department of Child Safety (*M* = 22.91, *SD* = 4.23) than for families that did not receive a maltreatment investigation (*M* = 23.81, *SD* = 3.99). A statistically significant difference between groups on the family's total problem solving subscale domain score was revealed by the analysis (*M* = 0.91, 95% CI = [0.39, 1.49]; *t* (2086) = 3.47, *p* = .001). The effect size for this analysis based on Cohen's *d* was (*d* = .22).

Table 14.1

t-test for Independent Samples Regarding HFPI Problem Solving Scores and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	23.81 (3.99)	3.47	.001**	0.39	1.42	.22
Yes	272	22.91 (4.34)					

**$p < .01$

In further analysis, the binary logistic regression analysis examining the capacity of the problem solving subscale domain to uniquely predict the occurrence of a maltreatment investigation with the Arizona Department of Child Safety (see Table 14.2) revealed a significantly predictive relationship between the subscale domain and the occurrence of a maltreatment investigation (χ^2 (6) = 38.06, p = .001), indicating that 3.6% of the variation in the occurrence of a maltreatment investigation was explained by the model. Three variables were found to be statistically significant at ($p < .05$), specifically the problem solving subscale score (β = -.05, Wald χ^2 = 8.27, p = .004), the family's income as defined (low/high) at the sample median split (β = -.28, Wald χ^2 = 3.84, p = .05), and the family's marital status (not married/married) (β = -.61, Wald χ^2 = 11.21, p = .001). The adjusted odds ratios (AOR) indicated that the likelihood of a maltreatment investigation of relative to no occurrence of a maltreatment investigation (a) decreased by 5.0% (AOR = 0.95, 95% CI = 0.92, 0.99) when the family's score on the problem solving subscale increased by one point, (b) decreased by 24.0% (AOR = 0.76, 95% CI = 0.58, 1.00) when a family's income changed from low to high, and c) decreased by 46.0% (AOR = 0.54, 95% CI = 0.38, 0.78) when a family's marital status changed from not married to married.

Table 14.2

Binary Logistic Regression to Predict the Odds of Maltreatment Using the Problem Solving Subscale Domain

Variable	β	Wald χ^2	*df*	*p*	*OR*	95% CI	
Total Family Income [a]	-.28	3.84	1	.050*	0.76	0.58	1.00
Maternal Ethnicity [b]	-.11	0.44	1	.506	0.89	0.66	1.23
Marital Status [c]	-.61	11.21	1	.001**	0.54	0.38	0.78
Birth Weight	-.07	0.93	1	.336	0.94	0.82	1.07
Gestational Age	-.07	2.15	1	.142	0.94	0.86	1.02
Problem Solving Subscale	-.05	8.27	1	.004**	0.95	0.92	0.99

Reference Category: a = low income (below median split), b = White/Hispanic, c = not married
**$p < .01$

Depression Subscale Domain

As it pertains to the depression subscale domain score, the independent samples t-test (t) (see Table 15.1) revealed that the average Healthy Families Parenting Inventory depression subscale domain score was lower for families that received a maltreatment investigation with the Arizona Department of Child Safety (*M* = 37.98, *SD* = 6.05), than for families that did not receive a maltreatment investigation (*M* = 39.26, *SD* = 5.29). A statistically significant difference between groups on the family's total depression subscale domain score was revealed by the analysis (*M* = 1.29, 95% CI = [0.59, 1.98]; *t* (335.92) = 3.32, *p* = .001). The effect size for this analysis based on Cohen's *d* was (*d* = .23).

Table 15.1

t-*test for Independent Samples Regarding HFPI Depression Scores and Maltreatment Investigation*

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	39.265 (5.291)	3.32	.001**	0.59	1.98	.23
Yes	272	37.978 (6.05)					

**$p < .01$

In further analysis, the binary logistic regression analysis examining the capacity of the depression subscale domain to uniquely predict the occurrence of a maltreatment investigation (see Table 15.2) revealed a significantly predictive relationship between the individual depression subscale domain and the occurrence of a maltreatment investigation ($\chi^2(6) = 40.49$, $p < .001$), indicating that 3.8% of the variation in the occurrence of a maltreatment investigation was explained by the model (Nagelkerke R^2). Two variables were found to be statistically significant at ($p < .05$), specifically the depression subscale domain score ($\beta = -0.04$, Wald $\chi^2 = 10.99$, $p = .001$), and the family's marital status (married/not married) ($\beta = -.61$, Wald $\chi^2 = 11.16$, $p = .001$). The adjusted odds ratios indicated that the likelihood of a maltreatment investigation relative to no occurrence of a maltreatment investigation a) decreased by 4.0% (AOR = 0.96, 95% CI = 0.94, 0.98) when a family's score on the depression subscale domain increased by one point, and (b) decreased 46.0% (AOR = 0.54, CI = 0.38, 0.78) when the family's marital status changed from not married to married.

Table 15.2

Binary Logistic Regression to Predict the Odds of Maltreatment Using the Depression Subscale Domain

Variable	β	*Wald* χ^2	*df*	*p*	*OR*	*95% CI*	
Total Family Income [a]	-.27	3.55	1	.060	0.77	0.58	1.01
Maternal Ethnicity [b]	-.12	0.55	1	.459	0.89	0.65	1.22
Marital Status [c]	-.61	11.16	1	.001**	0.54	0.38	0.78
Birth Weight	-.08	1.26	1	.262	0.93	0.81	1.06
Gestational Age	-.06	1.93	1	.165	0.94	0.86	1.03
Depression Subscale	-.04	10.99	1	.001**	0.96	0.94	0.98

Reference Category: a = low income (below median split), b = White/Hispanic, c = not married
**$p < .01$

Personal Care Subscale Domain

The independent samples t-test (t) pertaining to the personal care subscale domain (see Table 16.1) revealed that the average Healthy Families Parenting Inventory personal care subscale domain score was lower for families that received a maltreatment investigation with the Arizona Department of Child Safety (M = 18.38, SD = 3.98) than for families that did not receive a maltreatment investigation (M = 19.26, SD = 3.69). A statistically significant difference between groups on the family's total personal care subscale domain score was revealed by the analysis (M = 0.89, 95% CI = [0.41, 1.36]; t (2086) = 3.65, p = .001). The effect size for this analysis based on Cohen's d was (d = .23).

Table 16.1

t-test for Independent Samples Regarding HFPI Personal Care Scores and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	19.26 (3.69)	3.65	.001**	0.41	1.36	.23
Yes	272	18.375 (3.98)					

**p < .01

In further analysis, the logistic regression analysis examining the capacity of the personal care subscale domain to uniquely predict a maltreatment investigation (see Table 16.2) revealed a significantly predictive relationship between the individual personal care subscale domain and the occurrence of a maltreatment investigation (χ^2 (6) = 46.61, p = .001), indicating that 4.4% of the variation in the occurrence of a maltreatment investigation is explained by the model (Nagelkerke R^2). Three variables were found to be statistically significant at (p < .05), specifically the personal care subscale domain score (β = -.07, Wald χ^2 = 16.98, p < .001), the family's total income as

defined (low/high) at the sample median split (β = -.29, Wald χ^2 = 4.46, *p* = .035), and the marital status of the family (not married/married) (β = -.66, χ2 = 12.99, *p* < .001). The adjusted odds ratios (AOR) indicated that the likelihood of a maltreatment investigation relative to no occurrence of a maltreatment investigation a) decreased by 7.0% (AOR = 0.93, 95% CI = 0.89, 0.96) when a family's score on the personal care domain subscale increased by one point, (b) decreased by 26.0% (AOR= 0.74, 95% CI = 0.89, 0.96) when a family's income changed from low to high, and (c) decreased by 48.0 % (AOR = 0.52, 95% CI = 0.36, 0.74) when a family's marital status changed from not married to married.

Table 16.2

Binary Logistic Regression to Predict the Odds of Maltreatment Using the Personal Care Subscale Domain

Variable	β	Wald χ^2	*df*	*p*	*OR*	95% CI	
Total Family Income [a]	-.29	4.46	1	.035*	0.74	0.56	0.98
Maternal Ethnicity [b]	-.13	0.61	1	.435	0.88	0.64	1.21
Marital Status [c]	-.66	12.99	1	.000***	0.51	0.36	0.74
Birth Weight	-.08	1.24	1	.266	0.93	0.81	1.06
Gestational Age	-.06	1.66	1	.198	0.94	0.86	1.03
Personal Care Subscale	-.07	16.98	1	.000***	0.93	0.89	0.96

Reference Category: a = low income (below median split), b = White/Hispanic, c = not married
* *p* < .05, ****p* < .001

Role Satisfaction Subscale Domain

Pertaining to the role satisfaction subscale domain, the independent samples t-test (t) (see Table 17.1) revealed that the average Healthy Families Parenting Inventory role satisfaction subscale domain was lower for families that received a maltreatment investigation with the Arizona Department of Child Safety *M* = 25.28, (*SD* = 4.45) than for families that did not receive a maltreatment investigation *M* = 25.89, (*SD* = 3.94). A

statistically significant difference between groups on the family's total role satisfaction subscale domain score was revealed by the analysis (M = .61, 95% CI = [0.05, 1.17]; t (337.66) = 2.15, p = .03). The effect size for this analysis based on Cohen's d was (d = .15).

Table 17.1

t-tests for Independent Samples Regarding HFPI Role Satisfaction Scores and Maltreatment Investigation

	N	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	25.89 (3.94)	2.15	.03*	0.05	1.17	.15
Yes	272	25.28 (4.45)					

*$p < .05$

In further analysis, the binary logistic regression analysis examining the capacity of the role satisfaction subscale domain to uniquely predict the occurrence of a maltreatment investigation with the Arizona Department of Child Safety (see Table 17.2) revealed a significantly predictive relationship between the model and the occurrence of a maltreatment investigation (χ^2 (6) = 37.54, p = .001), indicating that 3.5% of the variation in the occurrence of a maltreatment investigation is explained by the model (Nagelkerke R^2). Two variables were found to be statistically significant at ($p < .01$), specifically the role satisfaction subscale domain score (β = -.05 Wald χ^2 = 7.97, p = .005), and the family's marital status (not married/married) (β = -.65, Wald χ^2 = 12.57, $p < .001$). The adjusted odds ratio (AOR) indicated that the likelihood of a maltreatment investigation relative to no occurrence of a maltreatment investigation (a) decreased by 4.0% (AOR = 0.96, 95% CI = 0.93, 0.99) when the family's score on the role satisfaction solving

subscale domain increased by one unit, and (b) decreased by 48.0% (AOR = 0.52, 95% CI = 0.37, 0.75) when a family's marital status changed from not married to married.

Table 17.2

Binary Logistic Regression to Predict the Odds of Maltreatment Using the Role Satisfaction Subscale Domain

Variable	β	Wald χ^2	*df*	*p*	*OR*	95% CI	
Total Family Income [a]	-.28	3.80	1	.051	0.76	0.58	1.00
Maternal Ethnicity [b]	-.12	0.51	1	.474	0.89	0.65	1.22
Marital Status [c]	-.65	12.57	1	.000**	0.52	0.37	0.75
Birth Weight	-.08	1.25	1	.264	0.93	0.81	1.06
Gestational Age	-.06	1.94	1	.164	0.94	0.86	1.03
Role Satisfaction Subscale	-.05	7.97	1	.005**	0.96	0.93	0.99

Reference Category: a = low income (below median split), b = White/Hispanic, c = not married
**p < .01, ***p < .001

Parenting Efficacy Subscale Domain

As it pertains to the parenting efficacy subscale domain, the independent samples t-test (t) (see Table 18.1) revealed that the average Healthy Families Parenting Inventory parenting efficacy subscale domain was lower for families that received a maltreatment investigation with the Arizona Department of Child Safety *M* = 25.23, (*SD* = 4.44) than for families that did not receive a maltreatment investigation *M* = 26.05, (*SD* = 3.56). A statistically significant difference between groups on the family's total parenting efficacy subscale domain score was revealed by the analysis (M = 0.82, 95% CI = [0.28, 1.38]; *t* (325.18) = 2.92, *p* = .004). The effect size for this analysis based on Cohen's *d* was (*d* = .20).

Table 18.1

t-test for Independent Samples Regarding HFPI Parenting Efficacy Scores and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	25.23 (4.44)	2.92	.004**	0.27	1.38	.20
Yes	272	26.05 (3.56)					

**$p < .01$

In further analysis, the logistic regression model examining the capacity of the parenting efficacy subscale to uniquely predict an investigation of maltreatment with the Arizona Department of Child Safety (Table 18.2) revealed a significantly predictive relationship between the individual parenting efficacy subscale and the occurrence of a maltreatment investigation ($\chi^2(6) = 40.82$, $p = .001$), indicating that 3.8% of the variation in the occurrence of a maltreatment investigation was explained by the model (Nagelkerke R^2). Three variables were found to be statistically significant at ($p < .05$); specifically the parenting efficacy subscale domain score ($\beta = -.06$, Wald $\chi^2 = 11.34$, $p = .001$), the family's income as defined (high/low) at the sample median split ($\beta = -.28$, Wald $\chi^2 = 4.04$, $p = .04$), and the family's marital status (not married/married) ($\beta = -.65$, Wald $\chi^2 = 12.48$, $p < .001$). The adjusted odds ratios (AOR) indicated that the likelihood of a maltreatment investigation of relative to no occurrence of a maltreatment investigation (a) decreased by 6.0% (AOR = 0.94, 95% CI = 0.91, 1.09) for every unit increase on the parenting efficacy subscale score, and (b) decreased by 25.0% (AOR= 0.75, 95% CI = 0.57, 0.99), and (c) decreased by 48.0% (AOR = 0.52, 95% CI = 0.37 0.75) when the family's marital status changed from not married to married.

Table 18.2

Binary Logistic Regression to Predict the Odds of Maltreatment Using the Parenting Efficacy Subscale Domain

Variable	β	Wald χ^2	*df*	*p*	*OR*	95% CI	
Total Family Income [a]	-.28	4.04	1	.044*	0.75	0.57	0.99
Maternal Ethnicity [b]	-.12	0.523	1	.469	0.89	0.65	1.22
Marital Status [c]	-.65	12.48	1	.000***	0.52	0.37	0.75
Birth Weight	-.07	1.09	1	.297	0.93	0.82	1.06
Gestational Age	-.07	2.29	1	.130	0.93	0.86	1.02
Parenting Efficacy Subscale	-.06	11.34	1	.001**	0.94	0.91	1.09

Reference Category: a = low income (below median split), b = White/Hispanic, c = not married
* $p < .05$, ** $p < .01$, ***$p < .001$

The conclusion based on these results is that the hypothesis that families with lower scores on individual subscale domains of the Healthy Families Parenting Inventory were more likely to experience a maltreatment investigation with the Arizona Department of Child Safety was supported. Specifically, independent samples t-tests (t) revealed that families who experienced an investigation of the Arizona Department of Child Safety had significantly lower scores on the social support, problem solving, depression, personal care, role satisfaction, and parenting efficacy subscale domains of the Healthy Families Parenting Inventory than those that did not experience an investigation of maltreatment. The effect size as determined by Cohen's *d* in these analyses were all below ($d = .50$). In further analyses, the hypothesis that when examined individually, the nine Healthy Families Parenting Inventory subscale domains are predictive of an investigation of maltreatment with the Arizona Department of Child Safety was partially supported. The results of the individual logistic regression analyses for all six subscales controlling for covariates revealed that the Healthy Families Parenting Inventory subscale scores were each significantly predictive of the occurrence of a maltreatment investigation with the

Arizona Department of Child Safety. Specifically, the findings showed that a family's risk for a maltreatment investigation decreased as a family's score on the social support, problem solving, depression, personal care, role satisfaction, and parenting efficacy subscales increased. The following analysis examines the collective predictive validity of all nine Healthy Families Parenting Inventory subscale domains.

Model with all 9 Subscale Domains

A logistic regression was estimated including all nine Healthy Families Parenting Inventory subscales (Table 19.1) to examine the simultaneous relationship between the nine subscales of the Healthy Families Parenting Inventory and the occurrence of a maltreatment investigation with the Arizona Department of Child Safety. A binary logistic regression analysis was estimated that revealed a statistically significant relationship between the model and the occurrence of a maltreatment investigation (χ^2 (14) = 76.35, p = .001), indicating that 7.1% of the variation in the occurrence of a maltreatment investigation was explained by the model (Nagelkerke R^2). Five variables were found to be statistically significant at (p < .05), specifically the personal care subscale (β = -.07, Wald χ^2 = 9.07, p = .003), mobilizing resources (β = .07, Wald χ^2 = 15.47, p < .001), home environment (β = .03, Wald χ^2 = 4.77, p <.05), parenting efficacy (β = -.07, Wald χ^2 = 7.87, p = .005), and the family's marital status (not married/ married) (β = -.70, Wald χ^2 = 14.04, p < .001). The adjusted odds ratios (AOR) indicated that the likelihood of a maltreatment investigation of relative to no occurrence of a maltreatment investigation (a) decreased 1.0% (AOR = 0.99, 95% CI = 0.89, 0.98) for every unit increase in the family's score on the personal care subscale (b) decreased by 6% (AOR =

.94, 95% CI = 0.89, 0.98) for every unit increase in the family's score on the parenting efficacy subscale

(c) decreased 51.0 % (AOR = 0.49, 95% CI = 0.34, 0.72) when a family's marital status changed from not married to married. In terms of the mobilizing resources and home environment subscales, the analyses revealed that the likelihood of a maltreatment investigation compared to no occurrence of a maltreatment investigation (d) increased by 7.0% when a family's score on the mobilizing resources subscale increased by a point (AOR = 1.07, 95% CI = 1.04, 1.11) and (e) increased by 3.0% when a family's score on the home environment subscale increased by one point (AOR = 1.03, 95% CI = 1.00, 1.06).

Table 19.1

Binary Logistic Regression to Predict the Odds of Maltreatment Using Collective HFPI Subscale Domains

Variable	β	Wald χ^2	*df*	*p*	*OR*	95% CI	
Total Family Income [a]	-.27	3.63	1	.057	0.76	0.58	1.01
Maternal Ethnicity [b]	-.13	0.66	1	.416	0.88	0.64	1.21
Marital Status [c]	-.70	14.04	1	.000***	0.49	0.34	0.72
Birth Weight	-.08	1.30	1	.254	0.93	0.81	1.06
Gestational Age	-.05	1.02	1	.312	0.96	0.87	1.04
Social Support Subscale	-.01	1.02	1	.584	0.99	0.95	1.03
Problem Solving Subscale	-.04	3.09	1	.079	0.96	0.92	1.00
Depression Subscale	-.01	0.22	1	.643	0.99	0.96	1.03
Personal Care Subscale	-.07	9.08	1	.003**	0.99	0.89	0.98
Mobilizing Resources Subscale	.07	15.47	1	.000***	1.07	1.04	1.11
Role Satisfaction Subscale	-.02	1.34	1	.247	0.98	0.94	1.02
Parent/Child Interaction	.01	0.09	1	.762	1.01	0.97	1.05
Home Environment Subscale	.03	4.77	1	.029*	1.03	1.00	1.06
Parenting Efficacy Subscale	-.07	7.87	1	.005**	0.94	0.89	0.98

Reference Category: a = low income (below median split), b = White/Hispanic, c = not married
*$p < .05$, **$p < .01$, ***$p < .001$

The conclusion based on these results is that the hypothesis that when examined simultaneously, the nine subscale domains of the Healthy Families Parenting Inventory were predictive of an investigation of maltreatment with the Arizona Department of Child Safety was partially supported. Specifically, when controlling for covariates, the binary logistic regression model revealed that the subscale domains of social support, problem solving, depression, and role satisfaction were no longer predictive of a maltreatment investigation with the Arizona Department of Child Safety. However, the personal care and parenting efficacy subscales remained a significant predictor of a maltreatment investigation, as a family's score on the personal care and parenting efficacy subscales increased, their family's risk for maltreatment decreased. Alternatively, when a family's risk for the occurrence of a maltreatment investigation increased, the family's score on the mobilizing resources and home environment subscales also increased. Findings from Research Question 2 are discussed in further detail in Chapter Five.

Research Question Three

Research question three conducts exploratory research and builds upon research question two by examining the interaction between the nine individual subscale domains of the Healthy Families Parenting Inventory. Specifically, the following analyses explore whether the effects of depression and role satisfaction subscale domains on the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety are different for families with varying scores on the social support, problem solving, home environment, parent/child interaction, and parenting efficacy subscale domains. The role satisfaction and depression subscale domains were selected as independent variables in the moderation analysis because these two subscale domains

contain all seven of the flag indicator items contained in the overall Healthy Families Parenting Inventory. In particular, the role satisfaction subscale domain contains three of the seven red flag indicator items, and the depression subscale domain contains four of the seven red flag indicator items. It is hypothesized that the subscale domains of social support, problem solving, home environment, parent/child interaction, and parenting efficacy of the Healthy Families Parenting Inventory will moderate the relationships between both the role satisfaction subscale and depression subscale domains, and the occurrence of a report of maltreatment to the Arizona Department of Child Safety. To test these hypotheses, binary logistic regression models were estimated analyzing the relationships between these subscale domains building upon research question two. For each moderator variable, three regression models were estimated. Model one included the subscale domain serving as the predictor variable (depression or role satisfaction subscale domains), the subscale domain serving as the moderator (social support, problem solving, personal care, mobilizing resources, parent/child interaction, home environment, or parenting efficacy subscale domains) and covariates including total family income, maternal ethnicity, marital status, birth weight and gestational age of the targeted child of the Healthy Families Arizona intervention. The second model built upon model one with the addition of the interaction term between the subscale domain serving as the independent variable and the subscale serving as the moderator. The final model built upon model two with the addition of interaction terms between the covariates and the identified moderating subscale domain. The analyses revealed that none of the subscale domains were significant moderators of the relationship between the depression subscale domain and the occurrence of a maltreatment investigation with the Arizona

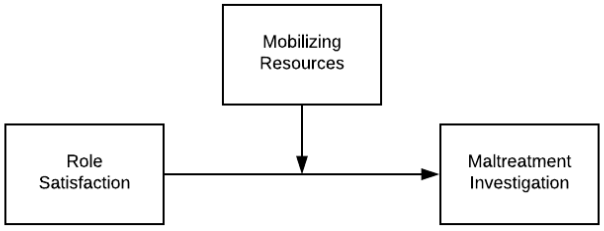
Department of Child Safety. However, as it pertains to the role satisfaction subscale domain, the mobilizing resources and home environment subscale domains were determined to be significant moderators of the relationship between the role satisfaction subscale domains and the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety.

Mobilizing Resources

The mobilizing resources subscale domain was examined as a moderator of the relationship between the role satisfaction subscale domain and the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety (see Figure 4.1).

Figure 4.1

Moderation Analysis Using Mobilizing Resources as a Moderator between Role Satisfaction and Maltreatment Investigation



The logistic regression model examining the capacity of the mobilizing resources subscale domain to moderate the relationship between the role satisfaction subscale domain and the occurrence of a maltreatment investigation with the Arizona Department of Child Safety (Table 20.1) explained a significant increase in the variance in the occurrence of a maltreatment investigation with the Arizona Department of Child Safety $\chi 2(8) = 45.61$, $p = .001$, with 4.3% of the variance explained in the model (Nagelkerke

R^2). The moderating variable (role satisfaction x mobilizing resources subscale domains) was significant (β = .006, Wald $\chi 2 = 4.252$, $p = .039$). The adjusted odds ratio for the interaction term indicated that the likelihood of the occurrence of a report of maltreatment relative to no occurrence of a report of maltreatment a) increased by 6.0% (AOR = 1.006, 95% CI = 1.00, 1.01) for every unit increase on the (role satisfaction x mobilizing resources subscale domains) interaction term.

Table 20.1

Binary Logistic Regression Model to Predict the Odds of Maltreatment Outcome Using HFPI Subscale Role Satisfaction and Moderator (Mobilizing Resources) [1]

Variable	*β*	*Wald* χ^2	*df*	*p*	*OR*	*95% CI*	
Income [a]	-.262	3.447	1	.063	0.77	0.58	1.02
Maternal Ethnicity [b]	-.133	0.674	1	.412	0.88	0.64	1.20
Marital Status [c]	-.645	12.388	1	.000***	0.52	0.37	0.75
Birthweight	-.076	1.282	1	.258	0.92	0.81	1.06
Gestational Age	-.062	1.920	1	.166	0.94	0.86	1.03
Role Satisfaction	-.069	14.550	1	.000***	0.93	0.90	0.97
Mobilizing Resources	.020	1.653	1	.199	1.020	0.99	1.05
Role Satisfaction X Mobilizing Resources	.006	4.252	1	.039*	1.006	1.00	1.01

[1] Full models are reported in Appendix A.
Reference Category: a = low income (below median split), b = White/Hispanic, c = not married
* $p < .05$, *** $p < .001$

Next, simple odds ratios were computed for the interaction (see Appendix A for complete computation). In examination of families scoring one standard deviation below the mean (18.38) on the mobilizing resources subscale domain, the likelihood of the occurrence of a report of maltreatment relative to no occurrence of a report of maltreatment for families decreased by 9.4% (AOR = 0.91) for every point increase on the role satisfaction subscale domain. For families scoring at the mean (23.38) on the mobilizing resources subscale domain, the likelihood of the occurrence of a report of maltreatment relative to no occurrence of a report of maltreatment for families decreased

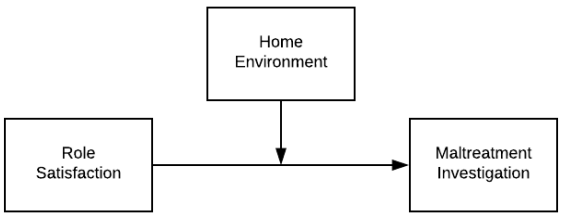
by 6.7% (AOR = 0.93) for every point increase on the role satisfaction subscale domain. For families scoring one standard deviation above the mean (28.38) on the mobilizing resources subscale domain, the likelihood of the occurrence of a maltreatment investigation relative to no occurrence of an investigation of maltreatment for families decreased by 3.8% (AOR = 0.96) for every point increase on the role satisfaction subscale domain. In further examination, none of the interaction terms between the covariates and the mobilizing resources subscale domain were found to be significant in the final logistic regression model. However, when these interaction terms were included in the model, the interaction term (role satisfaction x mobilizing resources) was no longer significant at ($p < .05$). Full models are presented in Appendix A.

Home Environment

In further analysis, the home environment subscale domain was examined as a moderator of the relationship between the role satisfaction subscale domain and the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety (See Figure 4.2).

Figure 4.2

Moderation Analysis Using Home Environment as a Moderator between Role Satisfaction and Maltreatment Investigation



The binary logistic regression model examining the capacity of the home environment subscale domain to moderate the relationship between the role satisfaction subscale domain and the occurrence of a maltreatment investigation with the Arizona Department of Child Safety (Table 21.1) explained a significant increase in the variance in the occurrence of a maltreatment investigation with the Arizona Department of Child Safety ($\chi2(8) = 43.71$, p =.001), explaining 4.1% of the variance in the model (Nagelkerke R^2). The moderating variable (role satisfaction x home environment subscale domains) was significant (β = .006, Wald $\chi2$ = 6.043, p = .014). The adjusted odds ratio for the interaction term indicated that the likelihood of the occurrence of a report of maltreatment relative to no occurrence of a report of maltreatment a) increased by 6.0% (AOR = 1.006, 95% CI = 1.00, 1.01) for every unit increase on the role satisfaction x home environment subscale domains interaction term.

Table 21.1

Binary Logistic Regression Model to Predict the Odds of Maltreatment Outcome Using HFPI Subscale Role Satisfaction and Moderator (Home Environment) [1]

Variable	*β*	*Wald* χ^2	*df*	*p*	*OR*	*95% CI*	
Income	-.277	3.833	1	.050*	0.76	0.58	1.00
Maternal Ethnicity	-.120	0.522	1	.457	0.89	0.65	1.22
Marital Status	-.668	13.159	1	.000***	0.51	0.36	0.74
Birthweight	-.072	1.154	1	.283	0.93	0.82	1.06
Gestational Age	-.063	1.941	1	.164	0.94	0.86	1.03
Role Satisfaction	-.065	12.911	1	.000***	0.94	0.91	0.97
Home Environment	-.004	0.137	1	.711	0.99	0.97	1.02
Role Satisfaction X Home Environment	.006	6.043	1	.014*	1.01	1.00	1.01

Reference Category: a = low income (below median split), b = White/Hispanic, c = not married
* p < .05, *** p <.001

Next, simple odds ratios were then computed for the interaction (see Appendix A for full computation). In examination of families scoring one standard deviation below the mean (34.06) on the home environment subscale domain, the likelihood of the

occurrence of a report of maltreatment relative to no occurrence of a report of maltreatment for families decreased by 9.9% (AOR = 0.90) for every point increase on the role satisfaction subscale domain. For families scoring at the mean (40.61) on the home environment subscale domain, the likelihood of the occurrence of a report of maltreatment relative to no occurrence of a report of maltreatment for families decreased by 6.3% (AOR = 0.94) for every point increase on the role satisfaction subscale domain. For families scoring one standard deviation above the mean (47.16) on the home environment subscale domain, the likelihood of the occurrence of a maltreatment investigation relative to no occurrence of an investigation of maltreatment for families decreased by 2.5% (AOR = 0.98) for every point increase on the role satisfaction domain. In further examination, none of the interaction terms were found to be significant between the covariates and the home environment subscale domain in the final binary logistic regression model. Furthermore, the addition of these interaction terms into the model did not significantly impact the interaction. Full models are presented in Appendix A.

The conclusion based on these results is that the hypothesis that the social support, problem solving, personal care, mobilizing resources, parent/child interaction, home environment, and parenting efficacy subscale domains moderate the relationship between the role satisfaction and depression subscale domains and the occurrence of a maltreatment investigation with the Arizona Department of Child Safety was partially supported. Specifically, two of the subscales: mobilizing resources and home environment were determined to be significant moderators of the relationship between

the role satisfaction domain and the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety.

In examination of the mobilizing resources subscale domain as a moderator of the relationship between the role satisfaction domain and the occurrence of a maltreatment investigation with the Arizona Department of Child Safety, the findings revealed that the relationship between a family's score on the role satisfaction subscale domain and the occurrence of a maltreatment investigation is impacted by their score on mobilizing resources subscale domain. Specifically, the relationship between the family's score on the role satisfaction subscale domain and the likelihood of receiving an investigation of maltreatment with the Arizona Department of Child Safety depends on the family's score on the mobilizing resources subscale domain. This finding is particularly relevant for families with low scores (1 *SD* below the mean) on the mobilizing resources subscale domain, as a one-unit increase on the family's role satisfaction subscale domain score can lead to an almost 10.0% decrease in the likelihood of receiving an investigation of maltreatment with the Arizona Department of Child Safety.

In examination of the home environment subscale domain as a moderator of the relationship between the role satisfaction subscale domain and the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety, the findings revealed that the relationship between a family's score on the role satisfaction domain and the occurrence of a maltreatment investigation is impacted by their score on the home environment subscale domain. Specifically, the relationship between a family's score on the role satisfaction subscale domain and the likelihood of receiving an investigation of maltreatment with the Arizona Department of Child Safety depends on the family's score

on the home environment subscale domain. This finding is particularly relevant for families with low scores (1 *SD* below the mean) on the mobilizing resources subscale domain, as a one-unit increase on the family's role satisfaction domain score can lead to an almost 10.0% decrease in the likelihood of receiving an investigation of maltreatment with the Arizona Department of Child Safety.

Research Question Four

Research question four is concerned with the overall predictive validity of individual red flag and strength indicator items contained within the nine subscales of the Healthy Families Parenting Inventory. With particular attention to the potential for strength indicator items to ameliorate the impact of red flag indicator items, this research question examines the predictive validity of the Healthy Families Parenting Inventory red flag and strength indicator items. It is hypothesized that families who experienced an investigation of maltreatment with the Arizona Department of Child Safety would have lower scores on each red flag item, and families that did not experience an investigation of maltreatment with the Arizona Department of Child Safety will have higher scores on strength indicator items than families who experienced a maltreatment investigation. A secondary hypothesis for this research question is that the red flag indicator items of the Healthy Families Parenting Inventory would predict the occurrence of a maltreatment investigation with the Arizona Department of Child Safety both individually and collectively.

Table 22.1 presents the percentiles of the red flag and strength indicator items corresponding to the occurrence of a maltreatment investigation with the Arizona Department of Child Safety, and the absence of an investigation of maltreatment. The

percentiles supported the hypothesis that scores on the red flag indicator items were lower for families who experienced a maltreatment investigation with the Arizona Department of Child Safety than families who did not. Further, the scores on the strength indicator items were higher for families who did not receive a maltreatment investigation with the Arizona Department of Child Safety than those that did. However, these results were not consistent across the seven red flag and ten strength indicator items. In the lower percentiles, differences between groups was more consistently pronounced, however the heterogeneity between groups dissipated in the upper percentile ranges, resulting in homogeneity between families that experienced an investigation of maltreatment with the Arizona Department of Child Safety and those that did not. Therefore, families who did not receive a maltreatment investigation with the Arizona Department of Child Safety inconsistently had higher scores on strength and red flag indicator items than families who experienced a maltreatment investigation. Additionally, families who received an investigation of maltreatment with the Arizona Department of Child Safety did not consistently have lower scores on the red flag indicator items than families who did not.

Table: 22.1

Percentiles of the Red Flag and Strength Indicator Items and Maltreatment Investigation

HFPI Item	Outcome	Percentiles						
		5th	*10th*	*25th*	*50th*	*75th*	*90th*	*95th*
Red Flag Indicator Questions								
Role Satisfaction Subscale								
34. "I feel drained dealing with my child"	No Maltreatment Investigation	3.0	3.0	4.0	5.0	5.0	5.0	5.0
	Maltreatment Investigation	2.0	2.0	3.0	5.0	5.0	5.0	5.0
33. "I feel trapped by all the things I have to do for my child"	No Maltreatment Investigation	3.0	3.0	4.0	5.0	5.0	5.0	5.0
	Maltreatment Investigation	2.0	3.0	4.0	5.0	5.0	5.0	5.0
37. "I feel frustrated because my whole life seems to revolve around my child"	No Maltreatment Investigation	3.0	4.0	5.0	5.0	5.0	5.0	5.0
	Maltreatment Investigation	3.0	4.0	5.0	5.0	5.0	5.0	5.0
Depression Subscale								
12." I feel sad"	No Maltreatment Investigation	2.0	3.0	3.0	4.0	4.0	5.0	5.0
	Maltreatment Investigation	2.0	3.0	3.0	4.0	4.0	5.0	5.0
18. "I have so many problems I feel overwhelmed by them"	No Maltreatment Investigation	2.0	3.0	3.0	4.0	5.0	5.0	5.0
	Maltreatment Investigation	1.0	2.0	3.0	4.0	5.0	5.0	5.0
15. "I feel unhappy about everything"	No Maltreatment Investigation	3.0	3.0	4.0	5.0	5.0	5.0	5.0
	Maltreatment Investigation	2.0	3.0	4.0	5.0	5.0	5.0	5.0
16. "I feel hopeless about the future"	No Maltreatment Investigation	3.0	4.0	5.0	5.0	5.0	5.0	5.0
	Maltreatment Investigation	2.0	3.0	5.0	5.0	5.0	5.0	5.0
Strength Indicator Items								
Social Support Subscale								
2. "I feel others care about me"	No Maltreatment Investigation	2.0	3.0	4.0	5.0	5.0	5.0	5.0
	Maltreatment Investigation	3.0	3.0	4.0	5.0	5.0	5.0	5.0
4. "If I have trouble, I feel there is always someone I can turn to for help"	No Maltreatment Investigation	2.0	3.0	4.0	5.0	5.0	5.0	5.0
	Maltreatment Investigation	2.0	3.0	3.0	5.0	5.0	5.0	5.0

Table: 22.1

Percentiles of the Red Flag and Strength Indicator Items and Maltreatment Investigation

HFPI Item	Outcome	Percentiles						
		5th	*10th*	*25th*	*50th*	*75th*	*90th*	*95th*
Strength Indicator Items								
Problem Solving								
8. "When I have a problem, I take steps to solve it"	No Maltreatment Investigation	3.0	3.0	4.0	5.0	5.0	5.0	5.0
	Maltreatment Investigation	3.0	3.0	4.0	5.0	5.0	5.0	5.0
11. "I remain calm when new problems come up"	No Maltreatment Investigation	2.0	2.0	3.0	4.0	5.0	5.0	5.0
	Maltreatment Investigation	2.0	2.0	3.0	4.0	4.0	5.0	5.0
Depression Subscale								
13. "I feel positive about myself"	No Maltreatment Investigation	2.0	3.0	4.0	4.0	5.0	5.0	5.0
	Maltreatment Investigation	2.0	3.0	3.0	4.0	5.0	5.0	5.0
Parent Child Interaction								
46. "I can remain calm when my child is upset"	No Maltreatment Investigation	3.0	3.0	4.0	5.0	5.0	5.0	5.0
	Maltreatment Investigation	3.0	3.0	4.0	5.0	5.0	5.0	5.0
Home Environment Subscale								
50. "I plan to do a variety of activities with my child every day"	No Maltreatment Investigation	1.0	2.0	3.0	4.0	5.0	5.0	5.0
	Maltreatment Investigation	2.0	2.0	3.0	4.0	5.0	5.0	5.0
52. "I have organized my home for raising my child"	No Maltreatment Investigation	2.0	3.0	4.0	5.0	5.0	5.0	5.0
	Maltreatment Investigation	2.0	3.0	4.0	4.0	5.0	5.0	5.0
Parenting Efficacy Subscale								
59. "I am proud of myself as a parent"	No Maltreatment Investigation	3.0	3.0	4.0	5.0	5.0	5.0	5.0
	Maltreatment Investigation	3.0	3.0	4.0	5.0	5.0	5.0	5.0
63. "I learn new parenting skills and use them with my child"	No Maltreatment Investigation	3.0	4.0	4.0	5.0	5.0	5.0	5.0
	Maltreatment Investigation	3.0	3.0	4.0	5.0	5.0	5.0	5.0

The following section presents findings for independent samples t-tests (t) for the red flag and strength indicator items of the Healthy Families Parenting Inventory that examined the differences in the average individual Healthy Families Parenting Inventory item scores for families that received an investigation of maltreatment with the Arizona Department of Child Safety versus families that did not. The independent samples t-tests (t) revealed a statistically significant difference between families who experienced a maltreatment investigation with the Arizona Department of Child Safety versus those that did not experience a maltreatment investigation on the family's scores for four of the seven red flag indicator items, and seven of the ten strength indicator items. Further analysis of the red flag and strength indicator items included estimating two binary logistic regression models to predict a maltreatment investigation with the Arizona Department of Child Safety while controlling for covariates (e.g., total family income, maternal ethnicity, marital status, birth weight and gestational age of the targeted child of the Healthy Families Arizona intervention).

Strength Indicator Items

The independent samples t-test (t) (see Table 23.1) revealed that the average score on the Healthy Families Parenting Inventory strength indicator item # 2 "I feel others care about me" was higher for families that did not receive a maltreatment investigation with the Arizona Department of Child Safety M = 4.44, (SD = 0.91) than families that received a maltreatment investigation M = 4.32, (SD = 0.94). A statistically significant difference between groups was revealed by the analysis (M = 0.12, 95% CI = [0.01, 0.24]; t (2086) = 2.06, p = .039). The effect size for this analysis based on Cohen's d was (d = .13).

Table 23.1

t-test for Independent Samples Regarding HFPI Strength Indicator Item # 2 and Maltreatment Investigation

	N	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	4.44 (0.91)	2.06	.039*	0.01	0.24	.13
Yes	272	4.32 (0.94)					

*$p < .05$

In further analysis, the independent samples t-test (t) (see Table 23.2) revealed that the average score on the Healthy Families Parenting Inventory strength indicator item # 4 "If I have trouble, I feel there is always someone I can turn to for help" was higher for families that did not receive a maltreatment investigation with the Arizona Department of Child Safety $M = 4.36$, ($SD = 0.94$), than families that received a maltreatment investigation $M = 4.10$, ($SD = 1.14$). A statistically significant difference between groups was revealed by the analysis ($M = 0.26$, 95% CI = [0.12, 0.41]; t (327.55) = 3.63, $p < .001$). The effect size for this analysis based on Cohen's d was ($d = .25$).

Table 23.2

t-test for Independent Samples Regarding HFPI Strength Indicator Item # 4 and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	4.36 (0.94)	3.63	.000***	0.12	0.41	.25
Yes	272	4.10 (1.14)					

***$p < .001$

As it pertains to strength indicator item #11 "I remain calm whenever new problems come up", the independent samples t-test (t) (see Table 23.3) revealed that the average score on the item was higher for families that did not receive a maltreatment investigation with the Arizona Department of Child Safety $M = 3.71$, ($SD = 1.04$), than

families that received a maltreatment investigation M = 3.57, (SD = 1.04). A statistically significant difference between groups was revealed by the analysis (M = 0.14, 95% CI = [0.01, 0.27]; t (2086) = 2.05, p = .040). The effect size for this analysis based on Cohen's d was (d = .14).

Table 23.3

t-test for Independent Samples Regarding HFPI Strength Indicator Item #11 and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	3.71 (1.04)	2.05	.040*	0.01	0.27	.14
Yes	272	3.57 (1.04)					

*p < .05

Further, the independent samples t-test (t) (see Table 23.4) pertaining to strength indicator item #13 "I feel positive about myself", revealed that the average score on the item was higher for families that did not receive a maltreatment investigation with the Arizona Department of Child Safety M = 3.99, (SD = 1.02), than families that received a maltreatment investigation M = 4.13, (SD = 0.95). A statistically significant difference between groups was revealed by the analysis (M = 0.14, 95% CI = [0.01, 0.26]; t (2086) = 2.19, p = .029). The effect size for this analysis based on Cohen's d was (d = .14).

Table 23.4

t-test for Independent Samples Regarding HFPI Strength Indicator Item #13 and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	4.13 (0.95)	2.19	.029*	0.01	0.26	.14
Yes	272	3.99 (1.02)					

*p < .05

As it pertains to strength indicator item #46 “I can remain calm when my child is upset”, the independent samples t-test (t) (see Table 23.5) revealed that the average score on the item was higher for families that did not receive a maltreatment investigation with the Arizona Department of Child Safety *M* = 4.41, (*SD* = 0.79), than families that received a maltreatment investigation *M* = 4.27, (*SD* = 0.87). A statistically significant difference between groups was revealed by the analysis (*M* = .14, 95% CI = [0.03 0.25]; *t* (341.20) = 2.54, *p* = .012). The effect size for this analysis based on Cohen’s *d* was (*d* = .17).

Table 23.5

t-test for Independent Samples Regarding HFPI Strength Indicator Item #46 and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen’s d*
Maltreatment							
No	1816	4.41 (0.79)	2.54	.012*	0.03	0.25	.17
Yes	272	4.27 (0.87)					

*$p < .05$

In further analysis, the independent samples t-test (t) (see Table 23.6) revealed that the average score on the Healthy Families Parenting Inventory on strength indicator item #59 “I am proud of myself as a parent” was higher for families that did not receive a maltreatment investigation with the Arizona Department of Child Safety *M* = 4.51, (*SD* = 0.75) than families that received a maltreatment investigation *M* = 4.36, (*SD* = 0.91). A statistically significant difference between groups was revealed by the analysis (*M* = .14, 95% CI = [0.03 0.26]; *t* (329.12) = 2.46, *p* = .014). The effect size for this analysis based on Cohen’s *d* was (*d* = .18).

Table 23.6

t-test for Independent Samples Regarding HFPI Strength Indicator Item #59 and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	4.51 (0.75)	2.46	.014*	0.03	0.26	.18
Yes	272	4.36 (0.91)					

*$p < .05$

As it pertains to the final strength indicator item #63 "I learn new parenting skills and use them with my child", the independent samples t-test (t) (see Table 23.7) revealed that the average score on the item was higher for families that did not receive a maltreatment investigation with the Arizona Department of Child Safety $M = 4.51$, ($SD = 0.75$) than for families that received a maltreatment investigation $M = 4.40$, ($SD = 0.86$). A statistically significant difference between groups was revealed by the analysis ($M = 0.12$, 95% CI = [0.02, 0.23]; t (333.42) = 2.26, $p = .024$). The effect size for this analysis using Cohen's d was ($d = .15$).

Table 23.7

t-test for Independent Samples Regarding HFPI Strength Indicator Item #63 and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	4.52 (0.74)	2.26	.024*	0.02	0.23	.15
Yes	272	4.40 (0.86)					

*$p < .05$

The final analysis pertaining to the individual strength indicator items included a binary logistic regression model containing the strength indicator items (see Table 23.8). The analysis revealed a statistically significant relationship between the model and the occurrence of a report of maltreatment (χ^2 (15) = 52.99, $p < .001$), indicating that 5.0% of

the variation in the occurrence of a maltreatment investigation is explained by the model (Nagelkerke R^2). Two variables were found to be statistically significant at ($p < .05$), specifically the strength indicator item "If I have trouble, I feel there is always someone I can turn to for help" ($\beta = -.172$, Wald $\chi^2 = 4.602$, $p = .032$), and the family's marital status (not married/married) ($\beta = -.659$, Wald $\chi^2 = 12.689$, $p < .001$). The adjusted odds ratios (AOR) indicated that the likelihood of the occurrence of a maltreatment investigation relative to no maltreatment investigation (a) decreased by 16.0% (AOR = 0.84, 95% CI = 0.72, 0.99) when a family's score on the item "If I have trouble, I feel there is always someone I can turn to for help" increased by one unit, and (b) decreased by 48.0% (AOR = 0.52, 95% CI = 0.36, 0.74) when a family's marital status changed from not married to married.

Table 23.8

Binary Logistic Regression between Individual Strength Indicators and the Occurrence of a Maltreatment Investigation

Variable	β	Wald χ^2	*df*	*p*	*OR*	95% CI	
Total Family Income [a]	-.27	3.68	1	.055	0.76	0.58	1.00
Maternal Ethnicity [b]	-.10	.38	1	.053	0.90	0.66	1.24
Marital Status [c]	-.66	12.69	1	.000***	0.52	0.36	0.74
Birth Weight	-.07	1.15	1	.284	0.93	0.82	1.06
Gestational Age	-.07	2.06	1	.152	0.94	0.86	1.03
Strength Indicators							
2."I feel others care about me"	-.00	.002	1	.965	0.99	0.84	1.18
4. "If I have trouble, I feel there is always someone I can turn to for help."	-.17	4.60	1	.032*	0.84	0.72	.985
8."When I have a problem, I take steps to solve it"	.04	.14	1	.705	1.0	0.87	1.24
11."I remain calm when new problems come up"	-.03	.163	1	.687	0.97	0.86	1.13
13."I feel positive about myself"	-.01	.03	1	.860	0.99	0.84	1.16
46."I can remain calm when my child is upset"	-.13	1.81	1	.178	0.88	0.73	1.06
50."I plan to do a variety of activities with my child every day"	.09	1.78	1	.183	1.09	0.96	1.25
52."I have organized my home for raising a child"	.02	0.04	1	.842	1.02	0.87	1.19
59."I am proud of myself as a parent"	-.18	3.49	1	.062	0.83	0.69	1.01
63."I learn new parenting skills and use them with my child"	-.07	.485	1	.486	0.93	0.77	1.14

Reference Category: a = low income (below median split), b = White/Hispanic, c = not married
*$p < .05$, ***$p < .001$

Red Flag Indicator Items

In examination of the red flag items, the independent samples t-test (t) (see Table 24.1) revealed that the average score on the Healthy Families Parenting Inventory red flag item # 12 "I feel sad" was lower for families that received a maltreatment investigation with the Arizona Department of Child Safety *M* = 3.95, (*SD* = 1.06) than for families that did not receive a maltreatment investigation *M* = 4.09, (*SD* = 1.03). A statistically significant difference between groups was revealed by the analysis (*M* = 0.07, 95% CI = [0.01, 0.27]; *t* (2086) = 2.04, *p* = .042). The effect size for this analysis based on Cohen's *d* was (*d* = .13).

Table 24.1

t-test for Independent Samples Regarding HFPI Red Flag Item #12 and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	4.09 (1.03)	2.04	.042*	0.01	0.27	.13
Yes	272	3.95 (1.06)					

*$p < .05$

In further analysis of the final red flag items, the independent samples t-test (t) (see Table 24.2) revealed that the average score on the Healthy Families Parenting Inventory red flag item # 15 "I feel unhappy about everything" was lower for families that received a maltreatment investigation with the Arizona Department of Child Safety *M* = 4.39, (*SD* = 0.98) than for families that did not receive a maltreatment investigation *M* = 4.56, (*SD* = 0.88). A statistically significant difference between groups was revealed by the analysis (*M* = 0.17, 95% CI = [0.44, 0.29]; *t* (340.141) = 2.67, *p* = .008). The effect size for this analysis based on Cohen's *d* was (*d* = .18).

Table 24.2

t-tests for Independent Samples Regarding HFPI Red Flag Item #15 and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	4.56 (0.88)	2.66	.008**	0.04	0.29	.18
Yes	272	4.39 (0.98)					

**$p < .01$

As it pertains to the red flag item #18 "I have so many problems I feel overwhelmed by them", the independent samples t-test (t) (see Table 24.3) revealed that the average score on the item # 18 was lower for families that received a maltreatment investigation with the Arizona Department of Child Safety $M = 3.86$, ($SD = 1.16$) than for families that did not receive a maltreatment investigation $M = 4.12$, ($SD = 1.05$). A statistically significant difference between groups was revealed by the analysis ($M = 0.26$, 95% CI = [0.12, 0.41]; t (339.93) = 3.52, $p < .001$). The effect size for this analysis based on Cohen's d was ($d = .24$).

Table 24.3

t-tests for Independent Samples Regarding HFPI Red Flag Item #18 and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	4.12 (1.05)	3.52	.000***	0.12	0.41	.24
Yes	272	3.86 (1.16)					

***$p < .001$

In further examination of the red flag indicator items, the independent samples t-test (t) (see Table 24.4) revealed that the average score on the Healthy Families Parenting Inventory red flag item #34 "I feel drained dealing with my child" was lower for families that received a maltreatment investigation with the Arizona Department of Child Safety $M = 3.13$, ($SD = 1.13$) than for families that did not receive a maltreatment investigation

M = 4.36, (*SD* = 0.93). A statistically significant difference between groups was revealed by the analysis (*M* = 0.24, 95% CI = [0.094, 0.38]; *t* (328.79) = 3.28, *p* = .001). The effect size for this analysis based on Cohen's *d* was (*d* = .22).

Table 24.4

t-test for Independent Samples Regarding HFPI Red Flag Item #34 and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	4.36 (0.93)	3.28	.001**	0.09	0.38	.22
Yes	272	4.13 (1.13)					

**$p < .01$

The final analysis pertaining to the individual red flag indicator items included a binary logistic regression model containing the red flag indicator items (see Table 24.5). The analysis revealed a statistically significant relationship between the model and the occurrence of a report of maltreatment (χ^2 (12) = 55.609, p = .001), indicating that 5.2% of the variation in the occurrence of a maltreatment investigation is explained by the model (Nagelkerke R^2). Four variables were found to be statistically significant at (p < .05), specifically the red flag indicator item "I feel drained dealing with my child" (β = - .250, Wald χ^2 = 9.795, p = .002), and " I have so many problems I feel overwhelmed by them" (β = - .141, Wald χ^2 = 3.841, p = .05), the family's income as defined as (low/high) at the sample median split (β = - .288, Wald χ^2 = 4.122, p = .042)," and the family's marital status (not married/married) (β = -.646, Wald χ^2 = 12.226, p < .001). The adjusted odds ratios (AOR) indicated that the likelihood of the occurrence of a maltreatment investigation relative to no maltreatment investigation (a) decreased by 22.0% (AOR = 0.78, 95% CI = 0.66, 0.91) when a family's score on the reverse coded item " I feel drained dealing with my child" increased by one unit, (b) decreased by

13.2% (AOR = .868, 95% CI = 0.75, 1.00) when a family's score on the item " I have so many problems I feel overwhelmed by them" increased by one unit, (c) decreased by 25.0% (AOR = 0.75, 95% CI = 0.57, 0.99) when a family's income changed from low to high, and (d) decreased by 48.0 % (AOR = 0.52, 95% CI = 0.37, 0.75) when a family's marital status changed from not married to married.

Table 24.5

Binary Logistic Regression between Individual Red Flag Indicators and the Occurrence of a Maltreatment Investigation

Variable	β	Wald χ^2	*df*	*p*	*OR*	95% CI	
Total Family Income [a]	-.29	1.903	1	.042*	0.75	0.57	0.99
Maternal Ethnicity [b]	-.12	.574	1	.499	0.88	0.64	1.22
Marital Status [c]	-.65	12.23	1	.000***	0.52	0.37	0.75
Birth Weight	-.08	1.412	1	.235	0.92	0.81	1.05
Gestational Age	-.06	1.62	1	.204	0.94	0.86	1.03
Red Flag Indicators							
12. "I feel sad"	.015	.036	1	.085	1.02	0.87	1.18
15. "I feel unhappy about everything"	-.089	1.059	1	.303	0.92	0.77	1.08
16. "I feel hopeless about the future"	-.014	.022	1	.883	0.99	0.82	1.19
18. "I have so many problems I feel overwhelmed by them"	-.141	3.841	1	.050*	0.87	0.75	1.00
33. "I feel trapped by all of the things I have to do for my child"	.158	2.787	1	.095	1.17	0.97	1.41
34. "I feel drained dealing with my child"	-.250	9.795	1	.002**	0.78	0.67	0.91
37. "I feel frustrated because my whole life seems to revolve around my child"	-.073	.498	1	.481	0.93	0.76	1.14

Reference Category: a = low income (below median split), b = White/Hispanic, c = not married
*p < .05, **p < .01, ***p < .001

The conclusion based on these results is that the hypotheses that families with lower scores on the Healthy Families red flag and strength indicator items are more likely to experience a maltreatment investigation with the Arizona Department of Child Safety and families with higher scores were less likely was partially supported. Independent samples t-tests (t) revealed that families who experienced a maltreatment investigation with the Arizona Department of Child Safety had significantly lower scores on several

red flag items including “I feel drained dealing with my child”; “I feel sad”; “I have so many problems I feel overwhelmed by them”; and “I feel unhappy about everything.” Furthermore, families who experienced an investigation of maltreatment with the Arizona Department of Child Safety had significantly lower scores on the strength indicator items “I feel others care about me”; “If I have trouble, I feel there is always someone I can turn to for help”; “ I remain calm whenever new problems come up”; “I feel positive about myself”; “I can remain calm when my child is upset”; “I am proud of myself as a parent”; and “I learn new parenting skills and use them with my child” than families who did not experience an investigation of maltreatment. The effect sizes as determined by Cohen’s *d* in these analyses were below (d = .05). In further investigation, the hypothesis that the red flag items have a significantly predictive relationship with the occurrence of a maltreatment investigation with the Arizona Department of Child Safety was partially supported. When controlling for covariates, the binary logistic regression analyses revealed that two red flag items “I feel drained dealing with my child” and “ I have so many problems I feel overwhelmed by them” and one strength indicator item “If I have trouble, I feel there is always someone I can turn to for help” had significantly predictive relationships with the occurrence of a maltreatment investigation with the Arizona Department of Child Safety when controlling for covariates. Further discussion of these results is presented in Chapter Five.

Risk and Protective Factor Subscale Domains

In further exploratory analysis, the red flag indicator items and the strength indicator items were operationalized into new subscale domains. The scores for the seven reliably measured red flag item questions measured in Table 14.14 were summed

to operationalize a subscale called “risk factors” with a reliable Cronbach’s alpha of .77. Further, the scores of the ten reliably measured strength indicator items measured in Table 14.15 were summed to operationalize a subscale called “protective factors”, with a Cronbach’s alpha value of .78.

The following section presents findings for independent samples t-tests (t) for the operationalized protective factor and risk factor subscales that examined the differences in the average individual Healthy Families Parenting Inventory item scores for families that received an investigation of maltreatment with the Arizona Department of Child Safety versus families that did not. The t-tests (t) revealed a statistically significant difference between families who experienced a maltreatment investigation with the Arizona Department of Child Safety versus those that did not experience a maltreatment investigation on both the operationalized risk factor and protective factor subscales. Specifically, families who experienced an investigation of maltreatment with the Arizona Department of Child Safety had significantly lower scores on the protective factor and risk factor subscales than families who did not. Contrarily, families who did not experience an investigation of maltreatment had significantly higher scores on the protective factor and risk factor subscales than those that that did. Further analysis of the operationalized subscales included estimating binary logistic regression models to predict a maltreatment investigation with the Arizona Department of Child Safety controlling for covariates (e.g., total family income, maternal ethnicity, marital status, birth weight and gestational age of the targeted child of the Healthy Families Arizona intervention).

Protective Factor Subscale

In examination of the operationalized protective factor subscale domain, the independent samples t-test (t) (see Table 25.1) revealed that the average score on the subscale was lower for families that received a maltreatment investigation with the Arizona Department of Child Safety M = 41.21, (SD = 5.68) than for families that did not receive a maltreatment investigation M = 42.46, (SD = 5.29). A statistically significant difference between groups was revealed by the analysis (M = 1.25, 95% CI = [0.53, 01.97]; t (345.37) = 3.43, p = .001). The effect size for this analysis based on Cohen's d was (d = .23).

Table 25.1

t-test for Independent Samples Regarding the Protective Factor Subscale and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	42.46 (5.29)	3.43	.001**	0.53	1.97	.23
Yes	272	41.21 (5.68)					

**$p < .01$

In further analysis, the results of the binary logistic regression analysis pertaining to the subscale (see Table 25.2) revealed that the model was significantly related to a maltreatment investigation ($\chi^2(6) = 41.58$ p = .001), indicating that 3.9% of the variation of the occurrence of a maltreatment investigation is explained by the model (Nagelkerke R^2). Two variables were significant at $p < .05$, specifically the protective factor subscale (β = -.04, Wald χ^2 = 11.96, p = .001), and a family's marital status (not married/married) (β = -.64, Wald χ^2 = 12.18, p =.001). The adjusted odds ratio (AOR) indicated that the likelihood of the occurrence of a report of a maltreatment report relative to no occurrence of a maltreatment report (a) decreased by 4.0% (AOR = 0.96, 95% CI = 0.94, 0.98) when

a family's score on the protective factor subscale increased by one unit, (b) decreased by 47.0% (AOR = 0.54, 95% CI = 0.37, 0.76) when a family's marital status changed from not married to married.

Table 25.2

Binary Logistic Regression between the Protective Factor Subscale and the Occurrence of a Maltreatment Investigation

Variable	β	Wald χ^2	*df*	*p*	*OR*	95% CI	
Total Family Income	-.28	3.807	1	.051	0.68	0.51	0.91
Maternal Ethnicity	-.12	0.55	1	.457	0.89	0.64	1.24
Marital Status	-.64	12.18	1	.001***	0.54	0.38	0.79
Birth Weight	-.07	0.07	1	.306	0.99	0.96	1.02
Gestational Age	-.07	2.33	1	.127	0.92	0.86	0.99
Protective Factor Subscale	-.04	11.96	1	.001**	0.97	0.94	1.00

Reference Category: a = low income (below median split), b = White/Hispanic, c = not married
*$p < .05$, ** $p < .01$, *** $p < .001$

Risk Factor Subscale

The operationalized independent samples t-test (t) (see Table 26.1) revealed that the average score on the subscale was lower for families that received a maltreatment investigation with the Arizona Department of Child Safety $M = 30.04$, ($SD = 4.64$) than for families that did not receive a maltreatment investigation $M = 31.07$, ($SD = 4.02$). A statistically significant difference between groups was revealed by the analysis ($M = 1.03$, 95% CI = [0.45, 01.62]; t (334.49) = 3.48, $p = .001$). The effect size for this analysis based on Cohen's d was ($d = .24$).

Table 26.1

t-test for Independent Samples Regarding the Risk Factor Subscale and Maltreatment Investigation

	n	*Mean (SD)*	*t*	*p*	*Confidence Intervals*		*Cohen's d*
Maltreatment							
No	1816	31.07 (4.02)	3.48	.001**	0.45	1.62	.24
Yes	272	30.04 (4.64)					

**$p < .01$

In further analysis, the results of the binary logistic regression analysis pertaining to the subscale (see Table 26.2) revealed that the model was significantly related to a maltreatment investigation with the Arizona Department of Child Safety ($\chi^2(6) = 45.23$ $p < .001$), indicating that 4.2% of the variation of the occurrence of a maltreatment investigation is explained by the model (Nagelkerke R^2). Two variables were significant at $p < .05$, specifically the risk factor subscale ($\beta = -.06$, Wald $\chi^2 = 16.13$, $p < .001$), and a family's marital status (not married/married) ($\beta = -.64$, Wald $\chi^2 = 12.24$, $p < .001$). The adjusted odds ratio (AOR) indicated that the likelihood of the occurrence of a report of a maltreatment report relative to no occurrence of a maltreatment report (a) decreased by 6.0% (AOR = 0.94, 95% CI = 0.91, 0.97) when a family's score on the risk factor subscale increased by one unit, (b) decreased by 47.0% (AOR = 0.53, 95% CI = 0.37, 0.76) when a family's marital status changed from not married to married.

Table 26.2

Binary Logistic Regression between the Risk Factor Subscales and the Occurrence of a Maltreatment Investigation

Variable	β	Wald χ^2	*df*	*p*	*OR*	95% CI	
Total Family Income	-.27	3.64	1	.056	0.76	0.58	1.01
Maternal Ethnicity	-.12	0.55	1	.457	0.89	0.65	1.22
Marital Status	-.64	12.24	1	.000***	0.53	0.37	0.76
Birth Weight	-.08	1.28	1	.258	0.93	0.81	1.06
Gestational Age	-.06	1.86	1	.173	0.76	0.86	1.01
Risk Factor Subscale	-.06	16.13	1	.000**	0.94	0.91	0.97

Reference Category: a = low income (below median split), b = White/Hispanic, c = not married
** $p < .01$, *** $p < .001$

The conclusion based on these results is that the ten strength indicator items and the seven red flag indicator items can be reliability operationalized into new protective factor and risk factor subscale domains. Independent samples t-tests(t) revealed that families who experienced a maltreatment investigation with the Arizona Department of Child Safety had significantly lower scores on the operationalized protective factor subscale domain, and significantly lower scores on the operationalized risk factor subscale domain. The effect size as determined by Cohen's *d* for these analyses were below ($d = .50$). When controlling for covariates, the binary logistic regression analyses revealed that both the operationalized protective factor and risk factor subscales had a significantly predictive relationship with the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety. Specifically, the analysis showed that a family's risk for a maltreatment investigation increased, as a family's score on both the risk factor and protective factor subscales decreased.

CHAPTER FIVE

DISCUSSION OF RESULTS

The overarching aim of this dissertation was to explore the capacity of the Healthy Families Parenting Inventory to predict a family's risk for future maltreatment. As such, the predictive validity of the Healthy Families Parenting Inventory was explored across multiple domains. Through collaboration with Healthy Families Arizona, the Healthy Families Parenting Inventory was administered to 2,088 families across the state of Arizona during the 2012 and 2013 fiscal years. These families were subsequently followed administratively through Department of Child Safety data for one year from the date of enrollment in Healthy Families Arizona to predict the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety.

This research explored the predictive validity of the total composite score of the Healthy Families Parenting Inventory and subsequent risk classifications to predict a family's risk for future maltreatment (Research Question 1). In further examination, the predictive validity of individual components of the Healthy Families Parenting Inventory including the nine individual subscale domains were explored (Research Question 2), followed by an exploratory analysis of the interaction between the nine individual subscale domains of the Healthy Families Parenting Inventory (Research Question 3). The final component of the dissertation examined the predictive validity of the individual red flag and strength indicator items of the Healthy Families Parenting Inventory (Research Question 4).

The study of predictive validity of instrumentation used in public and community based child welfare systems to predict a family's risk for future maltreatment has been

conducted primarily within the boundaries of the public child welfare system. Additional work in the area of generalized assessment and the prediction of adverse outcomes has occurred within early childhood prevention populations. However, existing evidence suggests that many instruments that are used in early childhood education programs to predict a family's risk for maltreatment were not developed for this purpose, and subsequently do not consistently contain strengths-based language or dynamic variables important to home visitation practice in engaging at-risk families and measuring change over time. Further, methodological challenges are common in validation research, resulting in inconsistency in capturing maltreatment as an outcome variable, and findings that demonstrate overall poor predictive capacity of risk assessment instruments (Kirk et al., 2005; Haskett et al., 2006; Lawson et al., 2015). This gap in the literature was the impetus for this study. The purpose of this final chapter is to discuss the most prominent findings and their possible meaning, to critique study limitations, as well as provide implications specific to the areas of social work practice, policy, and research.

Key Findings

The statistical analyses reported in Chapter Four confirm that the Healthy Families Parenting Inventory has predictive validity when forecasting the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety among a sample of Healthy Families Arizona participants. This is an important finding, as the Healthy Families Parenting Inventory has historically only been used for purposes of outcome assessment and treatment plan development during the course of early childhood home visitation programming. The implication of this finding is that there is potential to expand the utility of the Healthy Families Parenting Inventory to assist home-

visitors in more accurately predicting a family's likelihood for future abusive or neglectful parenting practices. The predictive validity of the Healthy Families Parenting Inventory was vetted through several approaches in this dissertation, all of which yielded results that support the use of multiple components of the instrument in predicting a family's risk for an investigation with the Arizona Department of Child Safety.

Predictive Validity of the HFPI Total Score

The first key finding explored the predictive validity of the total composite score of the Healthy Families Parenting Inventory. This finding supports methodological rigor in the study of maltreatment risk prediction through examination of the continuous composite score of the instrument. Specifically, examining the predictive validity of the total composite score of the Healthy Families Parenting Inventory prior to dichotomizing the variable into risk classifications allowed for the preservation of important data points of the inventory. The examination of the utility of the Healthy Families Parenting Inventory total composite score to predict future maltreatment was analyzed using several analytic techniques including a point biserial correlation (r_{pb}), an independent samples t-test (t), and a binary logistic regression model. The analyses revealed that the total composite score of the Healthy Families Parenting Inventory was predictive of a maltreatment investigation with the Arizona Department of Child Safety.

Overall, these findings support the expansion of the Healthy Families Parenting Inventory total composite score to be used in early childhood home visitation practice to predict a family's risk for future maltreatment from a developmental-ecological perspective. Crossing ecological domains, a family's total score on the 63-item inventory includes measurement of both risk and protective factors for child abuse and neglect. In

the study of the prediction of risk, the interaction of these factors at the individual item level contributes to a family's overall score on the HFPI, and subsequently the family's risk for future maltreatment. Although the effect sizes for the analysis were determined to be small, the practical relevance of this finding within the context of the prediction of maltreatment across at-risk families has the potential to produce a large impact. More specifically, at the individual family level, the strength of these analyses derive from the fact that even a single point manipulation of the 63-item Healthy Families Parenting Inventory accounted for some variance in maltreatment risk for families. This finding has implication for social work policy and practice, as capturing even a small amount of variation in a family's maltreatment risk increases the opportunity enhanced protection of children and development of tailored intervention strategies.

Predictive Validity of the HFPI Risk Classifications

In further examination of the Healthy Families Parenting Inventory, the total composite score was dichotomized into risk classifications (at-risk, not at-risk) using the total scores of the sample (N = 2,088) to assist practitioners in labeling families by risk level rather than using interpretations of a total composite score. However, this simplicity was gained at some cost, including reduction in statistical power (MacCallum, Zhang, Preacher, & Rucker 2002; Cohen, 1983), an increase in the likelihood of finding of a false positive in negative results (Austin & Brunner, 2004), and an underestimation of variation between groups. Considering the implementation challenges specific to the use of risk assessments (Shlonsky & Gambrill, 2014), the reward of establishing a valid cut-point outweighed the potential risks, as ease of interpretation of a family's level of

risk for future maltreatment was prioritized for paraprofessionals working in early childhood education home visitation programs.

The resulting risk classifications were developed through dichotomization of the total Healthy Families Parenting Inventory total composite score using percentile rankings. Establishing a cut-point using percentile rankings was determined to be the most appropriate analytic approach, as the non-normative sample and relatively weak predictive capacity of the Healthy Families Parenting Inventory total composite score created difficulty in successfully utilizing alternative analytic strategies such as a ROC curve to identify an optimal cut-point. Utilizing the optimized cut-point of 245 at the 25^{th} percentile, the sensitivity (true negative) value was 14.66%, and the specificity (true positive) level was 88.10%. The subsequent false positive rate was 83.69%, and the false negative rate was 12.08%. Further investigation of the predictive capacity of the developed Healthy Families Parenting Inventory risk classifications occurred using multiple analytic strategies including a chi square test (χ^2) and binary logistic regression model. The analyses revealed that the established risk classifications of the Healthy Families Parenting Inventory were predictive of the occurrence of a maltreatment investigation with the Arizona Department of Child Safety.

Overall, these findings suggest that the Healthy Families Parenting Inventory risk classifications can be used to predict a family's level of risk for future maltreatment. However, this finding should be interpreted cautiously, as the sensitivity rate of the established risk classifications was low, suggesting that when used in practice, many children who would go on to experience maltreatment would not be captured using the HFPI risk classifications. As such, if the established risk classifications for the Healthy

Families Parenting Inventory were to be used in early childhood home visitation practice to predict future maltreatment risk, many children who may be at risk for maltreatment will not be captured during the screening process. Further examination of an optimal cut-point for the Healthy Families Parenting Inventory using a normative sample has the potential to enhance opportunities to improve the sensitivity rate of the established cut-point.

Predictive Validity of the Individual HFPI Subscale Domains

A second key finding of the dissertation relates to the predictive validity of the nine individual subscale domains of the Healthy Families Parenting Inventory. This dissertation expands previous work in the study of risk prediction across the public and private child welfare systems, as previous examination of predictive validity of maltreatment instruments has occurred primarily using risk classifications. In order to expand the predictive reach of the Healthy Families Parenting Inventory, the predictive validity of the nine subscales were analyzed using multiple analytic strategies including t-tests (t), and binary logistic regression models. The analyses revealed that individually the social support, problem solving, depression, personal care, role satisfaction, and parenting efficacy subscales of the Healthy Families Parenting Inventory were predictive of maltreatment.

Overall, these findings suggest that the social support, problem solving, depression, personal care, role satisfaction, and parenting efficacy subscale domains of the Healthy Families Parenting Inventory to be used individually in early childhood education home visitation practice to predict a family's risk for future maltreatment. However, when all nine of the subscale domains were entered together into the full

logistic regression model, the findings revealed a more complicated relationship between the HFPI subscale domains and an investigation of maltreatment. Specifically, when all nine of the HFPI subscale domains were entered into the logistic regression model collectively, the findings suggested that the relationship between the HFPI subscale domains and a maltreatment investigation was a result of the interaction of the nine subscale domains rather than individual relationships between the subscales and a maltreatment investigation. This finding was confirmed in the fully specified model, which demonstrated several significant interactions between the nine subscale domains in their relationship with a maltreatment investigation with the Arizona Department of Child Safety.

Examination of the Collective Subscale Domains of the HFPI

When the nine subscale domains of the Healthy Families Parenting Inventory were examined simultaneously in a single binary logistic regression model to examine the interaction of the subscales in the prediction of maltreatment, the analysis revealed that the relationships between several subscales and maltreatment transformed. Specifically, the analysis demonstrated that only two subscale domains that were individually predictive of a maltreatment report, including the personal care and parenting efficacy subscale domains, remained significant predictors of a maltreatment report in the full model. In addition, two subscale domains including the mobilizing resources and home environment subscales that had not been significant predictors in the individual models emerged as predictors in the full model. This finding is consistent with existing risk prediction literature from an ecological perspective that suggests that a family's risk for maltreatment is multiplicative and multi-dimensional (Belsky 1980; Cicchetti & Rizley,

1981; Scannapieco & Connell-Carrick, 2005; Pecora & Harrison-Jackson, 2014; Thomlison, 2004); particularly among populations where an individual is facing multiple risks across several ecological domains.

In examination of the personal care and parenting efficacy subscale domains, these two subscales were significantly predictive in the individual models, and remained inversely related to a maltreatment investigation in the full model, with only a small reduction in significance in terms of predictive capacity. This finding suggests that the personal care and parenting efficacy subscales predict maltreatment independently, but also that their relationships are highly interdependent on a family's scores on the remaining subscale domains. For example, as a proxy for maternal stress management, the relationship between the personal care subscale and a maltreatment investigation highlights the well-established multifactorial relationship between psychological risk factors for maltreatment such as maternal stress and well-being (Stith et al., 2009). Existing work using the family stress model parses out this relationship in linking maltreatment indicators such as economic pressure, parent psychological functioning, interpersonal conflict, and parenting problems to maltreatment; often using parental or familial stress as a mediator (Conger, Ge, Elder, Lorenz, & Simons, 1994; McLoyd, 1998). A similar relationship was demonstrated in the fully specified model in the study, revealing that the personal care subscale had a significant interaction with the depression subscale domain. Therefore, it is not only caregiver engagement in personal care practices in isolation that is predictive of maltreatment, it is the interactive and multiplicative nature of personal care strategies that interact with risk factors such as depression in predicting a family's risk for maltreatment. As it pertains to the parenting

efficacy subscale, this construct is defined by many researchers and practitioners as the "final common pathway" in the determination of effective parenting (Teti, O'Connell, & Reiner, 1997, p. 238). The construct of parenting efficacy is known to be interactive, and is both impacted by maltreatment risk factors, and subsequently predictive of maltreatment. Specifically, parenting efficacy is impacted by socioeconomic disadvantage and neighborhood characteristics (Warren & Font, 2015), and has been determined to predict ecological variables related to maltreatment including adjustment to parenthood, parenting stress, satisfaction with parenting role (Coleman & Karraker, Reece & Harkless, 1998), and a host of developmental outcomes for children (Anzman-Frasca, Stifter, Paul & Birch, 2013; (Verhage, Oosterman, & Schuengel, 2013; Jones & Prinz, 2005). A similar relationship was demonstrated in the fully specified model between the parenting efficacy subscale domain and the mobilizing resources subscale domain, in that the two subscales had a significant interaction in their relationship with a maltreatment investigation. The findings of this analysis demonstrate that the relationship between parenting efficacy and maltreatment emerges among at-risk families through complicated pathways where parental efficacy is developed over time and across contextual ecological domains of the child and family system, and in turn serves to influence parenting activities and strategies; ultimately contributing to maltreatment risk.

The subscale domains that were non-significant in individual models but emerged as significant predictors of maltreatment in the full model illuminate underlying interactions between the nine subscales and their relationship with maltreatment from an ecological perspective. Specifically, in exploration of the home environment subscale, item analyses of the nine subscale items revealed that a single item in the subscale #57 "I

set rules for behavior in my home" when removed, changed the direction of the relationship of the entire subscale when examined individually (β = -.005, Wald $\chi^2(1)$ = .208; p = .649), and the significance level (β = .028, Wald χ^2 (1) = 3.29; p = .070) when examined in the full model, in that it was no longer significant. The analysis demonstrated that this single item within the home environment subscale domain altered the relationship between the subscale and maltreatment, suggesting that the subscale is not a reliable or stable predictor of maltreatment. In further examination of the mobilizing resources subscale domain, the relationship between the six individual items of the subscale domain and maltreatment was found to be more complex and interrelated. Specifically, in examination of the fully specified model, the mobilizing resources subscale domain was found to have significant interactions with the home environment, role satisfaction and parenting efficacy subscales. This finding suggests that the relationship between a family's risk for maltreatment across multiple ecological domains and their subsequent utilization of community resources is consistent with existing literature in highlighting the impact of surveillance bias (Chaffin & Bard, 2006; Olds et al., 2005). Specifically, it is not a family's connection to and knowledge of community resources alone that causes an increase in a family's risk for maltreatment. Rather, it is the interaction between a family's connection and knowledge of community resources and compounded multidimensional risks across ecological domains that increases a family's risk level for maltreatment, thus bringing the subscale into significance in the full model. For example, families at higher risk across ecological domains have fewer needs met through individual and family resources, and subsequently have higher community resource utilization rates than their lower risk peers (DePanfilis & Zuravin,

1999). Compounded by multiple risks across the family system, this leads to greater scrutiny of these higher risk families as they interact with community based service providers and social service delivery systems more regularly, subsequently increasing their risk for a maltreatment investigation as a result of suspected maltreatment.

Interaction of the HFPI Subscale Domains

A third key finding in the dissertation involves the interaction of the nine subscale domains of the Healthy Families Parenting Inventory. This component of the dissertation further confirmed the multidimensional nature of maltreatment risk, particularly as it relates to the ability of protective factors to moderate the relationship between risk factors and a maltreatment report among at-risk families. Specifically, this finding revealed the usefulness in understanding the ability of the seven subscale domains of the Healthy Families Parenting Inventory including social support, problem solving, personal care, mobilizing resources, parent/child interaction, home environment, and parenting efficacy to moderate the relationship between the role satisfaction and depression subscale domains and the occurrence of maltreatment. Using moderation analysis in logistic regression, the analyses revealed that the mobilizing resources and home environment subscale domains were significant moderators of the relationship between the role satisfaction domain and maltreatment.

Mobilizing Resources Subscale Domain

In examination of the mobilizing resources subscale domain as a moderator of the relationship between the role satisfaction domain and the occurrence of a maltreatment investigation, the findings demonstrated that the relationship between a family's score on the role satisfaction domain and the occurrence of a maltreatment investigation is

impacted by their score on the mobilizing resources subscale domain. The analysis specifically revealed that the relationship between a family's score on the role satisfaction subscale domain and the occurrence of an investigation of maltreatment with the Arizona Department of Child Safety is different depending on a family's score on the mobilizing resources subscale domain. The relationship between a family's score on the mobilizing resources subscale domain and role satisfaction subscale domain was more pronounced for families scoring at least one standard deviation below the mean on the mobilizing resources subscale domain. Specifically, as a family is less connected to community resources demonstrated by a lower score on the mobilizing resources subscale domain; when the family's role satisfaction improves (demonstrated by an increased score on the role satisfaction subscale), this has the potential to decrease the family's risk for the occurrence of maltreatment by nearly 10.0%.

This moderated relationship suggests that from a developmental-ecological perspective, a family's connection and familiarity to community resources and supports changes the relationship between their tolerance towards parenting activities and subsequent maltreatment. For example, for families that are the most unfamiliar with and disconnected to community resources, these parents are theoretically responsible for the sole burden of parenting and resource obtainment for their families. For these caregivers, when their perception of their parental role is seen as less burdensome, their risk for maltreatment is reduced. Contrarily, for families that are very connected to and familiar with community resources and supports, these caregivers theoretically have established support and assistance in sharing responsibility for parenting and obtaining necessary

household resources. Subsequently, as their perception of their parental role is seen as less burdensome, their relationship with maltreatment is not nearly as significant.

Home Environment Subscale Domain

Specifically pertaining to the home environment subscale domain as a moderator of the relationship between the role satisfaction domain and the occurrence of maltreatment, the findings revealed that the relationship between a family's score on the role satisfaction domain and the occurrence of a maltreatment investigation is impacted by the family's score on the home environment subscale domain. This finding highlights an important component of understanding a family's multi-dimensional risk for maltreatment across ecological domains as it pertains to the relationship between a parent's capacity to prepare their home for their child, and their satisfaction in their role as a parent. Specifically, the analysis revealed that the relationship between a family's score on the role satisfaction subscale domain and the occurrence of maltreatment is different depending on a family's score on the home environment subscale domain. The relationship between a family's score on the home environment and role satisfaction subscales was more pronounced for families scoring at least one standard deviation below the mean on the home environment subscale domain. The analysis specifically revealed that as a family's home is less prepared for their child, demonstrated by a lower score on the home environment subscale domain, when a family's role satisfaction improves (demonstrated by an increased score on the role satisfaction subscale), this has the potential to reduce the family's risk for the occurrence of maltreatment investigation by nearly 10.0%.

This moderated relationship suggests that from a developmental-ecological perspective, as a family's home environment becomes more structured and safe, this changes the relationship between their acceptance towards parenting activities and maltreatment. For instance, for families who reside in chaotic home environments with limited structure, these families likely present with multiple home environment related risk factors for maltreatment across ecological domains such as poverty (Coulton et al., 1995; Drake & Pandey, 1996), and overcrowded and unstable housing (Warren & Font, 2015; Culhane et al., 2003). As such, these children are more likely to receive less stimulation from their caregivers (Rutter, 2000), as household members are more highly focused on survival oriented tasks rather than on higher-ordered attachment and self-care activities. For these families, as their perception of their parental role is seen as less burdensome, their risk for maltreatment is reduced. Contrarily, for families who reside in less chaotic home environments that are well prepared for a child, these families likely have an enhanced capacity to focus on higher ordered parenting tasks such as attachment and bonding rather than solely on task-oriented concrete needs. Subsequently, as their perception of their parental role is seen as less burdensome, their relationship with maltreatment is not nearly as significant.

Predictive Validity of the Red Flag and Strength Indicator Items

A fourth key finding in the dissertation involves an exploration of the predictive validity of the individual red flag and strength indicator items of the Healthy Families Parenting Inventory. These findings expand the existing literature base pertaining to public and community based risk assessment instruments by investigating the predictive capacity of individual instrument items. In particular, at the level of an individual item of

the Healthy Families Parenting Inventory, a practitioner can be easily alerted during the assessment as a result of a caregiver's score on an individual item that further intervention is required within a specific risk domain. Using t-tests (t) and regression models as analytic strategies, the predictive validity of individual strength and red flag items of the Healthy Families Parenting Inventory were analyzed, demonstrating that several red flag and strength indicator items were predictive of a maltreatment investigation with the Arizona Department of Child Safety.

In the analyses examining the predictive capacity of the strength and red flag indicator items, bivariate analyses revealed that when examining the red flag indicator questions, only four red flag items including "I feel drained dealing with my child"; "I feel sad"; "I have so many problems I feel overwhelmed by them"; and "I feel unhappy about everything" were significantly higher for families who experienced maltreatment than those that did not. In examination of the strength indicator items of the Healthy Families Parenting Inventory, bivariate analyses revealed that the seven items including "I feel others care about me"; "If I have trouble, I feel there is always someone I can turn to for help"; "I remain calm whenever new problems come up"; "I feel positive about myself"; "I can remain calm when my child is upset"'; " I am proud of myself as a parent" "I learn new parenting skills and use them with my child." had significantly higher average scores for families that did not experience maltreatment than those that did. However, when a binary logistic regression model was used as an analytic strategy, the analysis found only three items to be predictive of an investigation of maltreatment including the red flag indicator items "I feel drained dealing with my child" and "I have

so many problems I feel overwhelmed by them" followed by the strength indicator item "If I have trouble, I feel there is always someone I can turn to for help."

Overall, these findings do not support the expansion of the red flag and strength indicator items of the Healthy Families Parenting Inventory to be used in early childhood home visitation practice to predict a family's risk for future maltreatment. In comparison to previous findings in this dissertation, the total composite score, risk classifications, and individual subscale domains of the Healthy Families Parenting Inventory would be more appropriate for use in a predictive capacity.

Operationalized Risk and Protective Factor Subscales

The fourth key finding of the dissertation explored the predictive validity of two operationalized subscales collectively measuring risk and protective factors within the Healthy Families Parenting Inventory. This finding provides practical innovation to the study of risk prediction through examination of the predictive capacity of both risk and protective factors for maltreatment across ecological domains. Targeting the measurement of a family's risk and protective factors provides an opportunity to enhance the skillsets of practitioners to build upon a family's protective factors as a strategy to reduce the family's risk for future maltreatment. Operationalizing the red flag and strength indicator items into risk and protective factor subscales presents the opportunity to provide immediately useful feedback to practitioners regarding a family's established risk and protective factors across ecological domains, allowing
for ease of identification of intervention strategies. The predictive validity of the operationalized Healthy Families Parenting Inventory risk and protective factor subscale domains were analyzed using multiple analytic strategies including independent samples

t-tests(t) and binary logistic regression models. The analyses revealed that a family's score on both the protective factor and risk factor subscales were predictive of maltreatment.

Overall, these findings support the expansion of the operationalized risk and protective factor subscales of the Healthy Families Parenting Inventory to be used in early childhood home visitation programming to predict a family's risk for future maltreatment. The promotion of these subscales in practice provides an opportunity for risk prediction instruments to incorporate similar subscales within established instruments in order to promote ease of interpretation and utilization of data to drive targeted intervention planning for at-risk families. While the effect sizes of the operationalized subscales as measured by Cohen's *d* were small, this finding should be interpreted cautiously, as practical relevance of this finding within the context of the prediction of maltreatment across at-risk families as the potential to produce a significant impact. Specifically as it pertains to the operationalized risk and protective factor subscale domains, the strength of these analyses derive from the fact that a single increase and decrease on the subscale score accounted for some variance in maltreatment risk for families. Particularly in maltreatment risk prediction, capturing even a small amount of variance in a family's risk for maltreatment provides an opportunity for targeted treatment planning that disentangles complexities in the interaction between risk and protective factors during treatment plan development and subsequent service provision.

Influence of Socio-Demographic Characteristics in the Prediction of Risk

The final key finding of the dissertation pertaining to the predictive capacity of socio-demographic characteristics in the study of maltreatment risk prediction emerged during the analyses. Specifically, this finding has implications for the study of maltreatment risk prediction in early childhood home visitation programs in regards to capturing the multidimensional nature of maltreatment risk through incorporation of static and dynamic characteristics into risk prediction models. Specifically, the analyses demonstrated that several socio-demographic variables including a family's household income, maternal ethnicity, a family's marital status, and the child's birth weight were significant predictors in the bivariate analyses. When these variables were included in the multiple binary logistic regression models, the family's income in addition to the family's marital status were found to be significant predictors of a maltreatment investigation across models.

Overall this finding provides support for the use of socio-demographic variables in the prediction of maltreatment risk. In early childhood home visitation programming, using socio-demographic variables in risk assessment has the potential to transform a practitioner's understanding of a family's risk profile to include variables from across ecological domains. Using a strengths-focused framework important in home visitation, dynamic socio-demographic variables present opportunities for innovative intervention strategies in empowering families to take an active role in reducing their family's risk for future maltreatment. For instance, demographic and socio-economic variables such as a family's income or household stability can assist the home visitor in understanding a

family's risk for future maltreatment, and can direct treatment planning in order to enhance rapport building and strengthening familial autonomy.

Contributions of the Current Study

The most important contribution from this dissertation is that the results validated the expanded use of the Healthy Families Parenting Inventory to predict a family's risk for the occurrence of future maltreatment in Arizona. Based on these findings, home-visitors can be confident that a family's score on the Healthy Families Parenting Inventory has a meaningful relationship with the family's potential risk for an investigation of maltreatment with the Arizona Department of Child Safety. However, conversely, this dissertation also illustrated weaknesses within the instrument to be used as a predictor of a family's risk for future maltreatment. These weaknesses do not necessarily represent a flaw in the instrument, as the Healthy Families Parenting Inventory was not developed as a risk assessment instrument, rather it was developed to be utilized in the facilitation of a comprehensive assessment for purposes of treatment planning and measurement of outcomes over time. An important finding from this dissertation is that treatment planning and outcome instruments can be used successfully in the prediction of maltreatment in the absence of the public child welfare system. Past research has approached risk prediction with instruments that rely heavily on static factors and are not easily incorporated into a social service setting. The advantage of an instrument like the Healthy Families Parenting Inventory is that it can both predict a level of maltreatment and function to suggest needs and services that reduce the likelihood of maltreatment occurring. The findings suggest an opportunity for stakeholders to make adjustments to how the instrument is used in order to improve practice.

From an academic perspective, this dissertation represents a rigorous validation of the Healthy Families Parenting Inventory to predict a family's risk for maltreatment. The study uses a variety of standard statistical approaches to ensure that the results were accurate, including both bivariate analyses and logistic regression models that controlled for relevant covariates. Because of the wide range of statistical analyses utilized in this study, greater confidence can be placed in the findings, and in turn the conclusions drawn from the analyses. Further, this dissertation adds to the existing literature in exploring the use of a strengths-based assessment instrument widely used in early childhood home visitation to predict a family's risk for future maltreatment. The findings presented in this dissertation contribute to the growing body of literature that explores the predictive validity of assessment instruments across child welfare settings. Most of the existing literature to date has focused on the use of assessment instruments to predict maltreatment in the context of the public child welfare system after an allegation of maltreatment has been received. However, the findings here suggest an untapped opportunity to utilize a strengths-based assessment instrument from a developmental-ecological perspective to predict a family's risk for future maltreatment in the absence of public child welfare involvement. These findings suggest that, despite the challenges facing early childhood home visitation programs in predicting a family's risk for future maltreatment during assessment, there are several opportunities within social work policy and practice that prevention and community based programs can utilize to improve the identification of families most at risk.

Implications for Social Work Policy

The public child welfare system was never intended to serve the vast numbers of children and families that are involved in the system today. The majority of children reported to state child welfare agencies are victims of neglect (USDHHS, 2015a). This suggests that many families are struggling with issues related to poverty, substance abuse, mental health concerns, or domestic violence that are impeding their ability to provide safe and effective care for their children. Many of these children and their families interact with a wide range of public and private systems, including early childhood home visitation services, prior to involvement with the public child welfare system. Subsequently, community based early childhood home visitation programs are in an optimal position to engage in the assessment of maltreatment risk during the course of service provision. Early identification of risk prior to involvement with public child welfare systems has the capacity stabilize families most at risk for future maltreatment, diverting children and their families away from the child welfare system towards the development of more safe and stable family systems.

In recent years, expansion of home visitation programming in the United States has occurred as a result of shifting public policy and the recognition across the field of child welfare that prevention programming can be an incredibly power intervention in protecting children from abuse and neglect (Mikton & Butchart, 2009; Russell et al., 2007; Stagner & Lansing, 2009). Among existing prevention programs, home visitation interventions specifically have been identified as an effective intervention to improve parental capacities to care for their children and prevent abuse and neglect (Astuto & Allen, 2009; Stoltzfus & Lynch, 2010). However, because of wide variation in risk

among this population (Sweet & Applebaum, 2004; Duggan et al., 2007; Tandon et al., 2008), home visitation programs providing services to this population must pay specific attention to a family's risk for future maltreatment. Families at risk for maltreatment involved in early childhood prevention programs often have unmet needs across developmental-ecological levels, with each multiplicative risk factor shifting a family's risk for maltreatment over time. Subsequently, the utilization of risk assessment in home visitation programming has the capacity to better meet the needs of families at various levels of risk by targeting a family's risk and protective factors. Incorporating the prediction of risk and comprehensive strengths-based assessment into home visitation provides an untapped resource for assisting policy makers in utilizing data to prioritize service funding to at-risk families; ultimately enhancing opportunities to provide families with the right service at the right time.

Implications for Social Work Practice

In current home visitation practice, home-visitors often have high caseloads of at-risk families, with no standardized means of differentiating between families at varying levels of risk for future maltreatment. Existing research in this area has primarily focused on the use of risk assessment instruments in the public child welfare domain, with little work exploring risk assessment opportunities in early childhood home visitation practice. This exploratory research highlights an untapped opportunity to utilize a strengths-based assessment instrument to predict a family's risk for future maltreatment in an early childhood home visitation setting. Specific to the Healthy Families Parenting Inventory, as shown in Chapter Four, a family's score on multiple components of a Healthy Families Parenting Inventory can be used to predict the occurrence of a report of maltreatment to

the Arizona Department of Child Safety at approximately one year of instrument completion. This finding confirms the utility of the Healthy Families Parenting Inventory to assist practitioners working in home visitation settings to identify families most at risk for future maltreatment based on their score on the inventory. Furthermore, for practitioners requiring a brief assessment, or whom are interested in only specific dimensions of family functioning, individual subscales of the Healthy Families Parenting Inventory demonstrated the capacity to uniquely predict the occurrence of a maltreatment investigation with the Arizona Department of Child Safety. This finding is suggestive that home-visitors can be confident in utilizing both a family's total composite score on the Healthy Families Parenting Inventory as well as specific subscale domains to not only assess family needs for purposes of case plan development, but also predict a family's risk for abusive or neglectful parenting practices.

Social work practitioners working with at-risk children and families such as those enrolled in early childhood home visitation, must conduct intake assessments that incorporate questions pertaining to the assessment of risk across multiple domains. Considering the nature of risk for maltreatment is cumulative (Burton & Hardaway, 2012; MacKenzie et al., 2011; McGuigan & Pratt, 2001; Rumm et al., 2000), assessment instruments that are not comprehensive in nature have the potential to miss risk and protective factor indicators that are important to understanding a family's interactive risk for future maltreatment. The findings from this study demonstrate the predictive capacity of multidimensional risk and protection components within the Healthy Families Parenting Inventory; illuminating the capacity of the inventory to support home-visitors in identifying factors across multiple developmental-ecological domains. This viewpoint

is consistent with the person-in-environment and bio-psychosocial-spiritual approaches important to social work practice. The strengths-based language used in the Healthy Families Parenting Inventory facilitates rapport building between the home-visitor and family during data-driven treatment planning, allowing for the development of comprehensive treatment plans that not only target risk factors, but assist families in building upon their strengths. Home-visitors can infuse these findings directly into practice to better prioritize at-risk families on their caseloads, and provides the opportunity for the provision of tiered services to families based on their level of risk. Facing limited resources, expanding the use of the Healthy Families Parenting Inventory to predict a family's risk for future maltreatment provides an opportunity to provide services with enhanced precision to at-risk families enrolled in home visitation programming. Utilizing a strengths-based assessment instrument in prevention practice to predict risk therefore not only makes practical sense, but also aligns with social work ethics and values, particularly in the areas of service, competence, and the inherent dignity/worth of the person (National Association of Social Workers, 2017). The findings of this dissertation including the influence of specific items and subscales within the Healthy Families Parenting Inventory to predict future maltreatment provides opportunities to shape practice at the programmatic level by guiding practitioners in developing individualized treatment plans that target reduction among specific risk factors and promote enhancement of protective factors to optimally enhance child safety and improve child and family well-being.

Limitations and Ethical Considerations

Every effort was made to address all relevant concerns regarding the collection and analysis of the data, however there were several limitations that could not be addressed. These limitations are discussed in detail below, and provide insights on how future research can improve and expand on this dissertation.

Sampling

As discussed in Chapter Three, a key component of this dissertation is the utilization of administrative data. Among children captured in Healthy Families Arizona home visitation data, the purpose of this dissertation is to examine the utility of a widely utilized assessment instrument, the Healthy Families Parenting Inventory, to predict a family's risk for future maltreatment. The data collected for this study were originally collected for alternative purposes, including coordination of service provision in home visitation, and confirmation of child abuse and neglect in Arizona's public child welfare system. Consequently, a limitation of this dissertation is its inability to include the broader population of children in the analysis who also might have benefited from home visitation services, but were either not identified in the community as at-risk, or declined voluntary enrolment in the Healthy Families Arizona intervention. The resulting sample is non-normative, as all participants met criteria as at-risk for maltreatment, thus limiting the generalizability of the dissertation findings.

Setting

The second limitation of the study pertains to the impact of the early childhood home visitation intervention on the sample population. The entire sample that was used for analysis in the dissertation were enrolled in home visitation treatment programming

for varying periods of time, and received specialized treatment that targeted specific risk factors for child abuse and neglect within their family system. Because of the family's involvement in the early childhood home visitation intervention, every family that participated in the study received services designed to reduce their family's risk for future abuse and neglect. Subsequently, treatment effects may potentially influence the participating family's risk for future maltreatment. To examine the influence of the effect of treatment between groups, the length of time a family was involved in the Healthy Families Arizona intervention, as well as the number of home-visits received during enrolment, were analyzed between families who received an investigation of maltreatment with the Arizona Department of Child Safety and those that did not. In the bivariate analyses, no significant differences were found between families who received an investigation of maltreatment with the Arizona Department of Child Safety and those that did not in terms of their overall dosage of the Healthy Families Arizona intervention. Nonetheless a family's involvement in the program could have influenced the strength of the Healthy Families Parenting Inventory's predictive validity.

Implementation

A third limitation of the study includes the implementation of the Healthy Families Parenting Inventory by home-visitors among the sample population. It was necessary to conduct this study with an assumption that the implementation of the Healthy Families Parenting Inventory across the state of Arizona was uniform and sound in practice. Further, it was necessary to assume that the home-visitors who were trained in the Healthy Families Parenting Inventory continued to follow all of the policies and procedures recommended in implementation of the inventory. However, there is no

fidelity study attached to this dissertation to ensure that this assumption was not misguided. If staff had "drifted" away from appropriate policy and procedure during administration of the Healthy Families Parenting Inventory, it could have seriously impacted the validity of this data. Given the nature of this data, no fidelity measures could be computed, and thus the impact of any "drift" remains unknown.

Dichotomous Dependent Variable

A fourth limitation of the study is that the dependent variable was examined as dichotomous. This approach is consistent with the majority of the previous literature examining the predictive validity of assessment instruments to predict maltreatment, but some researchers have attempted to treat maltreatment as a continuous variable. Methodologically, treating maltreatment occurrence as a continuous variable by number of reports received may cause problems because of its positive skew, yet when treating maltreatment occurrence dichotomously, the variable loses information on the frequency of the occurrence of maltreatment. While operationalizing maltreatment as a dichotomous outcome is traditionally preferable, its use may underestimate or overestimate the predictive validity of the instrument by treating all maltreatment as the same (e.g., one occurrence of a maltreatment investigation is equivalent to multiple occurrences). Due to the binary nature of maltreatment in this study, the frequency at which maltreatment investigations occur remains unknown.

Reliance on Official Records

The final limitation of the study is reliance on official records. Measurement of both independent variables pertaining to family's scores on the Healthy Families Parenting Inventory and socio-demographic variables, in addition to the dependent

variable of the occurrence of a maltreatment investigation, relied exclusively on official data from Healthy Families Arizona and the Arizona Department of Child Safety. Though the use of records from community and social service agencies seem comprehensive, reliance on official data only captures information known to each individual agency. Specifically as it pertains to socio-demographic data from Healthy Families Arizona, while there was limited missing data, the accuracy of the data and exact data collection procedures were unknown. Furthermore, the use of secondary data limited the type and frequency of socio-demographic variables that could be controlled for as covariates in the logistic regression models. Specifically, in relation to the Arizona Department if Child Safety, official maltreatment data was gathered from the Department of Child Safety database, including only maltreatment information reported to the agency during the study years. Consequently, the occurrence of a maltreatment investigation is unique to state and agency guidelines specific to the geographic location and time-period of the study, limiting generalizability. Furthermore, this information cannot tap into the unknown occurrence of maltreatment. That is, it is likely that the maltreatment investigation rates presented and studied in this dissertation underestimate the "true" occurrence of maltreating behavior exhibited in this population.

Ethical Considerations

The final limitation centers on the ethics of using a risk assessment instrument to assess maltreatment risk among early childhood home visitation populations. Although risk instruments are frequently used to risk-stratify patients in healthcare settings, the application of this approach in early childhood home visitation presents unique ethical challenges. First, predicting risk of maltreatment from data collected for the purposes of

prevention programming raises concerns. Unlike healthcare settings in which instruments are used to predict hospital admissions and health outcomes, calculating maltreatment risk scores for children has the potential to stigmatize already marginalized and oppressed families. Additionally, ethical issues surround the extent to which a prevention agency may have the obligation to intervene once a risk score is computed. For example, if an at-risk family later refuses voluntary services, does the agency have any additional obligation to the child, or should the home visitation program increase its surveillance of the family, or notify the public child welfare system of the family's declination of services? In this case, the risk score would theoretically pre-empt an investigation of maltreatment with the Arizona Department of Child Safety. If a family's risk score changes over the course of services, does the home-visitor have an obligation to inform the family of this increased level of risk?

Although these complex ethical issues must be considered in the study of prediction of risk for future maltreatment, reliance on instruments that can accurately predict a family's risk for maltreatment can also serve to enhance decision-making equity. The utilization of risk prediction instruments in public child welfare has the potential to imbue interactions with a family with potential bias and discrimination in terms of life altering decisions for families. However, the use of risk prediction in home visitation utilizes a family's risk score as a means of decision-making pertaining to the provision of additional support to a family, rather than relying on risk scores for purposes of punitive decision-making. The utilization of risk prediction in early childhood home visitation practice has the potential to assist home-visitors in utilizing strategies that are reliable predictors of maltreatment, thus establishing a common threshold for decision-

making that has the potential to reduce clinical preconceptions in maltreatment assessment and treatment.

Future Research

In addition to social work practice and policy implications, future research stemming from this work includes the exploration of risk assessment in prevention and community based programs, enhanced development of prevention programming, as well as examination of the effect of risk at all developmental-ecological domains across family systems. Primarily, the dissertation findings highlight the opportunity to incorporate risk assessment instruments to predict a family's risk for future involvement with public child welfare systems among families who are involved in early childhood prevention programming. Given that the Healthy Families Parenting Inventory was not developed as a risk assessment instrument, the potential for future research to examine whether there are opportunities to strengthen the predictive capacity of the instrument through adaptation and re-organization of existing inventory items is significant.

First, the sample used for the dissertation focused exclusively on families identified as at-risk for maltreatment who were voluntarily engaged in an early childhood home visitation program in the state of Arizona. As a result, these findings may be imbued with differences among participating families that are not uniform across all families at-risk for child maltreatment. That said, future studies that utilize diverse populations from varying demographic regions have the potential to assist in further illuminating this subject. Incorporation of more diverse sample populations will enhance opportunities for further validation of the Healthy Families Parenting Inventory.

Next, given that this dissertation examines a family's risk for maltreatment at a

single point in time, future longitudinal studies that examine how a family's score on the Healthy Families Parenting Inventory changes over time through developmental-ecological contextual changes in the household would be particularly meaningful to enhanced validation of the instrument. Such longitudinal work has the opportunity to capitalize on the predictive validity of a family's score on the Healthy Families Parenting Inventory at different points in time by tracking a family's risk for maltreatment occurrence longitudinally. This has the potential to provide information not only pertaining to enhanced predictive validity of the instrument, but also would allow for the opportunity to examine the interaction of strength and protective factors over time as it pertains to their relationship to maltreatment.

Finally, the findings from this dissertation highlight an opportunity to adapt components of the Healthy Families Parenting Inventory to strengthen the predictive capacity of the instrument. Specifically, this dissertation provided an exploratory analysis of the predictive capacity of several components of the Healthy Families Parenting Inventory. Further research exploring the impact and relationship of individual items and the occurrence of maltreatment would be valuable in further clarifying the findings from this study, and strengthening the instrument. For instance, three of the nine Healthy Families Parenting Inventory subscales and five of the seven red flag indicator items were not predictive of a future investigation of maltreatment. Future research should further explore these relationships to identify specifically what processes are driving these relationships, and how modifications to the instrument could enhance the predictive capacity of individual items and subscales of the inventory. In sum, this dissertation provides support for the view that several components of the Healthy

Families Parenting Inventory are predictive of future maltreatment and future research aimed at illuminating these relationships could have both practical and academic implications by improving the validity of the instrument and enhancing what researchers know about risk and protective factors among home visitation populations.

Conclusion

The subject of the prediction of risk in early childhood home visitation programs has strong implications for social work policy and practice, as well as the potential to inform future social work research. The findings from this dissertation concerning the predictive validity of the strengths-based Healthy Families Parenting Inventory demonstrate that multiple components of the instrument have the utility to predict a family's risk for future maltreatment 12-months after completion of the instrument at time of program enrollment in Healthy Families Arizona. Through this enhanced understanding of a family's risk for maltreatment in the absence of public child welfare involvement, social work practitioners have the opportunity to increase their capacity to identify a family's risk for maltreatment early, before the public child welfare system becomes involved. This early identification has the capacity to divert families away from the public child welfare system through prioritization of services to families determined to be most at risk, and development of comprehensive treatment plans that target the most salient risk factors and build upon protective factors through a developmental-ecological lens. Working together, it is possible to advance the field of child welfare to better address the needs of families involved in early childhood prevention efforts, and at the same time improve outcomes for young children and their families, ultimately strengthening the next generation.

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Appendix A

COMPLETE STATISTICAL MODELS

Fully specified model for the nine HFPI subscale domains

Variable	*β*	*Wald* χ^2	*df*	*p*	*AOR*	*95% CI*	
Income [a]	-.245	2.75	1	.097	.783	.587	1.05
Maternal Ethnicity [b]	-.180	1.15	1	.284	.835	.601	1.61
Marital Status [c]	-.704	13.35	1	.000***	.495	.339	.722
Birthweight	-.093	1.68	1	.194	.912	.793	1.05
Gestational Age	-.034	.517	1	.472	.966	.880	1.06
Social Support	.011	.160	1	.690	1.011	.957	1.07
Problem Solving	-.062	4.74	1	.029*	.940	.888	.994
Depression	.007	.107	1	.743	1.01	.963	1.05
Personal Care	-.032	1.01	1	.315	.969	.911	1.03
Mobilizing Resources	.069	10.19	1	.001**	1.071	1.03	1.12
Role Satisfaction	-.066	7.06	1	.008**	.936	.892	1.05
Parent/Child Interaction	.007	.113	1	.737	1.01	.965	1.05
Home Environment	.032	2.80	1	.094	1.03	.995	1.07
Parenting Efficacy	-.089	9.92	1	.002**	.915	.866	.967
Social Support X Problem Solving	.000	.000	1	.999	1.00	.989	1.01
Social Support X Personal Care	.001	.025	1	.874	1.00	.988	1.01
Social Support X Mobilizing Resources	-.001	.048	1	.826	.999	.988	1.01
Social Support X Parent Child Interaction	-.004	.566	1	.452	.996	.986	1.01
Social Support X Home Environment	-.004	.873	1	.305	.996	.987	1.00
Social Support X Parenting Efficacy	-.006	.575	1	.448	.994	.980	1.01
Problem Solving X Personal Care	-.007	.907	1	.341	.993	.980	1.01
Problem Solving X Parent child Interaction	.008	2.14	1	.144	1.01	.997	1.02
Problem Solving X Mobilizing Resources	.006	1.34	1	.247	1.01	.996	1.02
Problem Solving X Home Environment	.003	.325	1	.569	1.00	.994	1.01
Problem Solving X Parenting Efficacy	-.002	.054	1	.816	.998	.984	1.01
Depression X Social Support	-.010	4.56	1	.033*	.990	.981	.999
Depression X Problem Solving	.003	.456	1	.495	1.00	.994	1.01
Depression X Personal Care	.010	4.64	1	.031*	1.01	1.00	1.02
Depression X Mobilizing Resources	-.006	1.55	1	.214	.994	.986	1.00
Depression X Parent Child Interaction	-.001	.046	1	.830	.999	.990	1.01
Depression X Home Environment	.001	.075	1	.785	1.00	.994	1.01
Depression X Parenting Efficacy	.003	.247	1	.619	1.00	.992	1.01
Personal Care X Mobilizing Resources	-.007	1.19	1	.275	.993	.982	1.00
Personal Care X Parent Child Interaction	-.011	2.97	1	.085	.989	.997	1.00
Personal Care X Home Environment	-.001	.027	1	.870	1.00	.992	1.01
Personal Care X Parenting Efficacy	.007	.720	1	.396	1.01	.991	1.02
Mobilizing Resources X Parent Child Interaction	.002	.196	1	.658	1.00	.992	1.01
Mobilizing Resources X Home Environment	-.008	4.31	1	.038*	.992	.985	1.00
Mobilizing Resources X Role Satisfaction	.011	4.36	1	.037*	1.01	1.00	1.02
Mobilizing Resources X Parenting Efficacy	.013	5.18	1	.023*	1.01	1.00	1.02
Role Satisfaction X Social Support	.009	1.99	1	.158	1.01	.997	1.02
Role Satisfaction X Problem Solving	-.009	2.29	1	.130	.991	.980	1.00
Role Satisfaction X Personal Care	-.001	.029	1	.866	.999	.986	1.01
Role Satisfaction X Parent Child Interaction	.005	1.04	1	.308	1.00	.996	1.01
Role Satisfaction X Home Environment	.007	3.58	1	.059	1.01	1.00	1.01
Role Satisfaction X Parenting Efficacy	-.010	2.29	1	.130	.990	.977	1.01
Role Satisfaction X Depression	-.001	.047	1	.828	.999	.991	1.01
Parent Child Interaction X Home Environment	.001	.147	1	.701	1.00	.995	1.01
Parent Child Interaction X Parenting Efficacy	-.001	.047	1	.828	.999	.988	1.01
Home Environment X Parenting Efficacy	.004	1.47	1	.226	1.004	.997	1.01

Moderation Model for Independent Variable Role Satisfaction, and Moderation Variable of Mobilizing Resources and Maltreatment Investigation

	Model 1				Model 2				Model 3			
Variable	β	*p*	OR	95% CI	β	*p*	OR	95% CI	β	*p*	OR	95% CI
Moderator: Mobilizing Resources												
Income	-.265	.061	.767	.582, .1.012	-.262	.063	.769	.583, 1.015	-.232	.174	.793	.567, 1.108
Maternal Ethnicity	-.122	.449	.885	.645, 1.214	-.133	.412	.876	.638, 1.202	-.184	.345	.832	.569, 1.218
Marital Status	-.643	.000***	.526	.367, .753	-.645	.000**	.524	.366, .751	-.535	.009**	.586	.391, .876
Birthweight	-.074	.270	.928	.814, 1.059	-.076	.258	.927	.812, 1.057	-.068	.395	.934	.798, 1.093
Gestational Age	-.062	.167	.945	.866, 1.033	-.062	.166	.939	.860, 1.026	-.043	.435	.958	.860, 1.067
Role Satisfaction	-.055	.001**	.946	.915, .978	-.069	.000***	.933	.901, .967	-.068	.000***	.934	.901, .968
Mobilizing Resources	.029	.050*	1.029	1.000, 1.060	.020	.199	1.020	.990, 1.052	.021	.504	1.021	.960, 1.087
Role Satisfaction X Mobilizing Resources					.006	.039*	1.006	1.000, 1.012	.006	.054	1.006	1.000, 1.012
Income X Mobilizing Resources									-.007	.798	.993	.939, 1.050
Ethnicity X Mobilizing Resources									.012	.709	1.012	.950, 1.079
Marital Status X Mobilizing Resources									-.039	.272	.962	.897, 1.031
Birthweight X Mobilizing Resources									-.001	.922	.999	.973, 1.025
Gestational Age X Mobilizing Resources									-.006	.503	.994	.977, 1.012

Moderation Model for Independent Variable Role Satisfaction, and Moderation Variable of Home Environment and Maltreatment Investigation

	Model 1				Model 2				Model 3			
Variable	β	*p*	OR	95% CI	β	*p*	OR	95% CI	β	*p*	OR	95% CI
Moderator: Home Environment												
Income	-.275	.051	.760	.576, .1.001	-.277	.050*	.758	.575, 1.000	-.221	.175	.801	.582, 1.104
Maternal Ethnicity	-.116	.473	.891	.650, 1.221	-.120	.457	.887	.647, 1.217	-.156	.399	.856	.596, 1.229
Marital Status	-.653	.000***	.520	.363, .745	-.668	.000**	.513	.358, .736	-.621	.004**	.538	.354, .817
Birthweight	-.076	.259	.927	.813, 1.057	-.072	.283	.930	.815, 1.061	-.048	.539	.953	.819, 1.110
Gestational Age	-.062	.171	.940	.861, 1.027	-.063	.164	.939	.859, 1.026	-.062	.256	.940	.846, 1.046
Role Satisfaction	-.047	.004**	.954	.924, .985	-.065	.000***	.937	.905, .971	-.064	.000***	.938	.906, .972
Home Environment	.005	.640	1.005	.984, 1.026	-.004	.711	.996	.974, 1.018	-.004	.681	.996	.951, 1.043
Role Satisfaction X Home Environment					.006	.014*	1.006	1.001, 1.010	.006	.017*	1.006	1.001, 1.010
Income X Home Environment									-.015	.478	.985	.945, 1.027
Ethnicity X Home Environment									.010	.694	1.010	.963, 1.059
Marital Status X Home Environment									-.010	.708	.990	.937, 1.045
Birthweight X Home Environment									-.007	.515	.993	.974, 1.013
Gestational Age X Home Environment									.000	.996	1.000	.986, 1.014

Simple Slope Analyses for the Home Environment Subscale Domain

Home Environment at 1 Standard Deviation Below the Mean

$$logit(maltreatment) = \beta_0 + \beta_1(Moderator) + \beta_2\ (Independent\ Variable) + \beta_3(Moderator * Independent\ Variable)$$

$$logit(maltreatment) = \beta_0 + \beta_1(Moderator) + (\beta_2 + \beta_3 Moderator) Independent\ Variable$$

$$logit(maltreatment) = (-1.4999) + (-.004 Home\ Environment) + (-.065 + .006 HomeEnvironment) Role\ Satisfaction$$

Home Environment at 1 Standard Deviation below the mean -6.55 (mean centered)

$$logit(maltreatment) = (-1.499 - .004(-.655)) + (-.065 + .006(-6.55))(Role\ Satisfaction)$$

$$logit(maltreatment) = -1.496 + (-.1043)(Role\ Satisfaction)$$

$$Simple\ Slope: logit(maltreatment) = -.1043$$

$$Odds\ Ratio = e^{-.1043}$$

$$Odds\ Ratio = .901$$

Home Environment at the Mean

$$logit(maltreatment) = \beta_0 + \beta_1(Moderator) + \beta_2\ (Independent\ Variable) + \beta_3(Moderator * Independent\ Variable)$$

$$logit(maltreatment) = \beta_0 + \beta_1(Moderator) + (\beta_2 + \beta_3 Moderator) Independent\ Variable$$

$$logit(maltreatment) = (-1.4999) + (-.004 Home\ Environment) + (-.065 + .006 HomeEnvironment) Role\ Satisfaction$$

Home Environment at the mean 0 (mean centered)

$$logit(maltreatment) = (-1.499 - .004(0)) + (-.065 + .006(0))(Role\ Satisfaction)$$

$$logit(maltreatment) = (-1.499) + (-.065)(Role\ Satisfaction)$$

$$Simple\ Slope: logit(maltreatment) = -.065$$

$$Odds\ Ratio = e^{-.065}$$

$$Odds\ Ratio = .937$$

Home Environment at 1 Standard Deviation Above the Mean

$logit(maltreatment) = \beta_0 + \beta_1(Moderator) + \beta_2\ (Independent\ Variable) + \beta_3(Moderator * Independent\ Variable)$

$logit(maltreatment) = \beta_0 + \beta_1(Moderator) + (\beta_2 + \beta_3 Moderator) Independent\ Variable$

$logit(maltreatment) = (-1.4999) + (-.004 Home\ Environment) + (-.065 + .006 HomeEnvironment) Role\ Satisfaction$

Home Environment at 1 Standard Deviation Above the Mean 6.55 (mean centered)

$logit(maltreatment) = (-1.499 - .004(6.55)) + (-.065 + .006(6.55))(Role\ Satisfaction)$

$logit(maltreatment) = (-1.525) + (-0.0257)(Role\ Satisfaction)$

$Simple\ Slope: logit(maltreatment) = -.0257$

$Odds\ Ratio = e^{-.0257}$

$Odds\ Ratio = .975$

Simple Slope Analyses for the Mobilizing Resources Subscale Domain

Mobilizing Resources at 1 Standard Deviation Below the Mean

$logit(maltreatment) = \beta_0 + \beta_1(Moderator) + \beta_2\ (Independent\ Variable) + \beta_3(Moderator * Independent\ Variable)$

$logit(maltreatment) = \beta_0 + \beta_1(Moderator) + (\beta_2 + \beta_3 Moderator) Independent\ Variable$

$logit(maltreatment) = (-1.572) + (-.020 MobilizingResources) + (-.069 + .006 MobilizingResources))(Role\ Satisfaction$

Home Environment at 1 Standard Deviation below the mean -4.99 (mean centered)

$logit(maltreatment) = (-1.572 - .020(-4.99)) + (-.069 + .006(-4.99))(Role\ Satisfaction)$

$logit(maltreatment) = -1.4722 + (-0.0989))(Role\ Satisfaction)$

$Simple\ Slope\ logit(maltreatment) = -.099$

$Odds\ Ratio = e^{-.099}$

$Odds\ Ratio = .906$

Mobilizing Resources at the Mean

$logit(maltreatment) = \beta_0 + \beta_1(Moderator) + \beta_2\ (Independent\ Variable) + \beta_3(Moderator * Independent\ Variable)$

$logit(maltreatment) = \beta_0 + \beta_1(Moderator) + (\beta_2 + \beta_3 Moderator) Independent\ Variable$

$logit(maltreatment) = (-1.572) + (-.020 MobilizingResources) + (-.069 + .006 MobilizingResources) Role\ Satisfaction$

Home Environment at the mean 0 (mean centered)

$logit(maltreatment) = (-1.572 - .020(0)) + (-.069 + .006(0))(Role\ Satisfaction)$

$logit(maltreatment) = (-1.572) + (-.069)(Role\ Satisfaction)$

$logit(maltreatment) = -.069$

$Odds\ Ratio = e^{-.069}$

$Odds\ Ratio = .933$

Mobilizing Resources 1 Standard Deviation Above the Mean

$logit(maltreatment) = \beta_0 + \beta_1(Moderator) + \beta_2\ (Independent\ Variable) + \beta_3(Moderator * Independent\ Variable)$

$logit(maltreatment) = \beta_0 + \beta_1(Moderator) + (\beta_2 + \beta_3 Moderator) Independent\ Variable$

$logit(maltreatment) = (-1.572) + (-.020 MobilizingResources) + (-.069 + .006 MobilizingResources) Role\ Satisfaction$

Home Environment at 1 Standard Deviation above the mean 4.99 (Mean Centered)

$logit(maltreatment) = (-1.572 - .020(4.99)) + (-.069 + .006(4.99))(Role\ Satisfaction)$

$logit(maltreatment) = (-1.6718) + (-.3906)(Role\ Satisfaction)$

$Simple\ Slope: logit(maltreatment) = -.03906$

$Odds\ Ratio = e^{-.03906}$

$Odds\ Ratio = .962$